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THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

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(COMPUTING)

**FOUR-STAR  
SOFTWARE ISSUE**

**Polar Plotter  
DiskMend  
Bio-signs  
Four-Star Software Picks**





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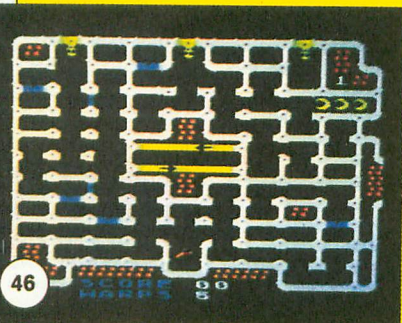
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## FEATURES



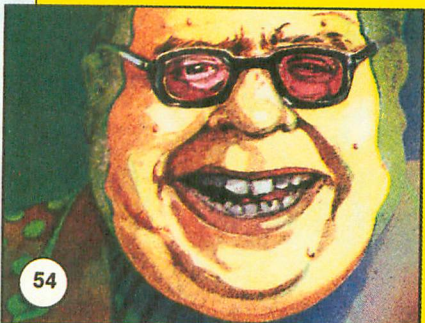
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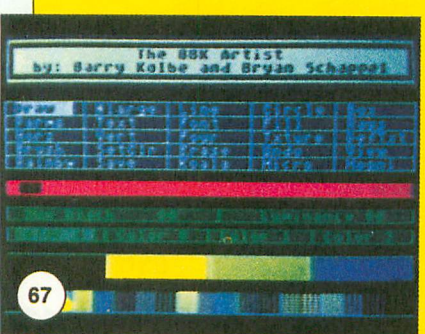
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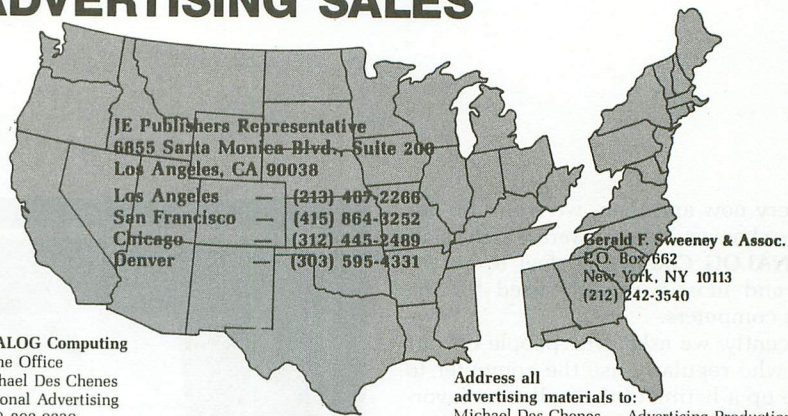
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Due, however, to many requests from Atari club libraries and bulletin board systems, our new policy allows club libraries or individually-run BBSs to make certain programs from **ANALOG Computing** available during the month printed on that issue's cover. For example, software from the July issue can be made available July 1.

This does not apply to programs which specifically state that they are not public domain and, thus, are not for public distribution.

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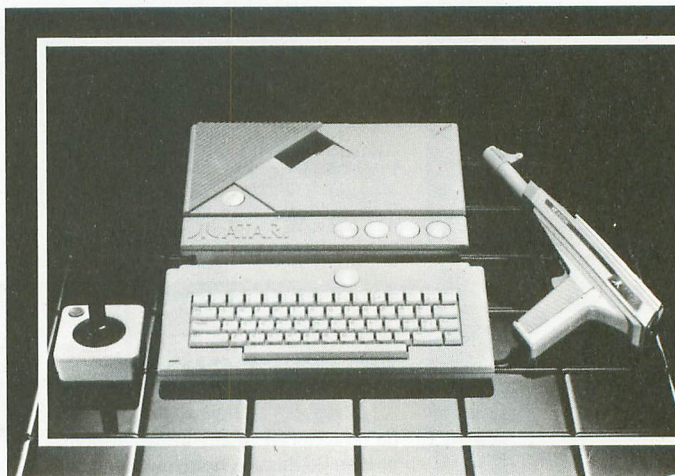
# Editorial

Every now and then, we try to let our readers know which software we, the staff of **ANALOG Computing**, feel to be the best and most frequently used for the Atari computers.

Recently, we asked the people on our staff who regularly use the computer to make up a listing of their all-time favorite products. We asked them to list as many titles as they wanted in the following categories: games, languages, utilities, telecommunications, graphics, word processors, applications, and a special category, for items such as hardware and peripherals. You'll notice that much of the same software appears on our lists every time we do this type of feature. You'll see a couple of new games, perhaps—but, after years of using a particular word processing or telecommunications program, most of us are hard pressed to change over to something new. . . Unless, of course, it's so much better that we're willing to sit down and learn how to use it.

After you've taken a look at our favorites, why don't you sit down and make up a list of your own? When you've completed the selection, drop your list in the mail to us—and let us know if you agreed with the choices that our staff made. Maybe we can tally the results and share them with you in a future issue.

Under new business. . . this year's Summer CES had Atari Corp. concentrating on the new XE game system. Actually, it's a 65XE in video-game clothing. The system has a detachable keyboard, and "Missile



Atari's XE video game system.

Command" is built into the system itself (if you take a gander at my favorite games in our list of Four-Star Software Picks, you can see why I'm excited about this inclusion).

The system will also include the games **Bug Hunt**, for use with the light gun, and the 128K **Flight Simulator II** cartridge. All of the Atari classics, as well as some new releases, will be coming out in the new bank-switch cartridges.

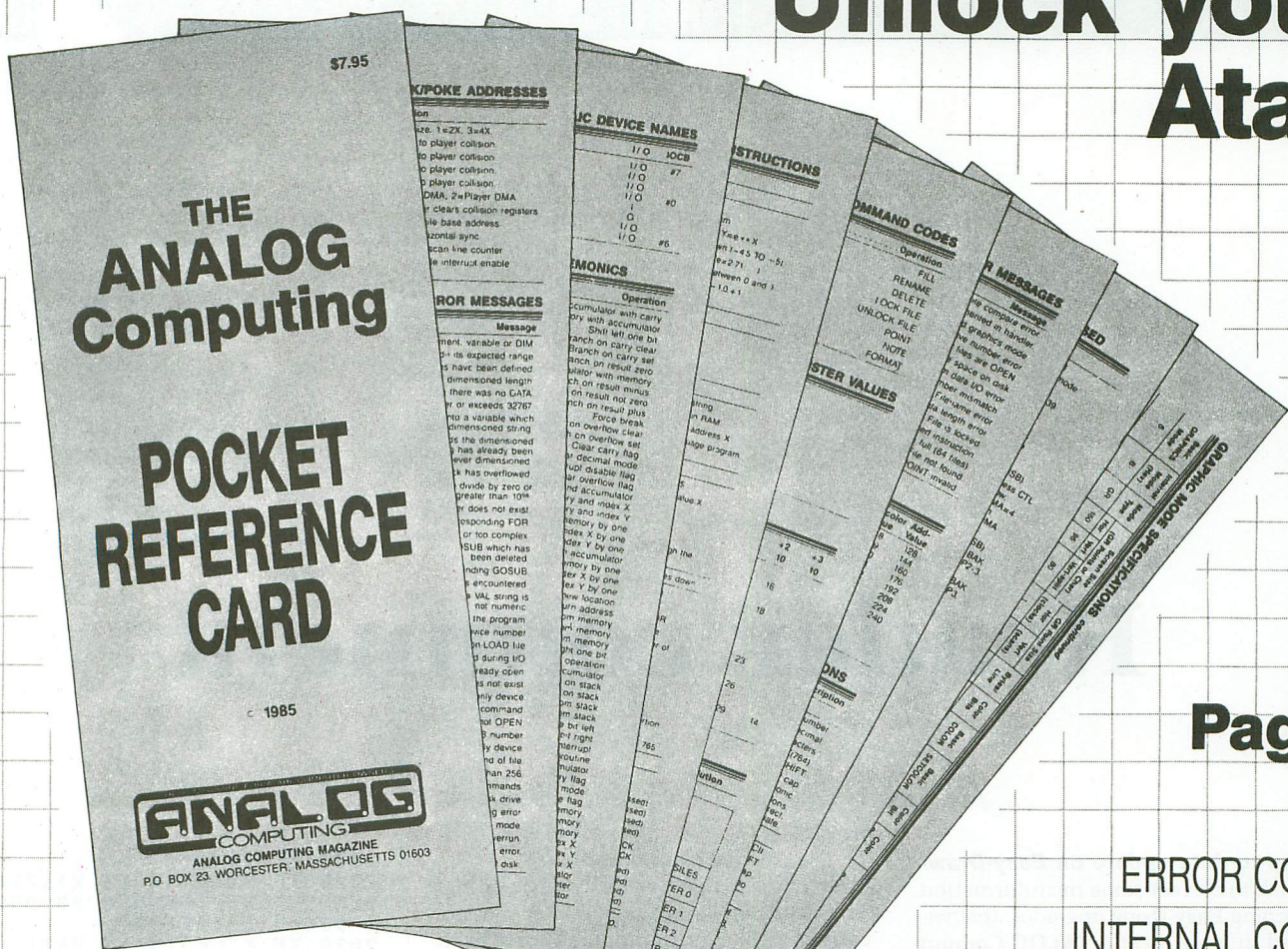
Don't think that they forgot about us 8-bit owners. Atari surprised us with the **XF551** double-density disk drive. It's a super sleek 5¼-inch drive, which will be priced at around the same level as the current **1050** drive. Expect to see this, along with the 80-column **XEP80** display box

and the 1200-baud **SX212** modem, sometime in late July or early August.

If you're one of the many people waiting for the Mega STs, then you'll be happy to hear that, according to Sam Tramiel, "they're on their way from Taiwan now." So perhaps we'll be able to get our hands on them within the next few months. Hmm, *Mega-Log*...

Michael J. DesChenes  
Publisher  
**ANALOG Computing**

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# Reader comment

## An up-to-date update on Easy-Draw.

I wish to correct some misinformation, concerning **Easy-Draw** upgrades, that was printed in issue 54 of **ANALOG Computing**. It had been written some time ago, and the information was no longer accurate.

The most current version of **Easy-Draw** is 2.0. Registered owners have all been notified via our newsletter that, to upgrade to the current version, it is \$26.00 plus \$3 shipping. All other **Easy-Draw** owners may upgrade by sending in their registration cards, both of their original disks and \$29.00. We will upgrade their disks and return them with a new copy of the documentation.

A note to all **Easy-Draw** owners who have a version lower than 2.0: there are now companion products for use with **Easy-Draw**—such as fonts, personal and technical clip-art, and new printer drivers—but you need version 2.0 to be able to use them. Version 2.0 also has a great many additional features. Should you have any questions, please call us at: (206) 838-4677.

Thanks for allowing me to correct this information so quickly.

Sincerely,

Liz Mitchell

V.P. Operations, Migraph Inc.

720 South 333rd Street

Suite 201

Federal Way, WA 98003

## Checks and copies.

Your April issue was really outstanding. The **HardCopy** and **CheckWriter** modifications to Clayton Walnum's **MicroCheck** program were very beneficial enhancements, which I hope to utilize to the fullest as soon as I receive computer checks from my bank.

The **Multicopy** utility by Charles Johnson is a program which I am sure will become a standard reference among Atari users, once it becomes well known that such a useful utility exists.

These types of programs certainly make **ANALOG Computing** the finest Atari publication in the business. Keep up the good work—each issue is better than the previous ones.

Charles A. Cole

Sierra Vista, AZ

One item that you may have already noticed not included with issue 53's **CheckWriter**, that you normally see on a check, is a memo. This I purposely left out in the program, but didn't mention it in the brief article.

In my version of the program, I inserted a GOSUB 2000 between Lines 230 and 240. The purpose of this added routine was to check the name field of the record for companies (banks, charge accounts, etc.), and set the memo to the account number. I did this since most companies ask for the account number on the check. Here is an example of the possible code:

```
2000 MEMO$=""
2010 IF FILE$(X+13,X+17)="
SEARS" THEN MEMO$="99 9999
9 99999 9":RETURN
2020 IF FILE$(X+13,X+21)="
J C PENNY" THEN MEMO$="999
999 999 9":RETURN
2030 REM ADD OTHER NUMBERS
3000 RETURN
```

Be sure to add a MEMO\$(30) to the DIM statement at the beginning of the program.

Also, change Line 475 to the following:

```
475 ? #3:? #3:? #3;"
";PAYEE$:? #3:? #3:? #3;"
";MEMO$
```

On my newest checks, I found I had to add one more space in Lines 450, 455 and 475, to center properly. Depending on your batch, you may have to change the same lines. Here is my latest change:

```
450 ? #3:? #3:? #3,,"
";MONTH$;" ";FILE$(X+8,X+9
);", 19";FILE$(X+11,X+12)
455 ? #3:? #3:? #3:? #3;"
";MSG$;
475 ? #3:? #3:? #3;"
";PAYEE$:? #3:? #3:? #3
```

I wrote this program in August of last year, and have continuously added to the personal routine, but have been using the main program without problem since.

Thank you,

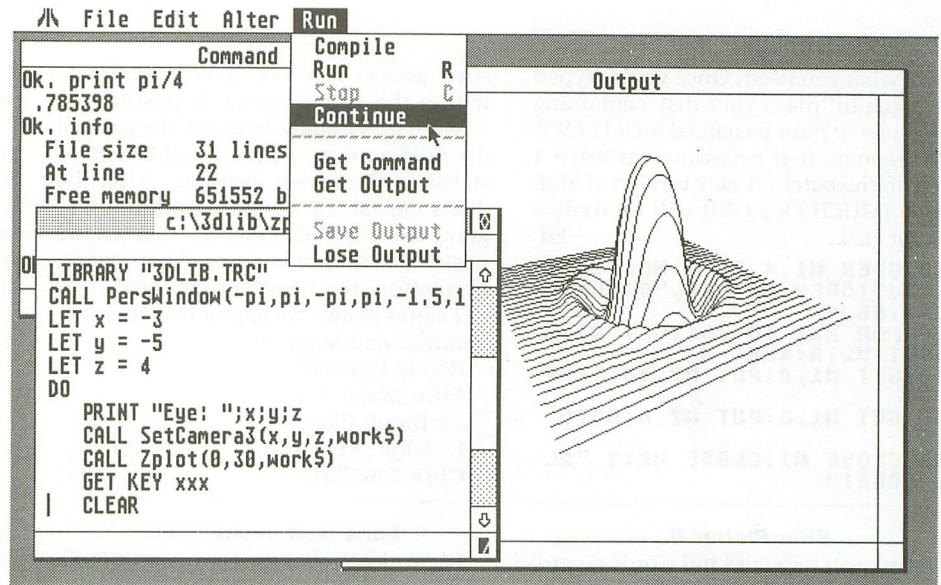
Jeff Killeen

Author of **CheckWriter**

If you've been having trouble getting issue 53's **Multicopy** to run properly on your XE or XL computer, the following patch



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## Reader comment *continued*

is just what you need. Once you've typed the patch in, place your disk containing **Multicopy** (it must be named **MULTCOPY.OBJ**; rename it if necessary) in drive 1 and run the patch. A new version of **Multicopy** (**MULTCOP2.OBJ**) will be written to your disk. —Ed.

```
10 OPEN #1,4,0,"D:MULTCOPY
.OBJ":OPEN #2,8,0,"D:MULTC
OP2.OBJ"
20 FOR X=1 TO 361:GET #1,A
:PUT #2,A:NEXT X
30 GET #1,A:PUT #2,18:TRAP
50
40 GET #1,A:PUT #2,A:GOTO
40
56 CLOSE #1:CLOSE #2:? "AL
L DONE!"
```

### Elfin Plotter II.

Thank you for your kind words regarding our product. **Super 3D Plotter II**, in issue 54.

We wish to point out that the reviewer may have missed the SCALEing function in the on-screen graphic editor. When used with the POSITION function, joy-

stick access to every X/Y/Z-coordinate within the  $\pm 32767$  range is possible.

More importantly however, the price of the product is now \$29.95, not \$39.95 as stated in the review heading. Also, the disk supplied now contains a support program for the 1020 Plotter, that allows poster-sized reproductions of your work, by plotting the image in sections!

Thanks again; we appreciate your recognition and support.

Randy Constan,  
Elfin Magic Co.  
23 Brook Place  
E. Islip, NY 11730  
CIS# 73637,317

### Lone wolf seeks pack.

I have just purchased an Atari 800XL and 1050 drive with DOS 2.5, which I purchased through the mail.

My problem: I'm unable to find Atari public domain programs—and very few other titles—as all the department stores (the nearest is twenty miles away) only

carry Commodore software—and say they can't get software for Atari.

I love my Atari system and wouldn't trade it for any other computer system in the world.

I am interested in joining any users' group that will accept "mail-in members." The only users' group in my area is, again, for Commodore computer owners.

I would greatly appreciate any help any of your other readers could give me.

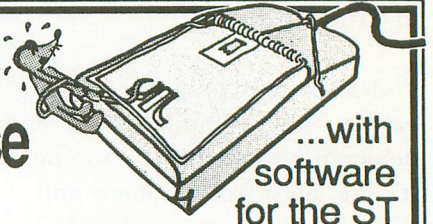
Kenny Lee  
412 East Keigan St.  
Dawson Springs, KY 42408

### Loud and clear.

My letter may not be to your liking, but nowadays things have to be said. First, I do want you to know: I love my XL and will not part with it.

In the last two years, several advances in the micro-revolution have occurred. Fierce competition exists everywhere. Just four months ago, Tandy released the Color Computer 3. For \$219, you get 640x200

# Release the POWER of your mouse

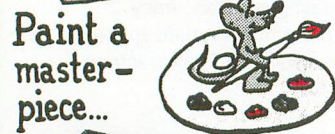


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Everyone is asking for program development for Atari 8-bits. The problem I see is: the Atari 8-bit community seems made up of pirates to the first degree. I sincerely believe that has been the number 1 reason for the XL/XE decline in software development. I myself have access to 400 double-sided disks of commercial software. Why buy it, if you can clone it? It is a major problem, and I believe your magazine should make a stand on this issue.

My background in computers goes back to 1972. I love the things, but there are problems which have to be discussed.

I sincerely believe the Atari 8-bit is still—today, in stock, right out of the box—the most powerful, full-featured 8-bit micro made. It may be years until another machine can whip it, in stock form. My CoCoIII can, but only for far more money. I base judgments on power, ease of use and features on my XL when comparing computers.

I don't know how to stop the things which detract from the XL/XEs. You may publish this if you see fit. I would enjoy corresponding with other 8-bit owners, not to judge, etc., but may to seek answers. . .not more hassle.

Sincerely,  
Jay Thomas  
113 15th St., W.  
Great Falls, MT 59401

P.S. — **ANALOG Computing** is beyond comparison. You people should be very proud of your excellent publication!

*And here we thought we'd beaten our readers into the ground about not pirating. Our stand is simple: Piracy is Theft; DON'T DO IT!* —Ed.

Piracy is a popular subject of discussion right now. A series of annoying accidents prompts me to write on the subject.

I know a pirate. He passes out software to anyone he happens to trust. Back when Atari was in trouble and software houses were abandoning Atari users, this man got angry. Here was all the protected software and no customer support if a disk happened to crash. He decided to learn how to unprotect all those programs. This man is now a programming genius. He can "break" any protection scheme there is.

If there's anything I want, I can get it from him. He has contacts all over the country. He also writes his own programs. You may even have some, if you're into telecommunications.

You might find his justification for the piracy interesting. He makes illegal copies because of the copy protection. He feels that, if the software developers are going to sell you something, then you ought to be protected from losing that program if the company goes out of business.

I have a lot of programs I got from him. Most are never used. If I do find a program I like and use, then I go out and buy a copy (I usually copy a "broke" version onto the original disk).

Unfortunately, I didn't get around to copying an unprotected copy of **The Print Shop** onto the original, purchased disk. Which brings me to the reason I decided to write this letter. As I was using **The Print Shop** the other day, my copy crashed. That left me only the protected original. At first all went well, but when I used it a second time, side two crashed. Here I sit with no working copy. Now, I paid good money for that program! Anyone else would have had to sent their disk to Broderbund to get a new program. I'm not inconvenienced that badly; I can have a new copy in four days when I next visit my pirate friend.

The point I'm making is that copy protection is a rotten trick for software houses to play on their customers. I make an effort to be honest and buy the programs I use, and yet I'm constantly inconvenienced by copy protection schemes. Since copy protection doesn't stop pirates, why don't software houses just stop it? Low prices and good documentation are better deterrents to piracy.

I have a suggestion. Many pirates copy software just to prove they can do it, leaving unprotected stuff alone. Let's all do that: never make an illegal copy of anything that isn't protected. That will encourage the software houses to leave out the protection schemes.

Piracy will never be completely eliminated, but if unprotected software isn't copied and the protected stuff is, then there soon will be no protected software. And wouldn't that be great?

Sincerely,  
Richard Bush  
Overton, NV

Funny. . .everyone who writes to us about piracy says they also have a purchased copy of anything they've gotten illegally. Well, it's still wrong—and ille-

gal—to own pirated software. When your favorite pair of shoes wears out, do you curse the manufacturer? Do you refuse to venture outside in search of new footwear?

Now, sometimes, a disk fails because of a defect, when it's still pretty new. Most distributors or manufacturers will rectify the problem if you send the disk back to them. We can't blame them for wanting to protect their property; that's only rational. It's not rational to think criminals won't steal unprotected software. This is not Utopia. —Ed.

### Greetings from Paris.

When someone contacts me in order to get information about a good magazine for the best computer in the world, I always answer the same thing, as if I were a tape recorder: "Buy an **ANALOG Computing** issue and see for yourself!" I just give the advice, and you do the work. So go on: do your job as well as today!

But now onto my real reason for writing. . .I'm French and am having great trouble in finding American penpals, because my modem doesn't work anymore. Therefore, I decided to write. I know I can rely on your help, so if you could release this letter, I'd appreciate it.

As I already wrote, I'm French, 18 years old. I have an 800 XL, two 1050 disk drives, and many other bits and pieces. I'm looking for American penpals, with whom I'd like to swap ideas, software, books, and so on.

Thanks for everything.  
Monsieur Bechbache Salah  
169 Blvd. Servrier 75019  
Paris, France

### Enhanced enhancements.

The following lines should be added to Listing 1 of issue 55's **Dragonlord Dungeon Editor**:

```
3040 REM
3348 POKE 752,N1:POKE 88,N
0:POKE 89,MAP:POSITION N18
,N9:? RMS(RM(ROOM)*N17-N16
, RM(ROOM)*N17)
```

Author Clayton Walnum apologizes profusely. . .he hates when this happens.

—Ed.



# M/L Editor

For use in machine language entry

by Clayton Walnum

M/L Editor provides an easy method to enter our machine language listings. It won't allow you to skip lines or enter bad data. For convenience, you may enter listings in multiple sittings. When you're through typing a listing with M/L Editor, you'll have a complete, runnable object file on your disk.

There is one hitch: it's for disk users only. My apologies to those with cassette systems. Listing 1 is M/L Editor's BASIC listing. Type it in and, when it's free of typos, save a copy to disk, then run it.

On a first run, you'll be asked if you're starting a new listing or continuing from a previously saved point. Press S to start, or C to continue.

You'll then be asked for a filename. If you're starting a new listing, type in the filename you want to save the program under, then press RETURN. If there's already a file by that name on the disk, you'll be asked if you wish to delete it. Press Y to delete the file, or N to enter a new filename.

If you're continuing a file, type in the name you gave the file when you started it. If the program can't find the file, you'll get an error message and be prompted for another filename. Otherwise, M/L Editor will calculate where you left off, then go on to the data entry screen.

Each machine language program in ANA-LOG Computing is represented by a list of BASIC data statements. Every line contains 16 bytes, plus a checksum. Only the numbers following the word DATA need be considered.

M/L Editor will display, at the top of the screen, the number of the line you're currently working on. As you go through the line, you'll be prompted for each entry. Simply type the number and press RETURN. If you press RETURN without a number, the default is the last value entered.

This feature provides a quick way to type in lines with repetitions of the same number. As an added convenience, the editor will not respond to the letter keys (except Q, for "quit"). You must either enter a number or press RETURN.

When you finish a line, M/L Editor will compare the entries' checksum with the magazine's checksum. If they match, the screen will clear, and you may go on to the next line.

If the checksums don't match, you'll hear a buzzing sound. The screen will turn red, and the cursor will be placed back at the first byte of data. Compare the magazine listing byte by byte with your entries. If a number's correct, press RETURN.


If you find an error, make the correction. When all data's valid, the screen will return to grey, and you'll be allowed to begin the next line.

Make sure you leave your disk in the drive while typing. The data is saved continuously.

You may stop at any time (except when you have a red screen) by entering the letter Q for byte #1. The file will be closed, and the program will return you to BASIC. When you've completed a file, exit M/L Editor in the same way.

When you've finished typing a program, the file you've created will be ready to run. In most cases, it should be loaded from DOS via the L option. Some programs may have special loading instructions; be sure to check the program's article.

If you want the program to run automatically when you boot the disk, simply name the file AUTORUN.SYS (make sure you have DOS on the disk).

That's M/L Editor. Use it in good health. 

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.  
BASIC listing.

```

AZ 10 DIM BF(16),N$(4),A$(1),B$(1),F$(15)
      F1$(15)
LF 11 DIM MOD$(4)
BN 20 LINE=1000:RETRN=155:BACKSP=126:CHK$
      UM=0:EDIT=0
GO 30 GOSUB 450:POSITION 10,6:?"Start or
      Continue?";:GOSUB 500:?"CHR$(A)

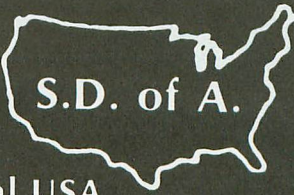
```

```

ZG 40 POSITION 10,8:?"FILENAME";:INPUT F
      $:POKE 752,1:?" "
FE 50 IF LEN(F$)<3 THEN POSITION 20,10:?"
      "GOTO 40
NF 60 IF F$(1,2)<"D:" THEN F1$="D":F1$(
      3)=F$:GOTO 80
KL 70 F1$=F$
TN 80 IF CHR$(A)="" THEN 120
FD 90 TRAP 430:OPEN #2,4,0,F1$:TRAP 110
HQ 100 FOR X=1 TO 16:GET #2,A:NEXT X:LINE
      =LINE+10:GOTO 100
HM 110 CLOSE #2:OPEN #2,3,0,F1$:GOTO 170
VT 120 TRAP 160:OPEN #2,4,0,F1$:GOSUB 440
      :POSITION 10,10:?"FILE ALREADY EXISTS
      !!":POKE 752,0
ZU 130 POSITION 10,12:?"ERASE IT?":GOS
      UB 500:POKE 752,1:?"CHR$(A)
      "
VH 140 IF CHR$(A)="" OR CHR$(A)="n" THEN
      CLOSE #2:GOTO 30
QG 150 IF CHR$(A)<"y" AND CHR$(A)<"y" T
      HEN 130
BH 160 CLOSE #2:OPEN #2,8,0,F1$
      IE 170 GOSUB 450:POSITION 10,1:?"NOH ON
      "
      :LINE:CHKSUM=0
GH 180 LI=3:FOR X=1 TO 16:POSITION 13*(X(
      10)+12*(X-9)),X+2:POKE 752,0:?"BYTE #
      ";X":?"GOSUB 310
      "
      :GOTO 10
KH 190 IF EDIT AND L=0 THEN BYTE=BF(X):G
      O 210
FY 200 BYTE=VAL(N$)
OZ 201 MOD$=N$
BU 210 POSITION 22,X+2:?"BYTE:" "
VZ 220 BF(X)=BYTE:CHKSUM=CHKSUM+BYTE*X:IF
      CHKSUM>999 THEN CHKSUM=CHKSUM-10000
MS 230 NEXT X:CHKSUM=CHKSUM+LINE:IF CHK$U
      M>999 THEN CHKSUM=CHKSUM-10000
IG 240 POSITION 12,X+2:POKE 752,0:?"CHEC
      KSUM:";:LI=4:GOSUB 310
EM 250 IF EDIT AND L=0 THEN 270
QH 260 C=VAL(N$)
SY 270 POSITION 22,X+2:?"C:" "
      :LINE:CHKSUM=0
DI 290 GOSUB 440:EDIT=1:CHKSUM=0:GOTO 180
LW 300 FOR X=1 TO 16:PUT #2,BF(X):NEXT X:
      LINE=LINE+10:EDIT=0:GOTO 170
FV 310 L=0
LG 320 GOSUB 500:IF A=ASC("Q") AND X=1 AN
      D NOT EDIT THEN 420
PO 330 IF A<>RETRN AND A<>BACKSP AND (A<4
      0 OR A>57) THEN 320
DX 333 IF A=RETRN AND N$="" THEN N$=MOD$
      TD 335 IF A=RETRN AND L=0 AND X>1 THEN 35
      0
JR 340 IF ((A=RETRN AND NOT EDIT) OR A=B
      ACKSP) AND L=0 THEN 320
DM 350 IF A=RETRN THEN POKE 752,1:?"":R
      ETRN
GG 360 IF A<>BACKSP THEN 400
SA 370 IF L>1 THEN N$=N$(1,L-1):GOTO 390
AS 380 N$=""
RE 390 ? CHR$(BACKSP);:L=L-1:GOTO 320
BB 400 L=L+1:IF L>1 THEN A=RETRN:GOTO 35
      0
WX 410 N$(L)=CHR$(A):?"CHR$(A);:GOTO 320
KN 430 GRAPHICS 0:END
YT 450 GOSUB 440:POSITION 10,10:?"NO SUC
      H FILE!":FOR X=1 TO 1000:NEXT X:CLOSE
      #2:GOTO 30
FD 440 POKE 710,40:SOUND 0,100,12,8:FOR X
      =1 TO 50:NEXT X:SOUND 0,0,0,0:RETURN
MY 450 GRAPHICS 23:POKE 16,112:POKE 53774
      ,12:POKE 559,0:POKE 710,4
      HR 460 DL=PEEK(561)+56*PEEK(561)+4:POKE
      DL-1,70:POKE DL+2,6
HM 470 FOR X=3 TO 39 STEP 2:POKE DL+X,2:N
      EXT X:FOR X=4 TO 40 STEP 2:POKE DL+X,0
      :NEXT X
ZM 480 POKE DL+41,65:POKE DL+42,PEEK(560)
      :POKE DL+43,PEEK(561):POKE 87,0
AC 490 POSITION 10,8:?"ANALOG M1 editor":
      POKE 559,34:RETURN
MZ 500 OPEN #1,4,0,"K":GET #1,A:CLOSE #1
      :RETURN

```

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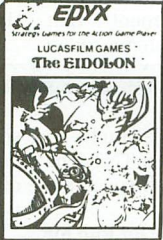
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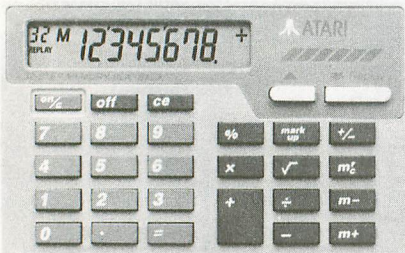
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# 8-bit news!

## ATARI CALCS

Former Atari V.P. David Harris has brought out a line of **high-technology calculators** bearing the Atari name and logo, from credit-card-sized units to printer calculators. Included are calculators with 4000-character memories.



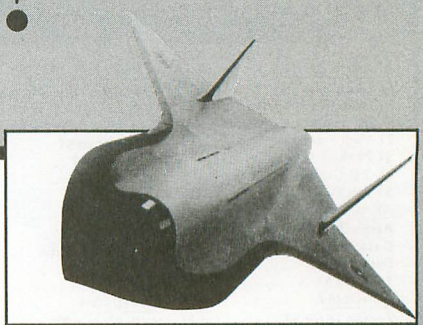
The credit-card-sized units are light powered, and have a sturdy 1/8-inch thickness. With liquid crystal display, they come in six styles. Desktop and wallet-encased models are also available. By Hartech USA Ltd., Scottsdale, Arizona. CIRCLE #128 ON READER SERVICE CARD

## CONTINUED MICROPROSE SUPPORT

A name which continues to come up in the Atari 8-bit world is MicroProse. True, other companies' names may appear, but most are not as consistent in bringing out the quality products this company is noted for. At the recent Consumer Electronics Show, Bill Stealey and his team announced additional new titles planned for the Atari line.

**Pirates!** is an adventure/simulation where you take on the role of a pirate captain sailing the Spanish Main, visiting ports and forging conquests. Arcade-style play is teamed with the interactive story line of a text adventure featuring ship battles, land conquests, fencing, sailing, and over seventy different scenes and images, as well as the opportunity to travel the Caribbean.

One of the anticipated products for the 8-bit, **Gunship**, will be available with 3D graphics, giving you the chance to pilot an Apache Attack Helicopter into some of the world's most troublesome areas. Hi-tech equipment—that includes lasers, radar warning systems, video



cameras and night viewers—is at your disposal, as are computers, jammers, missiles, rockets, flares and a 30mm cannon.

Another new product (though not slated for the Atari in the near future) is **Project Stealth Fighter**. This flight simulation gives you an aircraft equipped with powerful radar and infrared concealment devices, not to mention missiles, rockets, laser and cannon—all awaiting your command.

If you'd like to see this product for the Atari, we suggest that you contact MicroProse at the address below and, in a courteous manner, tell them so.

MicroProse is located at 120 Lakefront Dr., Hunt Valley, MD 21030 — (301) 667-1151.

CIRCLE #129 ON READER SERVICE CARD

## MORE FROM THE PEOPLE WHO BROUGHT US THE TINK-TONKS

Mindscape's Thunder Mountain division has several new Atari titles, only \$9.95 each.

In **Mission in Our Solar System**, you control a spacecraft touring our system. Landing on planets or moons, learn about the "neighborhood." The more lighthearted **Batty Builders** gives you a shot at constructing a building. Place

its walls in just the right way, while you try to catch falling stones and avoid leftover TNT. The folks at TM say this game has high-speed action and hilarious graphics.

Back in a—damaged—spaceship for **Run for the Money**, you're stranded on the planet Simian. You must raise enough money to repair the

ship, based on realistic economic modules prepared by an MIT professor. Sophisticated principles of economics and fast-paced animation with color graphics are part of the fun.

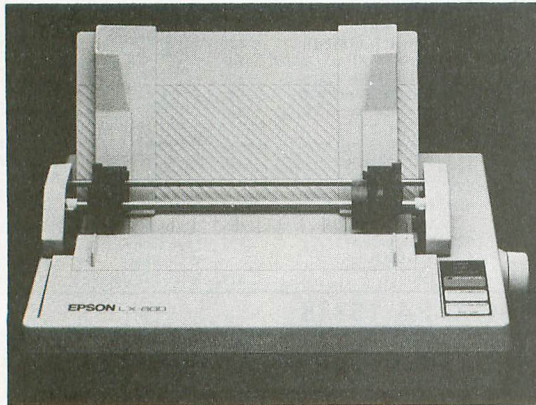
From Thunder Mountain, 3444 Dundee Rd., Northbrook, IL 60062 — (312) 480-9209.

CIRCLE #130 ON READER SERVICE CARD

## NEW EPSON DEBUTS

Epson's new **LX-800** printer offers 9-pin, 80-column capability for a retail cost of only \$269.00, the lowest-priced dot-matrix printer they offer.

In elite draft character mode, the printer speeds along at 180 characters per second, and, in near-letter-quality mode, 30 cps. More: pull-type tractor feed, automatic single-sheet loading, 3K buffer and front control panel come as standard. A parallel interface is utilized for I/O.



The **LX-800** makes use of the Epson's FX-style ribbon cartridge, and the printer is compatible with older and current software which uses Epson codes. The front panel allows easy selection of typestyles, without internal switches. A one-year warranty is standard.

From Epson America, Inc., 2780 Lomita Blvd., Torrance, CA 90505 — (213) 539-9140.

CIRCLE #131 ON READER SERVICE CARD

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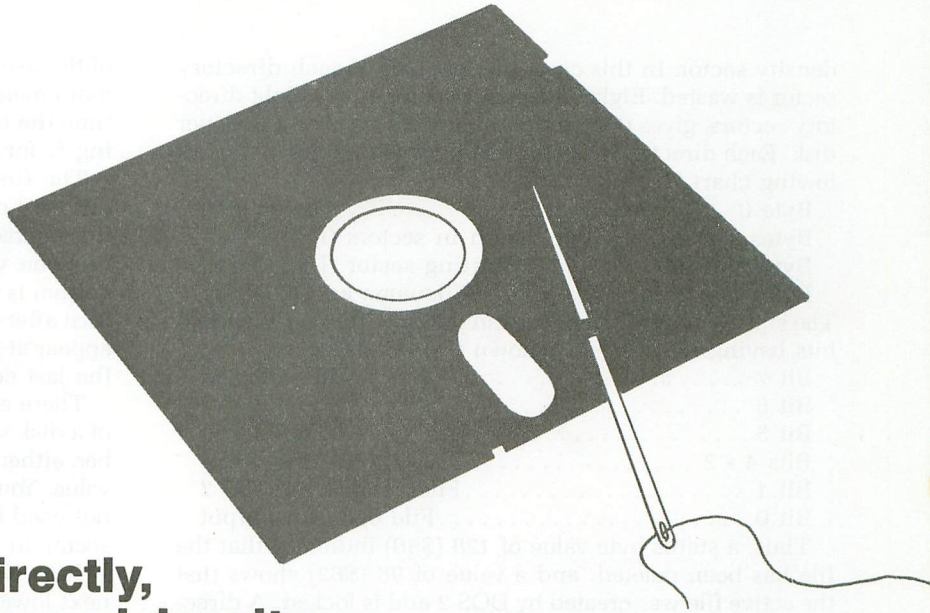
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# DiskMend



**Access those sectors directly,  
in single, double or enhanced density.**

by Justin E. Wilder

Have you ever deleted a disk file—then wished you could get it back? Or maybe you were interrupted while working with a data file, and later found you could no longer use the file because it wasn't properly closed. These are the sort of problems that can't be handled through Atari DOS. They can only be solved with the help of a utility which can bypass DOS and access disk sectors directly.

Several utilities of this type have been published, but they only work on single-density disk sectors. One of the most user friendly of these is **Disk Tool** by Tony Messina, published in issues 8 and 9 of **ANALOG Computing**. We now present **DiskMend**, which has many of **Disk Tool**'s features, but adds even more convenience and works on disks formatted in single density, double density or enhanced density of Atari DOS 2.5 (or any of these densities your disk drive can handle). Before it reads each sector, it checks the density of the disk in drive 1 and configures itself accordingly.

**DiskMend** requires an Atari 400, 800, XL or XE computer with 48K of memory and BASIC, an Atari-compatible disk drive and, optionally, an Atari-compatible printer. It's written in Atari BASIC, with machine language routines embedded in several **USR** functions.

Information is recorded on one side of a disk in 40 concentric tracks. Single-density DOS divides each track into 18 sectors and puts 128 bytes in each sector. The last sector isn't used, so that leaves 719 usable sectors. Double density uses a method of recording that allows twice as much data to be put in the same space, providing 719 sectors of 256 bytes each. Enhanced density uses the recording method of double density, but divides each track into 26 smaller sectors of 128 bytes each. Since DOS can only count to 1023, there are 16 unused sectors. A sector is the amount of data

that's written to or read from a disk at one time. (**DiskMend** uses the cassette buffer at address 1021 to hold a sector of data in memory while it's being examined or modified.)

### Sector specifics.

Fewer sectors are actually available for data, since formatting the disk reserves some sectors for special purposes. Sectors 1, 2 and 3 are boot sectors. When you *Write DOS Files* to a disk, these sectors are also written, although they're not actually part of the DOS files. They're used to tell the computer how to load the DOS files into memory when the computer is on. These three sectors are always written in single density, even when the rest may be in double density. Because of this, **DiskMend** cannot read the boot sectors of a double-density disk.

Sector 360 is reserved for a "Volume Table Of Contents" (VTOC), to keep track of which sectors are available and which are in use. Bytes 10 through 99 of this sector indicate the status of sectors 0 through 719 (1 bit per sector). If a bit is on, the corresponding sector is free. If it's off, the sector is in use. Sector 0 doesn't exist, so its bit and those of the reserved sectors are always off. According to Bill Wilkinson's column in the May 1984 issue of *COMPUTE!*, byte 0 indicates the DOS type; bytes 1 and 2 the maximum number of free sectors; bytes 3 and 4 the current free sector count; byte 5 is a write-required flag; and the next 4 bytes are unused. Since DOS 2.5 has more sectors to keep track of than the remaining bytes would allow, it uses sector 1024 as a VTOC extension to show the availability of sectors 720 through 1023. This should clear up the math if you were confused when I said there were 16 unused sectors.

Sectors 361 through 368 are reserved to record directory information for each of the files on the disk. A directory entry uses 16 bytes, and a sector can hold up to eight directory entries. No, we do not get sixteen entries in a double-

density sector. In this case, the last half of each directory sector is wasted. Eight entries per sector, times eight directory sectors, gives the maximum limit of sixty-four files per disk. Each directory entry is organized according to the following chart.

- Byte 0 ..... Status byte
- Bytes 1 & 2 ..... File length in sectors (LSB, MSB)
- Bytes 3 & 4 ..... Starting sector (LSB, MSB)
- Bytes 5 - 15 ..... Filename and extender

The status byte is further broken down with the individual bits having meanings as shown in the table below.

- Bit 7 ..... File deleted
- Bit 6 ..... File active
- Bit 5 ..... File locked
- Bits 4 - 2 ..... Unused bits
- Bit 1 ..... File created by DOS 2
- Bit 0 ..... File open for output

Thus, a status byte value of 128 (\$80) indicates that the file has been deleted, and a value of 98 (\$62) shows that the active file was created by DOS 2 and is locked. A directory entry of 66,8,0,3,1,77,89,70,73,76,69,32,32,68,80,32 is for an active file named MYFILE.DP, which starts at sector 259 and is 8 sectors long.

The remainder of the sectors (707 in single or double density, or 1010 in enhanced density) are for use in the files recorded on the disk. These may be BASIC program files, data files or machine language (binary) files, but they're all stored in the same way. They're recorded as data on all but the last 3 bytes of each sector. These last 3 bytes are reserved for linking sectors of the file together. The first 6 bits of the third byte from the end contain the file number (0 to 63) as a check on the integrity of the file.

The other 2 bits, along with the next byte, tell the number of the next sector of this file. These 10 bits can represent any number from 0 through 1023, which explains why DOS 2.5 uses only this number of sectors. The last byte of each sector tells how many bytes of the file are contained in this sector. This is always 125 in single or enhanced density, or 253 in double density—unless it's the last sector of the file, in which case it may be only partially filled. If this is the last sector, the number indicating the next sector of the file is set to 0. These 3 sector link bytes are found only in file sectors. They're not needed, or used, in any of the reserved sectors.

### Using DiskMend.

First, a word of caution is in order. **DiskMend** is a powerful utility—and, as such, can be dangerous. If you don't really know what you're doing, it will let you make your disk files totally unusable. Having a file locked is no protection, as the lock is only effective when using DOS. It's a good practice to copy any good files to another disk before trying to fix a bad one. On the other hand, this utility does give you some real help where it's needed most, and allows total flexibility to institute any changes required to make your files work properly. It warns you with a beep and a prompt when it's about to write a change to a disk file, and gives you a chance to avoid the change if you want.

Load and run **DiskMend** as you would any other BASIC program. It always works on the disk in drive 1, regardless

of the drive it was loaded from. First, you'll be shown the main menu of all the commands available. This is the only time the menu will appear, unless you request it by entering *H* for Help.

The first character of each command is displayed in a different color and luminance, to remind you to enter only this character for the command you choose (except for the first one, where *RET* means push RETURN). The line at the bottom is the common input prompt, to which you will return after each command is completed. Normally, this will appear at the bottom of the display, showing the results of the last command.

There are several ways to read and display the contents of a disk sector. The first is to simply enter the sector number, either as a decimal or as \$ followed by the hexadecimal value. You can access any sector this way, including those not used by DOS. Once you've selected a sector, the next sector in the file chain can be obtained by pushing RETURN. Or you can enter + or - to get the next higher or next lower sector number. First, the density of the disk is determined, then the sector is read into memory and displayed in an easy-to-follow format. The sector in memory can be redisplayed in this format at any time, by entering *R* at the command prompt.

The first line of the sector display tells the density of the disk from which the sector was read. Next are the headings for the three main sections of the display. The column at the left gives the byte numbers in hexadecimal values, as offset from the beginning of the sector. The center section has eight columns containing the hexadecimal values of data in the sector, reading from left to right across the line. At the right are the characters which might be represented by the data on that line. A period appears in place of any unprintable character. At the bottom of the display, on the left, are the number of this sector and the file number, determined by the position of its entry in the directory, starting with 0 for the first entry. At the right are the number of the next sector in the file and the number of bytes of the file contained in this sector. These values are derived from the contents of the last 3 bytes in the sector.

An example of the sector display is illustrated below.

### SINGLE DENSITY SECTOR

BYTE#	HEX	CHAR
>\$00	74 20 47 45 54 20 4E 45	t GET NE
>\$08	58 54 20 53 45 43 54 4F	XT SECTO
>\$10	52 14 40 28 1C 0E 40 06	R.0(.0.
>\$18	00 00 00 00 15 0F 0E 00	.....
>\$20	20 53 45 43 54 4F 52 20	SECTOR
>\$28	23 20 2B 20 31 14 5C 28	# + 1.\(
>\$30	1C 0E 40 06 00 00 00 00	..e.....
>\$38	15 0F 0E 0D 20 53 45 43	... SEC
>\$40	54 4F 52 20 23 20 2D 20	TOR # -
>\$48	31 14 7A 28 1C 0E 40 06	1.z( 0.
>\$50	00 00 00 00 15 0F 10 72	.....r
>\$58	45 44 49 53 50 4C 41 59	EDISPLAY
>\$60	20 53 45 43 54 4F 52 14	SECTOR.
>\$68	85 28 1C 0E 40 06 00 00	...e...
>\$70	00 00 16 32 00 6B 1F 28	...2 k.(
>\$78	1C 0E 40 06 00 10 6B 7D	..e...k.

SECTOR = 106  
FILE # = 4

NEXT SEC = 107  
BYTES = 125



If the sector is from a disk formatted in double density, half of the sector data is displayed at one time. If you push RETURN or enter the command + the next half-sector will be displayed. Likewise, if you enter - the displayed data will move backward a half-sector at a time.

**Directory List.**

The D command will produce a listing of the information found in the directory sectors. This includes all entries, even though the file may have been deleted or left open so that it cannot be accessed through DOS. The information is displayed in five columns. The first two show the file number and name with extender. Next is the sector number where the file starts, and the file length in sectors. The last column shows the status of the file represented by the directory entry. The following codes are used for the status.

- A ..... File active
- A\* ..... File locked
- A-O ..... File open for output
- D ..... File deleted

Up to 2 sectors of directory information are displayed at one time. If there are more entries to be shown, you can push RETURN to display the next 2 sectors.

**Undelete/Close File.**

This command is very useful, but if another file has been recorded on the disk since the file was deleted or left open, some of the sectors may have been overwritten. Of course, the last partial sector of a file left open will be missing. You can trace the file before trying to reclaim it, to see if it's complete. When you give the U command, DiskMend will recover as much of the file as still remains intact. The last sector will be marked with a 0, for next sector, and the file length in the directory entry will be corrected. However, since DiskMend doesn't change the VTOC, sectors can still be overwritten. You should immediately copy the file (and all other files) to another disk and reformat the disk to correct the VTOC and show the true number of free sectors.

**Change Sector Bytes.**

Here's the most powerful (and dangerous) command. The sector in memory is redisplayed, along with instructions for changing any bytes in it. Use cursor control keys to move the cursor to the line where a change is to be made. Type over the hexadecimal data with the new two-digit value. If you prefer, you can enter a character instead, by typing a space over the first digit and the character over the second. When you push RETURN, changes you have made on that line will be recorded in memory and the sector will be redisplayed with the changes. You'll be asked if the changed sector should be written to disk. If there are more changes to make, enter N and it won't be written to disk yet. Otherwise, enter Y to make the disk correspond to the way the sector in memory is displayed. At the Change Bytes prompt, you can enter a command or sector number, instead of moving the cursor to the data area.

**Trace Sector Chain.**

This command makes a list of all the sectors in the file and checks the sector links to make sure they're right and the file length corresponds with the length given in the directory entry. If a link error is found, it's indicated in the display as FILE # MISMATCH, PARTIAL SECTOR ERROR

or FILE SIZE ERROR. A file number mismatch may mean the link bytes of the previous sector contain the wrong next sector number and need to be modified. A little detective work and knowledge of the file being traced make it possible to correct such an error. A partial sector error means a sector other than the last sector of the file isn't completely filled, as indicated by the sector's last byte. The word END shows that the trace was successful to the end of the file. If the sector listing is too long to fit on-screen, you're prompted to push RETURN to see the rest.

**Modify Links.**

This command allows you to easily change the sector links of the sector in memory. It provides inputs for the next sector number and file number, which are then put into the second and third bytes from the end of the sector in memory. The sector is redisplayed, and you're asked if the sector should be written to disk. If your reply isn't Y, the disk will not be changed to incorporate the new links.

**Write Sector to Disk.**

This usually isn't needed; its operation is included in the Change Bytes and Modify Links commands. However, any sector that's been changed and not written to disk can be written with this command. It's recommended that a sector be written only to the disk it was read from. If you write it to a different one, you may spoil that disk.

**Print Screen.**

This command can be used to transfer the first twenty lines of any DiskMend display screen to a printer. In the directory list and trace sector chain operations, each screenful can be printed before you push RETURN to display additional data.

**That's all, folks.**

This concludes the description of DiskMend. The H command displays the command menu and the Q changes the screen colors to their normal condition before ending the program operation.

Use your imagination to see how DiskMend can help you with disk problems. For instance, call up a directory sector and change a filename with Change Bytes—very handy if you try to use the same filename twice. Make a file disappear, but remain on the disk, by changing the first byte of its directory entry to \$43. How about finding the Variable Name Table of a BASIC program, and changing a variable name to a more descriptive one?

The sky's the limit, but remember—be careful; and know what you're doing. ☛

A 1953 graduate of the University of Michigan, Justin E. Wilder is a Senior Project Engineer for Johnson Controls, Inc. He purchased his Atari 800 in 1980, and his Ultimate Re-number Utility was in the Atari Program Exchange. He's a member of Indiana-Michigan Atari Group Exchange (IMAGE) users' group.

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

(Listing begins on next page)

Listing 1.  
BASIC listing.

```

QS 10 REM -- DISKMEND -- by Justin Wilder
    , Sept 1985
SM 20 Q1=1:DIM A$(40),AN$(Q1),DEN$(8),STA
    $(Q1):STA$="N":SECMAX=1040:SECSIZ=128:
    POKE 82,Q1:TRAP 710
DM 25 FOR X=1536 TO 1722:READ Y:POKE X,Y:
    NEXT X
DY 30 GRAPHICS Q1:POKE 710,212: ? #6;"----
    -----": ? #6;" diskmend comma
    nds": ? #6;"
JI 40 ? #6;"ret GET NEXT SECTOR": ? #6;"
    SECTOR # + 1": ? #6;" SECTOR # - 1": ?
    #6;"REDISPLAY SECTOR": ? #6
YP 50 ? #6;"DIRECTORY LIST": ? #6;"UNDELET
    E/CLOSE FILE": ? #6;"TRACE SECTOR CHAIN
    ": ? #6
UP 60 ? #6;"MODIFY LINKS": ? #6;"CHANGE SE
    CTOR BYTES": ? #6;"WRITE SECTOR TO DSK"
    : ? #6
NQ 70 ? #6;"PRINT SCREEN": ? #6;"HELP (COM
    MAND MENU)": ? #6;"QUIT DISKMEND"
FM 80 POP : ? " COMMAND OR SECTOR NUMB
    ER": ? #6;"INPUT A$
JX 90 IF A$<>"" THEN 140
EX 100 IF FILSIZ THEN GRAPHICS Q0:POKE 71
    0,212: ? " CONTINUE SECTOR TRACE FILE "
    :N: ? NEXSEC: ? "":GOTO 900
OJ 110 IF N THEN GRAPHICS Q0:GOTO 450
KC 120 IF FBYT<SECSIZ-128 THEN FBYT=FBYT+
    128:STA$="Y":GOTO 320
ZQ 130 SECNUM=NEXSEC:FBYT=Q0:STA$="N":GOT
    O 320
UO 140 IF A$<>"" THEN 170
KI 150 IF FBYT<SECSIZ-128 THEN FBYT=FBYT+
    128:STA$="Y":GOTO 320
IM 160 SECNUM=SECNUM+Q1:FBYT=Q0:STA$="N":
    GOTO 320
RT 170 IF A$<>"" THEN 200
PJ 180 IF FBYT>Q0 THEN FBYT=FBYT-128:STA$
    ="Y":GOTO 320
OZ 190 SECNUM=SECNUM-Q1:FBYT=SECSIZ-128:S
    TA$="N":GOTO 320
RY 200 IF A$="H" THEN 30
AK 210 IF A$="P" THEN 110
GX 220 FILSIZ=Q0:N=Q0:IF A$="D" THEN 440
KD 230 IF A$="U" THEN 110
MS 240 IF A$="T" THEN 880
LC 250 IF A$="Q" THEN POKE 709,202:POKE 7
    10,148:TRAP 40000:GRAPHICS Q0:END
DR 260 IF SECNUM<Q1 OR SECNUM>SECMAX THEN
    310
AA 270 IF A$="M" THEN 1020
YU 280 IF A$="W" THEN GOSUB 820:GOTO 80
JO 290 IF A$="C" THEN 720
OL 300 IF A$="R" THEN 340
JJ 310 GOSUB 630:SECNUM=VAL(A$):FBYT=Q0:S
    TA$="N"
CI 320 IF SECNUM<Q1 OR SECNUM>SECMAX THEN
    ? " SECTOR OUT OF RANGE 1 TO ";SEC
    MAX:GOTO 80
RU 330 FILSIZ=Q0:N=Q0:IF STA$="N" THEN GO
    SUB 550:REM -- Get Sector
RR 340 GOSUB 350:GOTO 80
AE 350 GRAPHICS Q0:POKE 710,212: ? "":DEN
    $;" DENSITY SECTOR": ? "BYTEX" HEX"
    CHAR":REM -- Print Sector SR
HM 370 FOR BYT=FBYT TO FBYT+127 STEP 8
JK 380 PRINT ">$";:X=USR(1536,BYT):PRINT
    :NEXT BYT
PU 390 IF SECNUM>360 AND SECNUM<369 THEN
    ? " DIRECTORY SECTOR ";SECNUM:NEXSEC=S
    ECNUM+Q1:RETURN
HI 395 IF SECNUM=360 OR SECNUM=1024 THEN
    ? " U+TOC SECTOR ";SECNUM:NEXSEC=SECNUM

```

```

+Q1:RETURN
UR 400 IF SECNUM<4 THEN ? " BOOT SECTOR "
    ;SECNUM:NEXSEC=SECNUM+Q1:RETURN
QT 410 GOSUB 430: ? " SECTOR = ";SECNUM;">
    NEXT SEC = ";NEXSEC
SX 420 ? " FILE = ";PEEK(203);"> BYTES =
    ";PEEK(204):RETURN
IZ 430 NEXSEC=USR(1641,SECSIZ-Q1):RETURN
ML 440 GRAPHICS Q0:SECNUM=360:N=Q0:REM --
    Directory List
NZ 450 POKE 710,212: ? " FILES: FILENAM EXT
    START LENGTH STATUS"
ZS 460 SECNUM=SECNUM+Q1:GOSUB 550: ? "
    SECTOR ";SECNUM
OJ 470 FOR X=1021 TO 1133 STEP 16:IF PEEK
    (X)<Q1 THEN ? :N=Q0:GOTO 80
NV 480 ? " ";N:POKE 85,7:FOR Y=X+5 TO X
    +15: ? CHR$(PEEK(Y));NEXT Y: ? " ";PEE
    K(X+3)+256*PEEK(X+4);
JH 490 POKE 85,26: ? PEEK(X+Q1)+256*PEEK(X
    +2);POKE 85,33:Z=PEEK(X):IF Z>127 THE
    N ? "D";:GOTO 520
UC 500 IF Z>63 THEN ? "A";:IF Z>95 THEN ?
    "X";
TM 510 IF Z>2*INT(Z/2) THEN ? "-0";
AT 520 ? :N=N+Q1:NEXT X:IF PEEK(84)<16 TH
    EN 460
YH 530 IF SECNUM>367 THEN N=Q0:GOTO 80
CT 540 ? " PUSH RETURN TO CONTINUE":GOTO
    80
UY 550 POKE 769,Q1:X=USR(1669):IF X THEN
    SECNUM=Q0:GOTO 590:REM -- Drive Status
NB 560 DEN$="SINGLE":SECMAX=720:SECSIZ=12
    8:Z=PEEK(746):IF Z>127 THEN SECMAX=104
    0:DEN$="ENHANCED":GOTO 580
TW 570 IF Z>31 THEN SECSIZ=256:DEN$="DOUB
    LE"
KD 580 POKE 770,82:POKE 771,64:GOSUB 610:
    REM -- Read Sector
UY 590 IF X THEN ? " CAN'T READ SECTOR ";
    SECNUM:SECNUM=Q0:GOTO 80
ZC 600 RETURN
GT 610 POKE 769,Q1:POKE 772,253:POKE 773,
    3:REM -- Disk Access SR
YE 620 X=USR(1684,SECSIZ,SECNUM):RETURN
LK 630 IF LEN(A$)>1 THEN IF A$(Q1,Q1)="$"
    THEN GOSUB 650:A$=STR$(N)
VL 640 N=Q0:RETURN
FD 650 N=Q0:FOR Y=2 TO LEN(A$):REM -- Hex
    to Dec
ML 660 Z=ASC(A$(Y)):IF Z>47 AND Z<58 THEN
    N=N*16+Z-48:GOTO 700
KW 670 IF Z>64 AND Z<71 THEN N=N*16+Z-55:
    GOTO 700
TE 680 IF Z<>32 THEN N=-Q1
VE 690 POP :RETURN
SR 700 NEXT Y:RETURN
SM 710 ? " ILLEGAL INPUT":POKE 709,Q0:
    POKE 710,214:TRAP 710:GOTO 80
HA 720 GOSUB 350:REM -- Change Bytes
OL 730 POKE 710,20:POSITION Q1,19: ? " MOV
    E CURSOR, CHANGE LINE, PUSH RETURN"
UH 740 ? "OR ENTER COMMAND OR SECTOR NUMB
    ER": ? #6;"INPUT A$
IJ 750 IF LEN(A$)<8 THEN POKE 710,212:N=Q
    0:POSITION Q1,21:GOTO 90
BS 760 A$=A$(2):GOSUB 650:A$=A$(2):IF N<F
    BYT OR N>FBYT+120 THEN 720
AX 770 FOR BYT=N TO N+7:IF LEN(A$)<6 THEN
    800
YU 780 A$=A$(4):IF A$(2,2)="" THEN POKE
    1021+BYT,ASC(A$(3)):GOTO 800
WN 790 GOSUB 650:IF N=Q0 AND N<256 THEN
    POKE 1021+BYT,N
LL 800 NEXT BYT:GOSUB 820:IF AN$="Y" THEN
    N=Q0:GOTO 80
PE 810 GOTO 730
DU 820 GOSUB 350:POKE 710,64:REM -- Write

```

```

sector to disk
WA 830 ? "WRITE SECTOR ";SECNUM;" TO DI
SK (Y/N)";:INPUT AN$
UZ 840 IF AN$(Y) THEN ? "SECTOR NOT WRI
TTEN":GOTO 870
XY 850 POKE 770,87:POKE 771,128:GOSUB 610
:IF X THEN ? "DISK WRITE ERROR!":GOTO
870
NQ 860 ? "SECTOR WRITTEN"
PT 870 POKE 710,212:RETURN
SE 880 GRAPHICS Q0:POKE 710,212:GOSUB 990
:FILSIZ=PEEK(BYT+Q1)+256*PEEK(BYT+2):Z
=Q0: ? "K"
MU 890 ? "FILE ";N;" ";:FOR X=BYT+5 TO BY
T+15: ? CHR$(PEEK(X));:NEXT X: ? " STAR
T SECTOR=";NEXSEC
GM 900 SECNUM=NEXSEC:GOSUB 580:GOSUB 430:
Z=Z+Q1
LV 910 IF PEEK(203)<>N THEN ? : ? "FILE
# MISMATCH @ SECTOR ";SECNUM: ? " CHECK
PREV SEC LINKS":FILSIZ=Q0:GOTO 80
ZH 920 IF NEXSEC THEN 950
FC 930 IF Z=FILSIZ THEN ? "END":FILSIZ=Q0
:N=Q0:GOTO 80
YX 940 ? : ? "FILE SIZE ERROR": ? Z;" SEC
TORS INSTEAD OF ";FILSIZ:FILSIZ=Q0:GOT
O 80
CC 950 IF PEEK(1020+SECSIZ)<>SECSIZ-3 THE
N ? "PARTIAL SECTOR"
HS 960 IF PEEK(84)>18 THEN ? " PUSH RETUR
N TO CONTINUE":GOTO 80
XH 970 ? NEXSEC;" ";:IF PEEK(85)>35 THEN
?
PG 980 GOTO 900

```

```

FB 990 ? " FILE NUMBER or RETURN TO ABOR
T";:INPUT A$:GOSUB 630:N=VAL(A$):IF N<
0 OR N>63 THEN 710
BT 1000 X=INT(N/8):SECNUM=X+361:BYT=16*(N
-X*8)+1021:GOSUB 550:IF PEEK(BYT)<Q1 T
HEN ? "NO FILE# ";N:GOTO 990
ZB 1010 NEXSEC=PEEK(BYT+3)+256*PEEK(BYT+4
):RETURN
LM 1020 GOSUB 350:POKE 710,20:REM -- Modi
fy Links
CS 1030 IF SECNUM<4 OR SECNUM>359 AND SEC
NUM<369 OR SECNUM=SECMAX OR SECNUM>102
3 THEN ? "NO LINKS TO MODIFY":GOTO 80
UN 1040 ? " NEW NEXT SECTOR # or RETURN"
;:INPUT A$:IF A$="" THEN 1070
BC 1050 GOSUB 630:Z=VAL(A$):IF Z<4 OR Z>3
59 AND Z<369 OR Z>=SECMAX OR Z>1023 TH
EN ? "INVALID SECTOR LINK":GOTO 1040
LU 1060 NEXSEC=Z
QM 1070 ? " NEW FILE # or RETURN";:INPUT
A$:IF A$="" THEN Z=PEEK(203):GOTO 109
0
UY 1080 GOSUB 630:Z=VAL(A$):IF Z<Q0 OR Z>
63 THEN ? "INVALID FILE #":GOTO 1070
FF 1090 X=INT(NEXSEC/256):POKE 1019+SECSI
Z,NEXSEC-256*X:POKE 1018+SECSIZ,4*X+X
QD 1100 GOSUB 820:GOTO 80
K5 1110 TRAP 1180:LPRINT :POKE 710,184:Y=
40-20*5GN(PEEK(87)): ? "PRINTING SCREE
N"
DM 1120 X=PEEK(88)+256*PEEK(89)-Q1:FOR X=
X TO X+19*Y STEP Y:FOR BYT=Q1 TO Y
SH 1130 AN$(CHR$(PEEK(X+BYT))):IF AN$(Y)"
THEN AN$(CHR$(ASC(AN$)-128)

```

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CIRCLE #105 ON READER SERVICE CARD

```

WN 1140 IF AN$>"♦" AND AN$<"♦" OR AN$="|"
    THEN 1160
NO 1150 AN$=CHR$(ASC(AN$)+32):IF AN$>"_"
    THEN AN$="."
ID 1160 A$(BYT)=AN$:NEXT BYT:LPRINT A$:NE
    XT X
FZ 1170 POKE 710,212:TRAP 710:GOTO 80
TL 1180 ? "K PRINTER DOES NOT RESPOND":G
    OTO 1170
AD 1190 GRAPHICS Q0:POKE 710,64:GOSUB 990
    :Z=SECNUM:?"UNDELETING/CLOSING FILE
    ";N:AN$="B"
OU 1200 Y=SECNUM:SECNUM=NEXSEC:GOSUB 580:
    GOSUB 430:IF PEEK(203)=N THEN 1230
OC 1210 IF FILSIZ THEN SECNUM=Y:GOSUB 580
    :POKE 1018+5EC5IZ,N*4:POKE 1019+5EC5IZ
    ,Q0:GOSUB 850:GOTO 1240
ZJ 1220 AN$="□":GOTO 1240
CG 1230 FILSIZ=FILSIZ+Q1:IF NEXSEC THEN 1
    200
EE 1240 SECNUM=Z:GOSUB 580:X=INT(FILSIZ/2
    56):POKE BYT+Q1,FILSIZ-256*X:POKE BYT+
    2,X
UX 1250 POKE BYT,ASC(AN$):GOSUB 850: ? :?
    " COPY TO ANOTHER DISK NOX": ? :N=Q0:FI
    LSIZ=N:GOTO 80
JI 1260 DATA 104,141,254,2,104,170,104,72
    ,24,105
DK 1270 DATA 253,133,214,138,105,3,133,21
    5,142,72
GN 1280 DATA 3,169,11,141,66,3,104,160,25
    4,132

```

```

JO 1290 DATA 216,48,2,177,214,72,74,74,74
    ,74
KO 1300 DATA 160,1,132,217,16,3,104,41,15
    ,201
QG 1310 DATA 10,144,2,105,6,105,48,32,86,
    228
VA 1320 DATA 198,217,16,238,169,32,32,86,
    228,230
OX 1330 DATA 216,48,247,164,216,192,8,144
    ,210,160
DE 1340 DATA 0,152,72,177,214,201,155,208
    ,2,169
FH 1350 DATA 46,32,86,228,104,168,200,192
    ,8,144
SQ 1360 DATA 236,142,254,2,96,104,104,104
    ,170,189
FO 1370 DATA 251,3,72,41,3,133,213,104,74
    ,74
HP 1380 DATA 133,203,189,252,3,133,212,18
    9,253,3
BK 1390 DATA 133,204,96,104,133,213,169,8
    3,141,2
PN 1400 DATA 3,32,83,228,136,132,212,96,1
    04,104
LE 1410 DATA 141,9,3,104,141,8,3,104,141,
    11
WK 1420 DATA 3,104,141,10,3,169,49,141,0,
    3
VI 1430 DATA 169,7,141,6,3,32,89,228,172,
    3
AP 1440 DATA 3,136,132,212,132,213,96,END

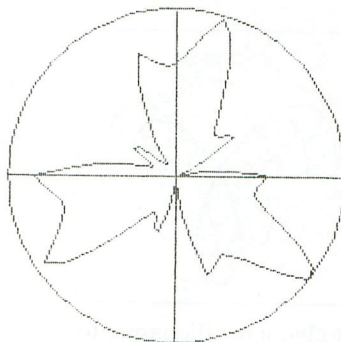
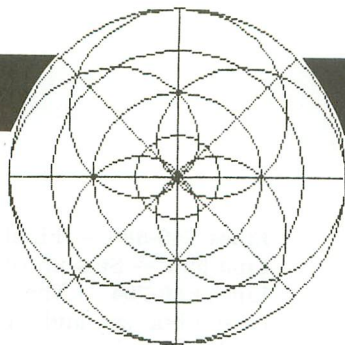
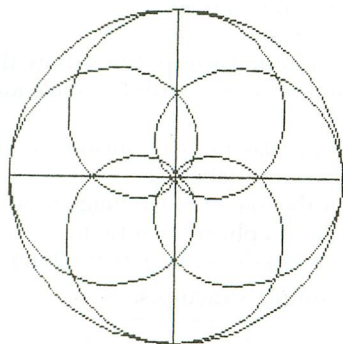
```

# Attention Programmers!

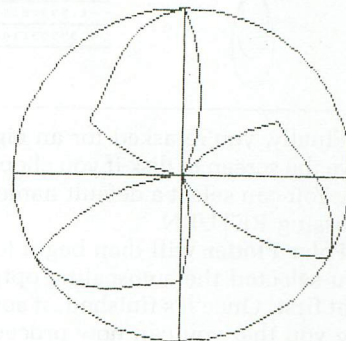
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# Polar Plotter



**Puts polar equations in their place, so you can get creative.**

by David Bader

Circles, spirals, roses, clovers, cardioids, lemniscates, and lemacons—exotic plants from a strange world? No, these are some of the fascinating shapes that can be created by polar equations. When you let a computer do the work of plotting them, you're left with nothing else to do but create and experiment with this separate area of geometry (explained later).

**Polar Plotter** will enable you to flaunt your imagination because of its ease of use. All you have to do is enter a formula and press RETURN. The program adds these special features: automatic scaling, the option to superimpose up to four formulas, two stages of labeling and bordering, a printout routine ("49-Second Screen Dump" supplied by *Compute's Second Book of Atari*), and a screen dump utility (formatted from **Magniprint** by Alpha Systems).

### What's a polar equation?

Imagine a circle; it's not too hard. Now, find the center of the circle and draw a radius stretching from the center horizontally to the right. Make the radius a distance of 1 unit. Using the same scale that measures this radius, measure the circumference of the circle. This length is  $2 * \pi * \text{Radius}$ , where  $\pi = 3.14159$ .  $\pi$ , simply, is the distance around one-half of the circle.

Therefore, taking a ordinary number line, with the radius of the circle as a distance of 1 on this line, and wrapping it around the circle would measure a circumference of about 6.28319, or  $2 * \pi$ . On the number line,  $\pi$  is just a distance between 3 and 4, and we call the units on this number line *radians*. So radians aren't some complicated way of measuring angles; they're simply real numbers on a number line.

Back to our circle now. We'll name our horizontal radius the *polar axis*. We can stretch this axis to the right to in-

finity. The left point of the polar axis, (the center of the circle) we will call the *pole*.

Now, let's imagine a line, or *ray*, over the polar axis like the hand of a clock. This ray makes an angle of  $\theta$  with the polar axis. Let's rotate the ray counterclockwise from the polar axis. Put a point on this ray. You can describe this point with the polar coordinates  $(R, \theta)$ . Here,  $\theta$  is the angle, in radians, that the ray makes with the polar axis.  $R$  is the distance, on the ray, from the pole to the point.

Let's make a formula to describe this distance from the pole to the point on the ray, in terms of the angle of rotation,  $\theta$ . Such a formula could be:  $R = \theta$ . As the angle gets bigger, the distance,  $R$ , gets longer. Therefore, this equation would describe a spiral getting larger and larger as the angle gets bigger and bigger. Consider the facts that  $R$  can be negative and  $\theta$  can wrap around itself for infinite revolutions (a full revolution is  $2 * \pi$ ). Think of equations like:  $R = \cos(\theta)$ ,  $R = \cos(\theta) * \sin(\theta)$ , or—get crazy— $R = 2 + \sin(2 * D + 2) - \text{ABS}(\cos(3 * D + 7))$  . . . just see what happens.

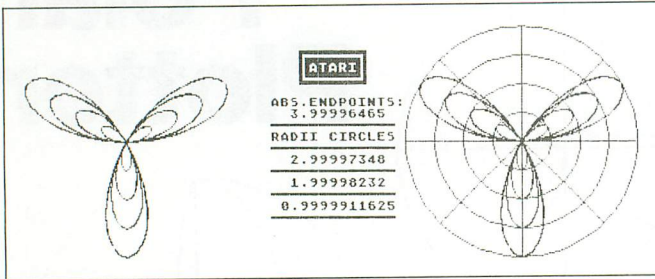
### How to run Polar Plotter.

This program will first inquire how many formulas you wish to plot. You can plot up to four equations on one graph, superimposed using the same scale.

Next, you simply input the formula(s) at each prompt. Type  $R = \text{function in terms of } D$ , where  $D$  is  $\theta$ . The program will calculate and plot the function for the interval  $[0, 2 * \pi]$ . Remember, when you enter a formula you're restricted by BASIC's constraints: dividing by 0, taking the square root of a negative value, improper number of parenthesis, etc.

Second, you're asked for the absolute endpoints, the maximum allowable value of  $R$ . You can select for the option of entering your own value or having the program autoscale the value itself. The program won't err if the function goes

beyond the selected endpoints; it only plots the formula within the selected domain. The reason for the manual option is to allow you to either zoom in on the function or just attain the desired effect.



Finally, you're asked for an eight-character filename, to save the screen to disk if you choose to do so after it's drawn up. You can select a default name, SCREEN.MP, by simply pressing RETURN.

**Polar Plotter** will then begin to graph the function(s). If you selected the autoscaling option, it will proceed with that first. Once it's finished, it sounds off with a beep, telling you that you can now proceed with the choices here.

(1) **OPTION** — The first time this is pressed, it will draw cross axes, circumscribe a bordering circle with a radius of the absolute endpoints, label the absolute endpoints, and title the screen with the formula(s). The second time it's pressed, it sketches in two more cross axes and three more concentric circles within the graph, complete with labels.

(2) **SELECT** — Pressing this will save the current screen to disk in **Magniprint** format.

(3) **START** — This will enable the "49-Second Screen Dump" and print the current screen, for the Gemini SG-series printers.

(4) **ESC** — This will erase the screen and rerun the program, without going through initialization again.

### Program breakdown.

**Lines 20-80** — Main loop to draw plots of the equation(s). Part of this loop is also used to draw the concentric circles making up the graph borders. Actually, R and theta are converted to Cartesian coordinates and then translated properly for display on part of the graphics 24 screen.

**Lines 101-104** — These lines are entered by the program, which builds them from the entered formula(s), tacking on a RETURN statement.

**Lines 130-140** — Autoscaling routine.

**Lines 160-310** — Saving routine supplied verbatim by **Magniprint** on disk.

**Lines 330-360** — "49-Second Screen Dump."

**Line 370** — Sound to indicate that the program is ready to take any of the console key commands.

**Lines 380-410** — Loop to read console keys and check ESCAPE key.

**Lines 430-460** — Initialization and loading of two machine language routines.

**Lines 470-480** — Introduction screen.

**Lines 490-530** — Formula entry screen. Takes inputs and enters them as program lines, using the forced read mode.

**Lines 540-580** — Final prompt screen.

**Line 590** — Sets up display screen.

**Lines 600-784** — These lines and subroutines draw the axes and borders, and label the screen with the scale and formula(s) used.


**Lines 791-794** — Subroutine used during formula entry to remember formula(s) for future labeling.

**Lines 860-920** — Data for the machine language routine to superimpose text over the graphics 24 screen.

**Lines 930-940** — Data for "49-Second Screen Dump."

**Table 1. — Sample functions.**

R=D	R=-D	R=D*2	R=-D*2
	R=1+COS(D)	R=1-COS(D)	
	R=1+SIN(D)	R=1-SIN(D)	
	R=2+SIN(3*D+2)-ABS(COS(3*D))		
	R=2+COS(2*D+2)-ABS(SIN(3*D-7))		
	R=3*SIN(3*D)	R=2*SIN(3*D)	
	R=SIN(3*D)		
R=D	R=2*D	R=3*D	R=4*D
	R=2+COS(3*D)-ABS(SIN(4*D))		
	R=COS(D)	R=1+COS(D)	
	R=2+COS(D)	R=3+COS(D)	
	R=COS(D)	R=-COS(D)	
	R=SIN(D)	R=-SIN(D)	

Table 1 gives you some equations to try, to get you started using **Polar Plotter**. Now get creative! 

David Bader is now studying Mechanical Engineering. For close to four years, he's been enthusiastically hacking through BASIC to create adventure games and mathematics programs (the original inspiration for issue 30's **Z-Plotter**). Writing, creative artwork and technical drawings are among his most avid hobbies (along with computing, of course).

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the **BASIC Editor II**, in issue 47.

**Listing 1.**  
BASIC listing.

```

NV 10 GOTO 430
AW 20 XM=96/Z:FOR Q=1 TO NUM:T=Q
FM 30 B=0:FOR D=0 TO 6.3 STEP 0.075:GOSUB
    100+T
LD 40 IF ABS(R)>Z THEN B=0:GOTO 80
NA 50 R=R*XM:X=COS(D)*R:Y=SIN(D)*R*0.83
LH 60 IF B=0 THEN PLOT X+208,191-(80+Y):B
    =1
JI 70 DRAWTO X+208,191-(80+Y)
SE 80 NEXT D:NEXT Q:GOTO 370
UY 101 REM FORMULA ENTERED DURING RUN
WB 102 REM FORMULA ENTERED DURING RUN
WE 103 REM FORMULA ENTERED DURING RUN
WH 104 REM FORMULA ENTERED DURING RUN
    
```

```

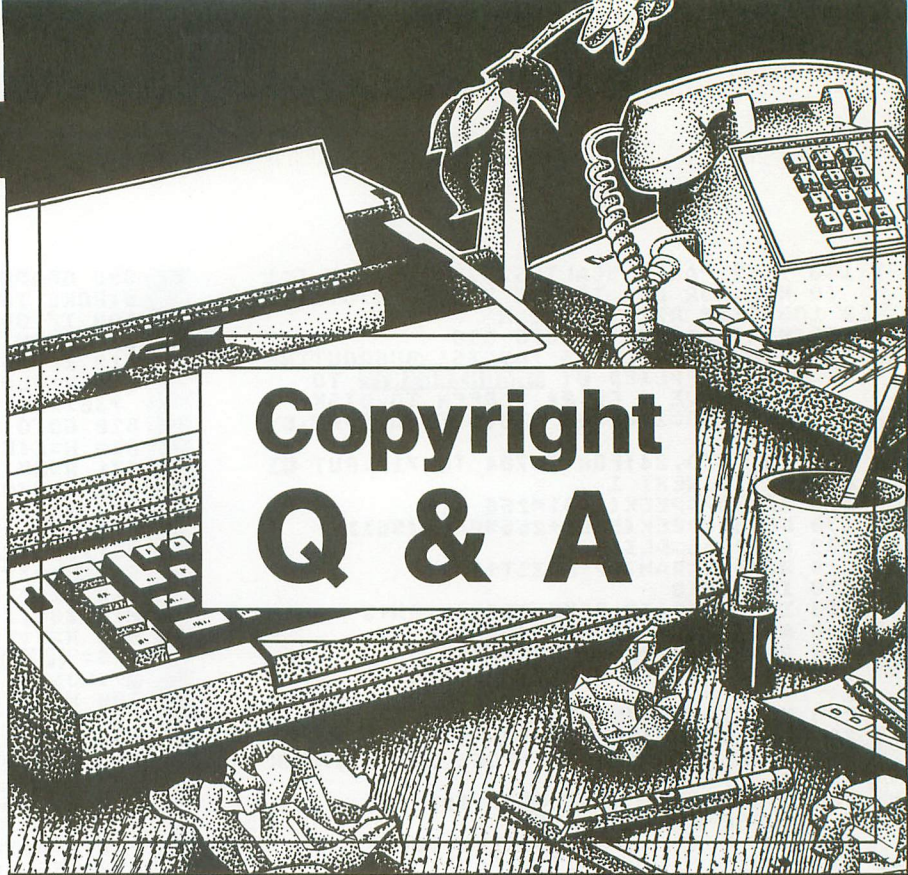
FY 130 ? :? "AUTO SCALING...":Z=0:FOR T=1
  TO NUM:FOR D=0 TO 6.3 STEP 0.075:GOSUB
  B 100+T:IF R>Z THEN Z=R
JC 140 NEXT D:NEXT T:GOTO 590
KK 150 REM *160-310 IS 'AS IS' SUBROUTINE
  SUPPLIED BY MAGNIPRINT TO
  SAVE A GR.24 SCREEN TO DISK.
QP 160 RW=8:IO=1:CLOSE #IO:OPEN #IO,RW,0,
  F$
IB 170 PUT #IO,24:FOR I=704 TO 712:PUT #I
  0,PEEK(I):NEXT I
NQ 180 RAMTOP=PEEK(106)*256
DO 190 DLIST=PEEK(560)+256*PEEK(561)
MY 200 ADDRESS=DLIST
FM 210 NUMBER=RAMTOP-DLIST+1
AF 220 IO=16*IO
OF 230 IOCB=832+IO:POKE IOCB+2,RW+3
X5 240 ADRHI=INT(ADDRESS/256)
FT 250 ADRLO=ADDRESS-ADRHI*256
KT 260 POKE IOCB+4,ADRLO:POKE IOCB+5,ADRHI
  I
QO 270 NUMHI=INT(NUMBER/256)
FN 280 NUMLO=NUMBER-256*NUMHI
QX 290 POKE IOCB+8,NUMLO:POKE IOCB+9,NUMHI
  I
NZ 300 I=USR(ADR("hhhLUV"),IO)
TF 310 CLOSE #IO/16:RETURN
HV 320 REM *49 SECOND SCREEN DUMP"
KQ 330 CLOSE #5:OPEN #5,8,0,"P:"
IE 340 ? #5;CHR$(27);"A";CHR$(8):FOR X=DM
  TO DM+39
OS 350 A$=CHR$(0):A$(192)=A$:A$(2)=A$
  360 Q=USR(1536,X,ADR(A$)):LPRINT CHR$(
  27);"K";CHR$(192);CHR$(0);A$:NEXT X:RE
  TURN
DD 370 SOUND 0,100,10,10:FOR T=1 TO 100:N
  EXT T:SOUND 0,0,0,0:POKE 764,255
ZC 380 T=PEEK(53279):IF T=3 THEN BD=BD+1:
  GOTO 600
GA 390 IF T=5 THEN GOSUB 160
ET 400 IF T=6 THEN GOSUB 330
PZ 410 IF PEEK(764)<>28 THEN 380
JL 420 BD=0:GOTO 470
EJ 430 RAD :DIM Q$(49),W$(49),E$(49),R$(4
  9),T$(49),F$(20),A$(193),Z$(169):GRAPH
  IC$ 24
AB 440 DM=PEEK(88)+PEEK(89)*256:DM=DM+40*
  191
IR 450 RESTORE 860:FOR T=1 TO 168:READ Q:
  Z$(LEN(Z$)+1)=CHR$(Q):NEXT T
CP 460 FOR T=1 TO 61:READ Q:POKE 1535+T,Q
  :NEXT T
MC 470 GRAPHICS 0:POKE 82,0:POKE 710,144:
  POKE 709,12:POSITION 0,0:?" DAVE
BADER'S POLAR PLOTTER! "
NB 480 ? "NUMBER OF FORMULA'S TO ENTER";:
  INPUT NUM:IF NUM>4 THEN 470
MK 490 FOR T=1 TO NUM
EQ 500 ? :? "K FORMULA ENTRY SCREEN:":?
  :? "INPUT FORMULA AS R=IN TERMS OF 'D
  ' WHERE 'D'=THETA"
AF 501 ? "FORMULA # ";T:INPUT Q$
SA 510 GOSUB 780+T:POKE 559,0:Q$(LEN(Q$)+
  1)=":RETURN":? "K":POSITION 0,6:?" 100+
  T;Q$:?" "CONT":POSITION 0,0
UH 520 POKE 842,13:STOP
YI 530 POKE 842,12:POKE 559,34:NEXT T
SK 540 ? :? "PLEASE CHOOSE [1] AUTOMATIC
  SCALING (ABS. BOUNDS) [2] MANUAL
  SETTING":INPUT T:IF T=1 THEN 560
CA 550 ? :? "ABSOLUTE ENDPOINTS":INPUT Z
YC 560 F$="D":?" :? "INPUT TITLE OF SAVED
  SCREEN (IF SAVED) IN MAGNIPRINT FORM
  AT (8 CHARACTERS MAX)"
SJ 570 INPUT Q$:IF Q$="" THEN F$="D:SCREE
  N.MP"
IO 580 F$(LEN(F$)+1)=Q$:IF T=1 THEN GOSUB
  130

```

```

GZ 590 GRAPHICS 24:POKE 710,58:POKE 712,5
  8:POKE 709,0:COLOR 1:GOTO 20
JX 600 IF BD=1 THEN GOSUB 670:TRAP 370:T=
  530:GOTO 30
TA 610 IF BD=2 THEN PLOT 275,55:DRAWTO 14
  1,167:PLOT 141,55:DRAWTO 275,167:GOSUB
  730:FOR Q=1 TO 3:T=530+Q:GOTO 30
PI 620 GOTO 370
PC 630 R=Z:RETURN
UR 631 R=3*(Z/4):RETURN
KM 632 R=Z/2:RETURN
LH 633 R=Z/4:RETURN
JK 670 FOR T=1 TO NUM:GOSUB 790+T:IF LEN(
  Q$)>39 THEN Q$=Q$(1,39)
AL 680 X=0:Y=(T-1):GOSUB 710:NEXT T:PLOT
  112,111:DRAWTO 302,111:PLOT 208,32:DRA
  WTO 208,190
GR 690 X=3:Y=6:Q$="":GOSUB 710:Y=7
  :Q$="ATARI":GOSUB 710:Y=8:Q$="
  ":GOSUB 710
EH 700 X=0:Y=10:Q$="ABS.ENDPOINTS":GOSUB
  710:Q$=STR$(Z):X=(14-LEN(Q$))/2:Y=11:
  GOSUB 710:RETURN
KT 710 Q=USR(ADR(Z$),X,Y,ADR(Q$),LEN(Q$))
  :RETURN
SQ 720 Q$="":GOSUB 710:RETUR
  N
GN 730 X=0:Y=12:GOSUB 720:Y=13:Q$="RADII
  CIRCLES":GOSUB 710:Y=14:GOSUB 720
FP 740 Q$=STR$(3*Z/4):Y=15:X=(14-LEN(Q$))
  /2:GOSUB 710:X=0:Y=16:GOSUB 720
TS 750 Q$=STR$(Z/2):Y=17:X=(14-LEN(Q$))/2
  :GOSUB 710:X=0:Y=18:GOSUB 720
HE 760 Q$=STR$(Z/4):Y=19:X=(14-LEN(Q$))/2
  :GOSUB 710:X=0:Y=20:GOSUB 720
ZR 770 RETURN
DU 781 W$=Q$:RETURN
AL 782 E$=Q$:RETURN
DB 783 R$=Q$:RETURN
DD 784 T$=Q$:RETURN
EO 791 Q$=W$:RETURN
ZD 792 Q$=E$:RETURN
DG 793 Q$=R$:RETURN
DZ 794 Q$=T$:RETURN
ZB 860 DATA 104,201,4,240,9,170,240,5,104
  ,104,202,208,251,96,104,133,215,104,13
  3,214,104,104,168,104,133
TZ 870 DATA 217,104,133,216,104,104,240,2
  36,133,212,24,165,214,101,88,133,214,1
  65,89,101,215,133,215,152,240,15
HE 880 DATA 165,214,105,64,133,214,165,21
  5,105,1,133,215,136,208,241,132,221,16
  0,0,132,220,177,216,160,0,170
IX 890 DATA 16,1,136,132,213,138,41,96,20
  8,4,169,64,16,14,201,32,208,4,169,0,16
  ,6,201,64,208,2
FF 900 DATA 169,32,133,218,138,41,31,5,21
  8,133,218,169,0,162,3,6,218,42,202,208
  ,250,109,244,2,133,219
DZ 910 DATA 164,221,177,218,69,213,164,22
  0,145,214,200,132,220,196,212,208,182,
  24,165,214,105,40,133,214,144,2
VQ 920 DATA 230,215,230,221,169,8,197,221
  ,208,159,96,207,96
HZ 930 DATA 104,104,141,21,6,104,141,20,6
  ,104,141,27,6,104,141,26,6,160,193,173
  ,255,255,136,240,35,141,255,255,238
BW 940 DATA 26,6,240,21,173,20,6,56,233,4
  0,141,20,6,144,4,24,76,19,6,206,21,6,7
  6,19,6,238,27,6,76,33,6,96

```



## Copyright Q & A

by Isaac Szlechter

This article was originally published in the July 1986 issue of *COMPUTER LANGUAGE*. We thought the topic deserved a return performance, since the legalities are often clouded.

One of the most legitimate concerns of a computer program writer is how to protect his work. When a computer manufacturer brings suit or settles a case out of court for copyright infringement involving an operating software program, it usually brings into focus the protection the copyright law offers.

To bring this protection to the attention of programmers, **ANALOG Computing** offers the following answers to frequently asked copyright questions.

**Q** What is copyright itself?

**A** Copyright is a form of protection provided by the laws of the U.S. to the authors of original works of authorship, including computer programs.

**Q** To what rights am I entitled under copyright law?

**A** The Copyright Act gives the owner of a copyright program the exclusive right to do and to authorize others to do the following:

- Reproduce the copyrighted program.
- Prepare derivative works based upon the copyrighted work.
- Distribute copies of the copyrighted program to the public by sale or other

transfer of ownership, or by rental, lease or lending.

These rights give you control over how your work is used, and assure you of receiving payment for any use of your work.

**Q** Who can claim copyright?

**A** Copyright protection subsists from the time the work is created. It is an incident of the process of authorship, and immediately becomes the property of the author who created the work. Only the author—or those deriving their rights through the author—can rightfully claim copyright.

**Q** In the case of works made for hire, who can claim copyright?

**A** The employer and not the employee is presumptively considered the author.

Seymour Vidur, a Brooklyn, New York attorney, explains, "the copyright statute defines a 'work made for hire' as: a work prepared by an employee within the scope of his employment; or a work specially ordered for use as a contribution to a collective work, as a supplementary work; or if the parties expressly agree in a written instrument signed by them that the work shall be considered a work made for hire."

**Q** What is not protected by copyright?

**A** Several categories of materials, listed below, are generally not eligible for statutory copyright protection.

- Works that have not been fixed in a tangible form of expression.
- Titles, names, short phrases and slo-

gans; familiar symbols or designs; mere variations of typographic ornamentations or lettering; mere listing of contents.

—Ideas, procedures, methods, systems, processes, concepts, principles, discoveries or devices, as distinguished from descriptions, explanations or illustrations.

—Works consisting entirely of information that is common property and contains no original authorship.

**Q** How can I secure a copyright?

**A** Under the law, copyright is secured automatically upon creation of the work. The way in which copyright protection is secured is frequently misunderstood. No publication or registration or other action in the Copyright Office is required. There are, however, certain definite advantages to registration.

**Q** What are the advantages of a copyright registration?

**A** The copyright law provides several advantages to encourage copyright owners to make registration.

—Registration establishes a public record of the copyright claim.

—Registration is ordinarily necessary before any infringement suits may be filed in court.

—If made before or within five years of publication, registration will establish *prima facie* evidence in court of the validity of the copyright.

—If registration is made within three months after publication of the work or prior to an infringement of the work, stat-





## What every programmer should know about these slippery laws.

utory damages and attorney's fees will be available to the copyright owner in court actions. Otherwise, only an award of actual damages and profits is available to the copyright owner.

**Q** *What do I have to do to register my program?*

**A** If you choose to register your program, send the following three elements to the Copyright Office in one envelope: a properly completed application Form TX; a \$10 filing fee payable to the Register of Copyrights; and a deposit of the program being registered.

**Q** *What are the deposit requirements?*

**A** For published or unpublished computer programs, one copy of identifying portions of the program (first twenty-five and last twenty-five pages), reproduced in a form visually perceptible without the aid of a machine or device, either on paper or in microform, together with the page or equivalent unit containing the copyright notice, if any.

"The Copyright Office believes that the best representation of the authorship in a computer program is a listing of the program in source code," says J. Smith, a Copyright Office spokesman.

If a published user's manual (or other printed documentation) accompanies the computer program, deposit two copies of the user's manual along with one copy of the identifying portion of the program.

**Q** *Is a notice of copyright required?*

**A** Yes, a notice of copyright is required, even on works published outside of the U.S.

**Q** *What should the notice contain?*

**A** The notice should contain the following elements: the symbol © [the letter C in a circle], or the word *Copyright*, or the abbreviation *Copr*; the year of first publication of the program; and the name of the owner of copyright (for example: © 1985 John Doe).

**Q** *Where do I affix the copyright notice?*

**A** Each of the following is an example of acceptable methods of affixation and position of notice:

—A notice embodied in the copies in machine-readable form, in such a manner that on visually perceptible printouts it appears either with or near the title, or at the end of the work.

—A notice that is displayed at the user's terminal at sign-on.

—A notice that is continuously on terminal display.

—A legible notice reproduced durably, so as to withstand normal use.

**Q** *How long does the copyright protection endure?*

**A** A program is automatically protected from the moment of its creation, and is ordinarily given a term enduring for the author's life, plus an additional fifty years after the author's death.

**Q** *Does my copyright protect me all over the world?*

**A** "There is no such thing as an 'international copyright' that will automatically protect an author's program throughout the entire world," explains Smith.

Protection against unauthorized use in a particular country depends on the laws of that country. However, most countries do offer protection to foreign works, under certain conditions simplified by international copyright treaties and conventions. For a list of countries which maintain copyright relations with the U.S., write to the Copyright Office, Washington, DC 20559, and ask for "International Copyright Relations of the U.S.," Circular R38a.

**Q** *How are transfers of copyrights made?*

**A** "Copyright," says Mr. Vidur, "is a personal property right, and is subject to the various state laws and regulations that govern the ownership, inheritance or transfer of personal property, as well as terms of contracts."

Transfers of copyright rights on a non-exclusive basis do not require a writing, but the transfer of exclusive rights is not valid unless that transfer is in writing—signed by the owner of the rights conveyed.

"It is a good idea to confer with a lawyer who specializes in computer law or intellectual property protection, before you enter into any agreement," says Mr. Vidur.

**Q** *What does "public domain" software mean?*

**A** Public domain means that the software

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# Copyright Q&A *continued*

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**Q** When does computer software become public domain?

**A** With very few exceptions, the copyright on any work published or copyrighted before September 19, 1906, has now expired by operation of law, and the work has permanently fallen into the public domain in the U.S. Also expired is the protection for software first published or copyrighted between September 19, 1906 and December 31, 1949, but not renewed.

Under the copyright law in effect prior to January 1, 1978, copyright could be lost and, therefore, software would become public domain in several situations. The most common were: publication without the required copyright notice, expiration of the first 28-year copyright term without renewal, or final expiration of the second copyright term.

For work first published on and after January 1, 1978, certain omissions of or defects in the notice of copyright may lead to loss of copyright protection if specific steps are not taken to correct or cure the omissions or defects.

Mrs. Rich, a Copyright Office Information Specialist, explains that "software becomes 'of public domain' if the author

leaves the copyright notice off, fails to register his work within five years after the publication without notice, and does not make a reasonable effort to add the notice to all copies that are distributed to the public in the U.S. after the omission has been discovered."

**Q** How can I find out the copyright status of a computer software work?

**A** There are several ways you can find out whether software is under copyright protection and, if so, the facts of the copyright. These are the main ones:

—Examine a copy of the work for such elements as a copyright notice, place and date of publication, author and publisher.

—Make a search of the Copyright Office catalogs and other records.

—Have the Copyright Office make a search for you.

Copyright investigations often involve more than one of these methods. In many cases, it is important to consult a copyright attorney before reaching any conclusions regarding the copyright status of computer software.

Even if you conclude that a work is in the public domain in the U.S., this does not necessarily mean you are free to use it in other countries. Every nation has its own laws governing the length and scope of copyright protection, and those regulations are applicable to uses of the work

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**Q** Where can I get additional information?

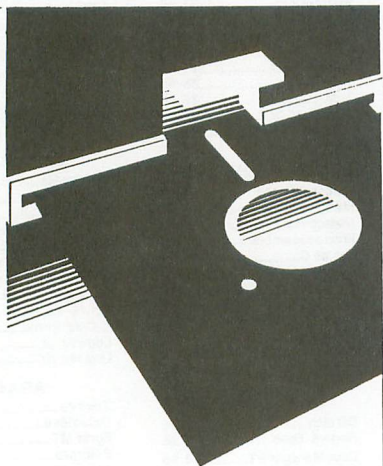
**A** Questions relating to copyright problems not mentioned in this article can be addressed to the Information and Publications Section, LM-455, Copyright Office, Library of Congress, Washington, DC 20559.

The following publications may be obtained: Circular R1 "Copyright Basics"; Circular R2 "Publications on Copyright"; Circular R22 "How to Investigate the Copyright Status of a Work"; Circular R61 "Copyright Registration for Computer Programs"; and Circular R99 "Highlights of the Current Copyright Law."

The hot-line number is (202) 287-8700. You can order applications forms at any time by telephoning (202) 287-9100. **A**

*Isaac Szlechter, a New York City-based free-lance writer, specializes in business and technology reporting for various magazines. He has a Bachelor of Science degree from the University of the State of New York, and is a member of the Authors Guild.*

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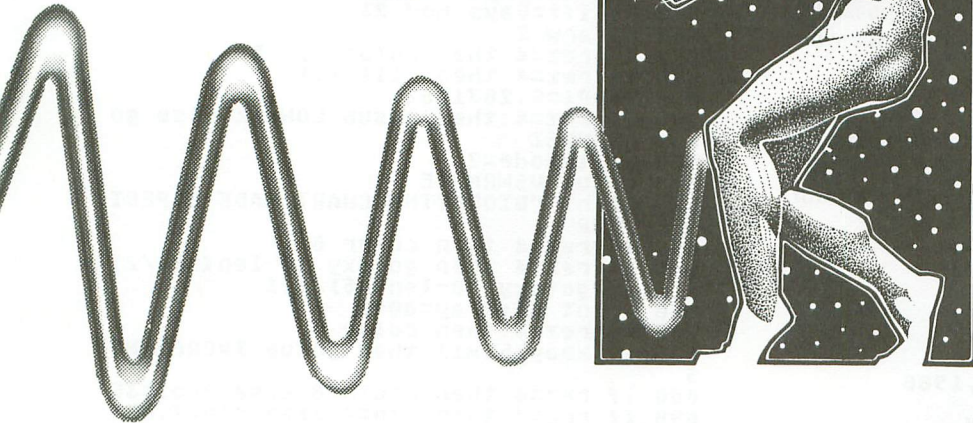
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# Bio-signs



**A program to show you what rhythm your body's following.**

by Patton Lockwood

Writing a bio-rhythm program has always been a challenge and, for many, a rite of passage—from innocence to a start toward mastery of a computer language.

Analyzing a bio-rhythm program someone else has written can be equally challenging. The following program, based on a prehistoric version that clanked over the teletype terminals back in 1975 (did they really have computers back then?), has been drastically modified and enhanced to run on the Atari ST.

**Bio-signs** was written primarily to explore the capabilities of ST BASIC, as well as the ST color monitor's ability to produce brilliant primary colors. The high-resolution output is a bit slower (there are four times as many pixels to deal with), but this mode produces a superior printout on a dot-matrix printer (Epson FX or Panasonic 1091).

The charts generated by **Bio-signs** have been checked for accuracy. All three sine waves will start at 0 on your birthday and return to 0,0,0 only after 21252 (33\*28\*23) days—58 years and 69 days later. Check it, starting with a birthdate of January 1, 1900. The curves should come together again on March 10, 1958. The three sine waves (which are color coded in the low-resolution output) have the correct periods. The "Intellectual" curve repeats every 33 days; the "Emotional," every 28 days; and the "Physical," every 23 days. The GEM window is scaled to 33 days and divided into one-week blocks which are clearly labelled.

The theory of bio-rhythms, as a means of explaining and predicting your life, is based on the assumption that three cycles regulate your emotional, physical and intellectual capacities. Starting on the day you were born, they continue until the day you die. According to this theory, when the sine waves that trace these cycles are "High," your poten-

tial in these areas is strongest. When they are "Low," your potential is weakest. In addition, when a curve crosses the zero level in either direction, the capacity it represents is—at that time—particularly unpredictable and unstable. A day when this happens is considered "Critical."

If the curves don't happen to match up with the facts in your life, there are three popular rationalizations: (1) your cycles got messed up because of a serious illness or a traumatic injury you experienced earlier in life; (2) you're a left-brain dominated person and should be using cosine rather than sine waves (substitute the cosine function for the sine function in Line 860 to invert the curves); and (3) the theory is really not scientific, but provides us with an intriguing stimulus to consider carefully these three important dimensions of our lives.

### Using *Bio-signs*.

The headings in the listings indicate the major elements of the program. Comments indentify many of the subordinate steps. **Bio-signs** will work on both monochrome and color monitors; choose high or low resolution. The latter uses color changes liberally. The high-resolution version uses different lines for the three sine waves.

To run the program after you've typed it in (or loaded it from disk): (1) double-click the BASIC.PRG icon; (2) on the file menu, first select "Load" and then click on **BIO-SIGNS.BAS**; and (3) type Run or click "Run" on the run menu, then follow the prompts.

After the chart is on-screen, pressing RETURN will offer you two options. Type in Y to start another chart, any other letter on the keyboard to quit.

A screen dump is a standard procedure on the ST. It can be done at any time by holding down ALTERNATE and pressing HELP. Before you can dump any screen to a printer, however, you'll need to change the printer configuration.

# // Bio-signs *continued*

If your TOS is on disk, click the "Install Printer" item on the desk menu and change the pixels/line from 1280 to 960 by clicking the appropriate box.

If your TOS is in ROM, you'll have to start up with the ST Language Disk, or use an ST Utility Disk to get the "Install Printer" capability. Switching from 1280 to 960 allows the entire bio-chart to fit across the width of a standard 8½x11-inch piece of paper. The monochrome chart prints clearly and is a joy, but the dump from the color monitor produces sine curves which are difficult (if not impossible) to differentiate, unless you're one of the favored ones who happens to have a color printer.

Have fun! **A**

Patton Lockwood is a professor of speech and theatre at Longwood College in Farmville, Virginia. He purchased his 520ST last October, and is currently learning to program in Modula-2.

## Listing 1. ST BASIC listing.

```

10 '      BIOSIGNS
20 '      by Patton Lockwood, June, 1986
30 '
40 '      COLLECT INFORMATION
50 dim a(12), b(12)
60 dim a$(3), m$(36), n$(20)
70 m$="JANFEBMARAPR MAYJUNJULAU GSEPOCTN
OVDEC"
80 fullw 2:clearw 2
90 rez=peek( systab )
100 if rez=2 then gosub CHECKREZ
110 gotoxy 2,5
120 print "YOUR NAME, PLEASE"
130 gotoxy 12,6: input n$
140 gotoxy 2,7
150 print "BIRTHDAY (M,D,Y) e.g. 2,16,
1930";
160 gotoxy 18,8: input m,d,y
170 if m>=1 and m<=12 then 200
180 gosub CHECKMONTH
190 goto 140
200 if d>=1 and d<=31 then 230
210 gosub CHECKDAYS
220 GOTO 140
230 gotoxy 2,9
240 print "START CHART (M,D,Y) e.g. 7,
8,1986"
250 gotoxy 18,10: input m1,d0,y1
260 if m1>=1 and m1<=12 then 290
270 gosub CHECKMONTH
280 goto 230
290 if d0>=1 and d0<=31 then 320
300 gosub CHECKDAYS
310 goto 230
320 '      DAYS LIVED
330 restore
340 for x=1 to 12: read a(x): next x
350 DATA 0,31,59,90,120,151,181,212,24
3,273,304,334
360 for x=1 to 12: read B(x): next x
370 DATA 31,28,31,30,31,30,31,31,30,31
,30,31
380 j=a(m)+d: 'days before birthday
390 if y=y1 and m=m1 then Days=d0-d:go
to 520
400 if y=y1 then gosub SAMEYEAR
410 IF y=y1 then goto 520
420 d1=365-j+abs((j<=60) and (y/4=int(
y/4)))': 'days in BirthYear
430 d2=365*(y1-(y+1))

```

```

440 LeapDays=0
450 for CYear=y+1 to y1-1
460 LeapDays=LeapDays+abs(CYear/4=int(
CYear/4))
470 next CYear
480 d3=A(m1)+d0: 'days in target month
490 d3=d3+abs(y/4=int(y/4) and (d3)>=60
))
500 Days=d1+d2+d3+LeapDays
510 '      DETERMINE CYCLES' PHASE
520 IShift=Days mod 33
530 EShift=Days mod 28
540 PShift=Days mod 23
550 clearw 2
560 if rez=4 then color 2,1,5
570 if rez=4 then fill 1,1
580 TwoPi=6.2831852
590 if rez=4 then gosub LOWREZ else go
sub HIGHREZ
600 writemode=2
610 gosub VSWRMODE
620 print "BIORHYTHM CHART MADE ESPECI
ALLY FOR"
630 if rez=4 then color 6
640 if rez=4 then gotoxy 18-len(n$)/2,
1 else gotoxy 18-len(n$)/4,1
650 print n$:XDay=d0+1
660 if rez=4 then color 5
670 if XDay>b(m1) then gosub INCREMENT
5
680 if rez=4 then rcol=28 else rcol=35
690 if rez=4 then stp=7 else stp=7.85
700 for x=0 to rcol step stp
710 gotoxy x+0.5,15:print XDay
720 gotoxy x+0.5,16
730 print mid$(m$,m1*3-2,3)
740 XDay=XDay+7
750 if XDay>b(m1) then gosub INCREMENT
5
760 next x
770 if rez=4 then gosub LOWREZINFO els
e gosub HIGHREZINFO
780 Pixels=IPixels
790 c=IShift/33*TwoPi
800 if rez=4 then color 2,1,3
810 '      SINE WAVE LOOP
820 for z=1 to 3
830 oldx=0
840 for x=0 to MaxPix
850 if x>=MaxPix-1 goto 980
860 y=a*sin((-TwoPi*x/Pixels)-c): 'the
key formula
870 y=y+XAxis: 'center curve on x-axis
880 if x=0 then goto 970
890 if rez=4 goto 960
900 if z=1 then linef oldx,oldy,x,y
910 if z=2 then linef oldx,oldy-1,x,y-
1
920 if z=2 then linef oldx,oldy+1,x,y+
1
930 if z=3 then linef oldx,oldy-2,x,y-
2
940 if z=3 then linef oldx,oldy+2,x,y+
2
950 goto 970
960 linef oldx,oldy,x,y
970 oldx=x: oldy=y
980 next x
990 if z=1 then gosub EMOTIONAL
1000 if z=2 then gosub PHYSICAL
1010 next z
1020 if rez=4 then gotoxy 34,16 else g
otoxy 37,17
1030 input WAIT$
1040 if rez=4 then gotoxy 2,17 else go
toxy 10,19
1050 print "Another chart? (Y or N)<RE
TURN>";

```

```

1060 input a$:if a$="Y" or a$="y" then
80
1070 clearw 2
1080 END
1090 PHYSICAL:
1100 Pixels=PPixels
1110 c=PSHIFT/23*TwoPi
1120 if rez=4 then color 2,1,2
1130 return
1140 EMOTIONAL:
1150 Pixels=EPixels
1160 c=ESHIFT/28*TwoPi
1170 if rez=4 then color 2,1,12
1180 return
1190 INCREMENTS:
1200 XDay=XDay-b(m1)
1210 m1=m1+1
1220 if m1=13 then y1=y1+1
1230 if m1=13 then m1=1
1240 return
1250 VSWRMODE:
1260 poke contrl,32
1270 poke contrl+2, 0
1280 poke contrl+6, 1
1290 poke intin,2
1300 vdisys( 1 )
1310 return
1320 CHECKMONTH: clearw 2
1330 print "PLEASE SELECT A MONTH"
1340 print "BETWEEN 1 AND 12!"
1350 return
1360 CHECKDAYS:clearw 2
1370 print "PLEASE SELECT A DAY"
1380 print "BETWEEN 1 AND 31!"
1390 return
1400 SAMEYEAR:
1410 Days=(a(m1)+d0)-(a(m)+d)
1420 Days=Days+abs((y/4)+int(y/4) and
a(m)+d<=60 and a(m1)+d0)=60)
1430 return
1440 LOWREZ: a=40: 'amplitude in pixe
ls
1450 linef 0,83,303,83: 'the X-axis
1460 XAxis=83:dV=0: 'divisions
1470 for z=0 to 304 step 9.2
1480 dV=dV+1
1490 if dV=2 or dV=9 or dV=16 or dV=23
or dV=30 then goto 1520
1500 linef z,XAxis,z,XAxis+3
1510 goto 1530
1520 linef z,40,z,134
1530 next z:gosub VSWRMODE:gotoxy 2,0
1540 return
1550 HIGHREZ: a=100: 'amplitude in pix
els
1560 linef 0,150,616,150
1570 XAxis=150:dV=0: 'division mark
1580 for z=0 to 616 step 18.65
1590 dV=dV+1
1600 if dV=2 or dV=9 or dV=16 or dV=23
or dV=30 then goto 1630
1610 linef z,XAxis,z,XAxis+6
1620 goto 1640
1630 linef z,45,z,255
1640 next z:gotoxy 9,0
1650 return
1660 LOWREZINFO:
1670 gotoxy 0,17:print y1:; 'year of c
hart
1680 color 3:print "Intellectual ";
1690 color 12:print "Emotional ";
1700 color 2:print "Physical";
1710 IPixels=304:EPixels=258:PPixels=2
12
1720 MaxPix=304
1730 return
1740 HIGHREZINFO:
1750 gotoxy 0,17:print y1:; 'chart yea

```

```

r
1760 gotoxy 10,18:print "Intellectual"
1770 gotoxy 20,18:print "Emotional"
1780 gotoxy 30,18:print "Physical"
1790 linef 120,318,160,318
1800 linef 290,318,330,318:linef 290,3
16,330,316
1810 linef 460,316,500,316:linef 460,3
20,500,320
1820 IPixels=616:EPixels=522.66666:PPi
xels=429.33333
1830 MaxPix=616
1840 return
1850 CHECKREZ:
1860 print "Please use HIGH or LOW res
olution"
1870 print "Press <RETURN> to clear sc
reen":input WAIT$
1880 clearw 2
1890 END

```

ST CHECKSUM DATA.  
(see page 77)

```

10 data 583, 248, 356, 120, 911, 653
, 192, 526, 739, 357, 4685
110 data 713, 700, 937, 728, 259, 40
1, 512, 761, 412, 453, 5876
210 data 475, 393, 733, 341, 982, 64
1, 760, 410, 599, 474, 5808
310 data 391, 880, 550, 225, 124, 23
3, 522, 382, 537, 21, 3865
410 data 35, 475, 246, 853, 47, 223,
990, 740, 577, 386, 4572
510 data 765, 761, 761, 787, 389, 66
6, 225, 264, 750, 4, 5372
610 data 479, 319, 239, 17, 826, 246
, 48, 924, 728, 525, 4351
710 data 672, 190, 31, 975, 44, 323,
866, 500, 754, 648, 5003
810 data 530, 853, 247, 656, 452, 41
2, 26, 895, 595, 587, 5253
910 data 959, 950, 969, 960, 441, 15
0, 451, 333, 71, 819, 6103
1010 data 381, 834, 895, 799, 579, 8
40, 537, 919, 803, 604, 7191
1110 data 739, 413, 443, 910, 587, 7
21, 517, 448, 51, 442, 5271
1210 data 200, 968, 531, 447, 859, 2
95, 424, 430, 93, 807, 5054
1310 data 447, 178, 297, 359, 451, 9
94, 992, 363, 455, 795, 5331
1410 data 147, 524, 452, 69, 994, 84
2, 197, 343, 648, 644, 4860
1510 data 568, 347, 29, 456, 183, 49
1, 561, 408, 347, 648, 4038
1610 data 654, 575, 365, 809, 460, 1
25, 183, 260, 541, 160, 4132
1710 data 107, 825, 461, 253, 768, 7
29, 102, 848, 749, 141, 4983
1810 data 110, 361, 840, 465, 815, 2
35, 572, 562, 944, 4904

```







## Word Magic/ Graphic Magic

by Blue Collar Software  
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by Randall Krippner

**Word Magic** and **Graphic Magic** are a pair of programs that provide your 800 with a word processor capable of inserting high-resolution graphics into a document.

On seeing the low price of this package, I was a bit skeptical as to how well it would perform. I was pleasantly surprised. **Word Magic (WM)** and **Graphic Magic (GM)** possess capabilities I would have expected only from programs costing far more.

**Word Magic** is installed by running a BASIC program from the WM disk. This allows you to set up the default characteristics of the word processor, printer driver and print formatting. You select screen colors, scrolling speed, and insert or overstrike mode. You must also select format defaults for justification, margins, page size, lines per inch; control codes for boldface and underlining for non-Epson printers, etc. Most of these defaults can be changed with control characters embedded in your text.

**Word Magic** can be used with any printer, but graphics and special character fonts are available only with Epson-compatible printers.

Once the installation is finished, you can run the program. **WM** offers all the usual functions of a word processor, and a few extras I hadn't expected.

When you edit a document, **WM** places you in the standard 40x24 text mode. The bottom three lines of the display are re-

served to show your status. The name of the file you're working on is displayed, and you're told whether you're in "Insert" or "Overstrike" mode, and how much RAM is left for your text.

Cursor movement is controlled by the arrow keys or a joystick. I found the latter addictive, because it let me quickly scan an entire document, or move the cursor more slowly by holding down the fire button.

**WM** offers full text-formatting capabilities via control characters embedded in the text. You can set up left, right, top and bottom margins, overriding the default values. You can change page length, page width and spacing, as well as indentation and justification. You can vary type fonts (with an Epson-compatible printer) to switch between italics, expanded and enhanced printing, and superscripts and subscripts are supported. **WM** also features headers and footers. It has just about every text-formatting option imaginable.

**WM's** right justification works, but not well. The program right justifies text by inserting extra spaces between words, but the spaces aren't distributed through the line evenly. Instead, they're inserted between the last few words on the line. This makes the text look rather peculiar when printed.

The **SELECT** and **OPTION** keys are used to perform other editing functions. **SELECT** used with **T**, **B**, **L** and **R** allows you to quickly move to the top or bottom of a document, or to the left or right ends of a line.

The **OPTION** key gives you access to **WM's** block move and search functions. There's the usual global search and replace, plus a very powerful block function. You can define a block of text and copy it, move it—even save it to disk.

**WM** supports chaining of documents during printing, and merging of files. Documents are chained together by using the **CTRL-A** function. Files so joined will be printed as if they were a single document.

A manuscript saved on disk can be merged into your text file via the "Include" function. Just hold down **OPTION** and press **I**. **WM** will ask for the name of the disk file to include, will read that file from disk, and will insert it at the cursor position.

Embedding graphics in text is done in a manner similar to using the "Append" function: Type a **CTRL-G**, followed by the name of the file containing the picture you wish printed in your document. The picture file must be processed by **GM** before **WM** can use it. We'll talk more about this later.

Before you print a document, it must be saved to disk. Select the "Print" option from the main menu. You'll be asked for the name of the file to print, then presented with a menu full of print format options. At this point, you can change many of the default print format settings. **WM** even allows you to print multiple copies.

However, printing with **WM** is one function that I didn't like. It's slow and the disk drive runs constantly through the



process. It can take several minutes to print out a long document, with the drive running all the while. That seems like an awful lot of wear to me, on both the drive and the disk.

Using WM's "View" command is similar to printing. The same prompts and options are displayed, and the file is seen on-screen, a page at a time in graphics mode, with dots representing characters. This is especially helpful if you're including graphics in a document. Pictures are displayed as boxes, allowing you to see where the picture is going so you can make any adjustments.

Graphic Magic is a good graphics utility in its own right. It permits you to load, view and print graphics created with several different programs, including MicroPainter, MicroIllustrator, KoalaPad, B/Graph and graphics 8 files.

Once you have the artwork loaded, you can create a picture file for use with WM. Before this is actually created, you specify whether the picture is to fill 1/2 or 1/4 of

a page and how many spaces you want it indented. You'll be asked if you want reverse polarity, too. (With some graphics programs, such as MicroPainter, a picture can end up printing like a photographic negative. This option lets you reverse polarity so the picture will print normally.)

The first time I made up a picture file for Word Magic, I thought something had gone wrong. It just kept going and going, with the disk drive churning away for a minute or more. When done, the picture file GM created was more than 400 sectors long! Fortunately, picture files don't need to be on the same disk as text files. If Word Magic doesn't find the specified file on the disk in the drive, it will ask you to insert the correct disk when needed.

There are a few problems with Word Magic. One is that you get no printed documentation. Instructions are, instead, stored on the back side of the program disk. You get them by booting up the back side of the disk with BASIC. The docu-

mentation can be seen on-screen or sent to a printer, one page at a time. It took me ten minutes at the keyboard, hitting the SPACE BAR after each page came out, to get my hard copy. There should have been an option to print it out all at once.

The documentation consists of 17 pages of single-spaced text. All the features are mentioned, but with no examples. Descriptions of the functions are brief and sometimes hard to understand.

On-screen formatting of text sometimes looks strange with WM. Occasionally, when deleting or inserting text in the middle of a document, I've ended up with a line containing only a single word. But after I saved the document to disk and printed or reloaded it, I found the text appeared normal.

All things considered, Word Magic and Graphic Magic make an excellent combination. At \$19.95, this program is a bargain. I wouldn't hesitate to recommend it to someone looking for a full-featured, inexpensive word processor.

Word Magic/Graphic Magic comes on a single, unprotected disk. The spelling checker program Spell Magic is also available from The Catalog for \$19.95. A version for the Atari 130XE includes Word Magic, Graphic Magic and Spell Magic, for \$29.95. ■

Randall Krippner has been involved with microcomputers since 1979. What started out as a hobby has turned into a part-time job, which includes training, programming and system analysis for small businesses.

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This upgrade for the XL and XE computers allows the use of three different operating systems. Comes with the OSNXL OS that includes the FASTCHIP (floating point routines) and the OMNIMON XL/XE machine language monitor. The OSNXL OS is compatible with the 400/800 OS, but has programmable cassette baud rates, increased keyboard speed, and all the graphic modes.

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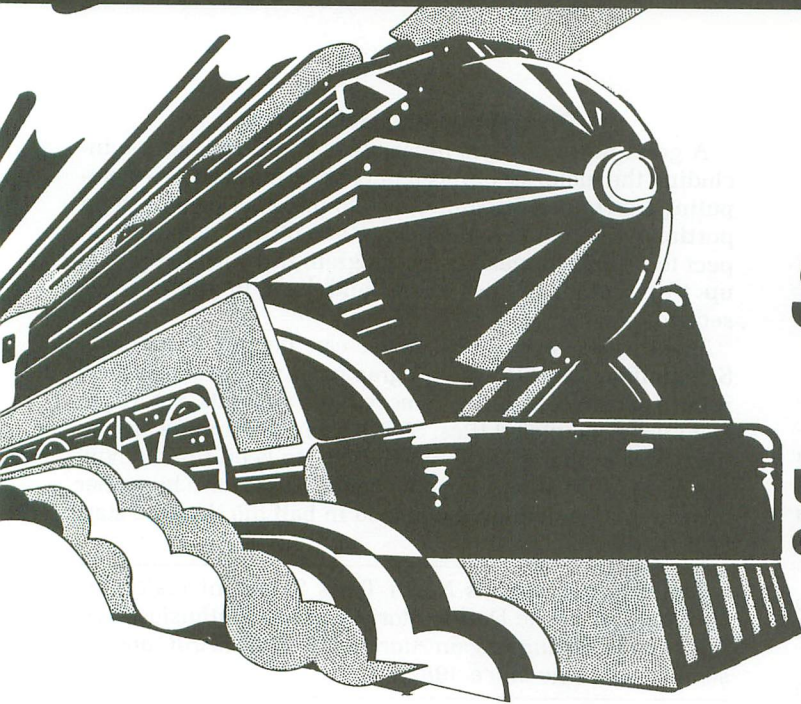
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# Streamliner

Up the loading efficiency of your machine language files.

by James Hague

Binary files. If there's one thing Atari owners have a lot of, it's definitely binary files. Whaddaya mean you don't have any? Sure you do! How about the flashy new machine language game you just downloaded from the local BBS? What about that slick utility written by the resident assembler whiz? See, how could you survive without 'em?

Okay, so you do have a large supply of (legal, naturally) binary files. What you probably don't know is that a lot of these files are larger and klunkier than they ought to be, and take longer to load than they should. Have you ever wondered why the loading of some files is accompanied by an uninterrupted stream of *beep-beeps*, while others seem to pause between each beep? This is *not* the fault of your disk drive, but rather of the binary files themselves—and, yes, it can be corrected.

**Streamliner** is an all machine language utility which takes binary files and whips them into tip-top condition. The resulting "Streamlined" files are shorter and, more importantly, can load up to three times faster than they could before. Please note that **Streamliner** is *not* a file compressor, in the sense that compressed files must be uncompressed before they can be used. **Streamliner's** output is merely a more tightly packed version of a binary file, which can be loaded in the usual manner (DOS option L, etc.)

### Typing it in.

Listing 1 is the BASIC data used to create the **Streamliner** file on disk. Listing 2 is for people who are interested in assembly language programming. You do not have to type it in.

Refer to the **M/L Editor** article on page 10 for complete typing instructions.

### The mechanics of Streamlining.

Before learning how to use the program itself, let's see what kind of files will benefit most from being Streamlined. I'll try not to get too technical, but if you think I'm going too fast, just raise your hand—I'll slow down.

There are three cases in which binary files contain unnecessary information that can be removed by **Streamliner**:

**Case #1:** binary files created by many popular assemblers and compilers. The reason for this is that most language systems break a file up into many *segments*. A segment is part of a binary file that consists of a block of data and 4 bytes to tell where in memory that data is to be loaded.

What most assemblers and compilers do is create a lot of little segments, instead of one big fat one. For example, an assembler might create a group of 100-byte segments, with the first one to be loaded at memory location 400, the second at 500, the third at 600, and so on. Doesn't it make sense that, since each segment loads into memory right after its predecessor, the whole file could be turned into one huge segment? And, since there's a 4-byte penalty for each segment in the file, 4 bytes would be eliminated for each segment removed. More importantly, the file can be loaded substantially faster, since DOS doesn't have to stop and think between each segment. Easy, right?

Some of the assemblers and compilers that break files up into a lot of short segments are: MAC/65 (which always makes 251-byte segments), the Atari Macro Assembler, Deep Blue C and the public domain Ace C. Surprisingly, the Atari Assembler Editor doesn't divide files.

**Case #2:** binary files that have been concatenated

(linked together). This most commonly occurs with AUTORUN.SYS files.

Let's say you have three great machine language programs which extend the capabilities of Atari BASIC (like the ones Angelo Giambra writes). Now, you can't have three AUTORUN files, so you clump them all together using the DOS copy option with append (by adding /A). The files will be combined into one, but 2 extra bytes will be inserted for every file that is concatenated to the first. Messy, messy. . .

Well, that's why files contain extraneous information—which wastes space and adds precious seconds to your loading time. Case #1 is definitely the most common, and is by far the worst offender when it comes to creating inefficient binary files. Remember, you didn't have to create the file in order to Streamline it.

### Down to business.

Now that you know all about why some binary files are not as nice and neat as they could be, let's just sit back and relax while **Streamliner** does all the work.

Upon loading **Streamliner** (which has already been Streamlined, by the way) you'll be presented with a screen consisting of two windows. The top one, the larger of the two, is the information window. It contains all sorts of neat little statistics about what is happening to a particular file. Underneath that is the interaction window, which is, not surprisingly, where you interact with **Streamliner**.

**Streamliner** is very user friendly; it's probably the easiest-to-use utility ever created. Just insert the disk containing the binary file you wish to clean up into drive 1, then type its name at the *Enter filename* prompt. That's all there is to it. Actually, this *difficult* task is made even easier by the fact that **Streamliner** will only let you type in a legal filename. It would have been a whole lot simpler for me to have left out the error checking involved here, but Atari owners deserve only the best, right?

It doesn't matter if the file is locked, because this will be detected and the file will be unlocked. When **Streamliner** is finished doing its thing, the file will be relocked for you. This prevents you from having to unlock all of your existing files before being able to Streamline them. Nice.


While the disk drive is busily whirring away, the information window will be constantly displaying information about what's happening. Counts of both bytes read and bytes written are maintained on-screen. Also, the number of extra segments and extra bytes found in a file are shown, to enable you to see how much or how little the file has been improved. Look at it as a cheap form of entertainment—it does cost less than going to the movies.

If a file doesn't need to be Streamlined (i.e., contains no extra bytes or segments), then the message *No need to re-write. Press a key* will appear. There's no reason for a heart attack; the file will remain on disk unaltered.

The only limitation of **Streamliner** is that the size of the file you can work with depends on how much memory you have available. This is because the entire file is stored in RAM, so it can overwrite the original. With 48K, I doubt that this should be much of a problem. The worst thing that could happen: you'll receive a *File too large* message.

### Disclaimer and datclaimer.

A good portion of the binary files you'll run across, including the majority of those published in **ANALOG Computing** won't need Streamlining. On the other hand, a good portion will need it—some more than others. Just don't expect to be able to make every program in your library take up two sectors of disk space and load in under three seconds.

Practically every Atari owner can benefit from using **Streamliner**. Non-BASIC programmers will probably find it indispensable, as it can remove large amounts of garbage from their completed files. SYSOPs can Streamline any binary files available for downloading, to keep things moving along. And almost anyone would like to have his or her favorite public domain game load in half the time. So start typing. 

---

*James Hague attends North Texas State University and is a member of the Dallas Atari Computer Enthusiasts. He has been programming an Atari 800 in both BASIC and assembly language since 1982.*

---

### Listing 1. M/L Editor data.

```
1000 DATA 255,255,160,34,8,42,112,112,
112,112,112,112,71,0,33,112,2267
1010 DATA 6,112,2,2,2,2,2,2,2,112,2,
2,2,2,65,3724
1020 DATA 160,34,216,32,209,34,32,145,
36,32,37,37,32,25,39,48,8271
1030 DATA 245,32,188,40,76,192,34,32,1
01,228,169,3,141,15,45,169,4595
1040 DATA 112,133,16,141,14,210,162,1,
142,68,2,202,142,1,210,142,6188
1050 DATA 8,210,141,47,2,138,157,0,33,
157,208,33,232,224,208,208,1177
1060 DATA 245,162,31,189,103,35,157,0,
33,189,135,35,157,32,33,189,4402
1070 DATA 167,35,157,32,34,202,16,235,
162,21,189,199,35,157,131,33,6561
1080 DATA 189,221,35,157,163,33,189,24
3,35,157,195,33,189,9,36,157,6785
1090 DATA 227,33,202,16,229,162,4,189,
31,36,157,196,2,202,16,247,7474
1100 DATA 169,160,141,48,2,169,34,141,
49,2,169,33,141,47,2,162,2423
1110 DATA 32,169,3,157,66,3,169,36,157
,68,3,169,36,157,69,3,1839
1120 DATA 169,4,157,74,3,169,0,157,75,
3,76,86,228,51,52,50,2180
1130 DATA 37,33,45,44,41,46,37,50,0,54
,17,14,16,192,226,249,3849
1140 DATA 192,234,225,237,229,243,192,
232,225,231,245,229,192,128,128,128,72
60
1150 DATA 128,128,128,128,169,174,166,
175,178,173,161,180,169,175,174,128,34
49
1160 DATA 183,169,174,164,175,183,128,
128,128,128,128,128,128,128,128,95
52
1170 DATA 128,128,128,128,169,174,180,
165,178,161,163,180,169,175,174,128,33
89
1180 DATA 183,169,174,164,175,183,128,
128,128,128,128,128,128,34,121,116,795
9
1190 DATA 101,115,0,50,101,97,100,63,6
3,63,63,63,63,63,63,312
1200 DATA 63,0,0,34,121,116,101,115,0,
```

55,114,105,116,116,101,110,3798  
1210 DATA 63,63,63,63,63,63,63,0,0,37,  
120,116,114,97,0,34,9440  
1220 DATA 121,116,101,115,63,63,63,63,  
63,63,63,63,63,63,37,9858  
1230 DATA 120,116,114,97,0,51,101,103,  
109,101,110,116,115,63,63,3072  
1240 DATA 63,63,63,63,63,70,10,148,3,2  
4,75,58,155,72,56,106,1206  
1250 DATA 74,74,74,153,64,33,200,104,4  
1,15,9,16,153,64,33,200,2446  
1260 DATA 96,162,2,160,87,181,156,32,3  
9,36,202,16,248,96,162,2,5350  
1270 DATA 160,119,181,159,32,39,36,202  
,16,248,96,160,153,165,163,32,7965  
1280 DATA 39,36,165,162,76,39,36,160,1  
85,165,165,32,39,36,165,164,6304  
1290 DATA 76,39,36,169,64,141,190,2,16  
2,32,169,7,157,66,3,169,4175  
1300 DATA 0,157,72,3,157,73,3,141,182,  
2,76,86,228,162,16,169,5916  
1310 DATA 12,157,66,3,76,86,228,169,9,  
133,170,169,42,133,171,169,8676  
1320 DATA 0,133,155,162,2,149,156,149,  
159,202,16,249,162,1,149,162,9449  
1330 DATA 149,164,202,16,249,162,25,18  
9,198,36,157,99,33,202,16,247,8887  
1340 DATA 32,59,36,32,72,36,32,85,36,7  
6,97,36,38,105,108,101,989  
1350 DATA 63,63,63,63,63,63,63,63,63,6  
3,63,63,63,63,63,9918  
1360 DATA 63,63,46,47,46,37,134,168,13  
2,169,160,0,177,168,201,155,9395  
1370 DATA 240,6,153,96,34,200,208,244,  
169,0,192,32,176,6,153,96,7463  
1380 DATA 34,200,208,246,96,138,72,32,  
14,39,162,175,169,20,141,0,4480  
1390 DATA 210,142,1,210,169,0,133,20,1  
65,20,201,2,144,250,202,224,569  
1400 DATA 160,176,238,104,170,32,224,3  
6,76,244,37,162,228,160,37,32,7686  
1410 DATA 224,36,162,2,134,144,189,225  
,37,149,128,56,233,32,157,112,8384  
1420 DATA 34,202,16,242,32,244,37,232,  
134,154,166,144,232,169,63,157,1752  
1430 DATA 112,34,32,109,36,166,144,224  
,2,240,77,201,155,208,17,181,9873  
1440 DATA 128,201,46,208,3,198,144,202  
,232,169,155,149,128,76,200,37,358  
1450 DATA 201,126,208,16,165,154,240,2  
,198,154,169,0,232,157,112,34,8655  
1460 DATA 198,144,208,198,164,154,192,  
4,240,192,201,46,208,18,164,154,1205  
1470 DATA 208,184,230,154,232,134,144,  
149,128,169,14,157,112,34,208,170,168  
1480 DATA 201,48,144,12,201,58,144,11,  
201,91,176,4,201,65,176,3,5620  
1490 DATA 76,68,37,164,154,208,4,224,1  
0,240,245,232,134,144,149,128,2317  
1500 DATA 56,233,32,157,112,34,165,154  
,240,230,230,154,208,226,169,14,3362  
1510 DATA 56,229,144,168,162,0,181,128  
,56,233,32,153,110,33,228,144,8867  
1520 DATA 240,4,232,200,208,240,96,68,  
49,58,0,37,110,116,101,114,4818  
1530 DATA 0,102,105,108,101,110,97,109  
,101,155,169,255,141,252,2,96,9502  
1540 DATA 169,128,157,68,3,169,0,157,6  
9,3,96,248,24,101,162,133,5960  
1550 DATA 162,169,0,101,163,133,163,21  
6,32,85,36,96,166,106,228,171,9420  
1560 DATA 208,13,162,61,160,38,32,255,  
36,32,109,36,164,255,96,160,7793  
1570 DATA 0,145,170,165,170,24,105,1,1  
33,170,165,171,105,0,133,171,7627  
1580 DATA 160,0,96,0,0,38,105,108,101,  
0,116,111,111,0,108,97,1987  
1590 DATA 114,103,101,14,0,48,114,101,

115,115,0,97,0,107,101,121,2461  
1600 DATA 14,155,152,72,72,162,39,189,  
96,34,149,172,202,16,248,162,9854  
1610 DATA 172,160,38,32,255,36,169,17,  
141,107,34,104,56,233,100,162,7197  
1620 DATA 0,201,10,144,6,56,233,10,232  
,208,246,9,16,141,109,34,6048  
1630 DATA 138,9,16,141,108,34,32,109,3  
6,201,82,208,14,104,162,39,4662  
1640 DATA 181,172,157,96,34,202,16,248  
,160,0,96,201,65,208,231,104,292  
1650 DATA 168,96,0,41,15,47,0,37,114,1  
14,111,114,0,0,0,7582  
1660 DATA 14,0,50,101,116,114,121,0,11  
1,114,0,33,98,111,114,116,3268  
1670 DATA 31,155,162,16,169,7,157,66,3  
,169,0,157,72,3,157,73,3177  
1680 DATA 3,32,86,228,48,29,72,248,165  
,156,24,105,1,133,156,165,7243  
1690 DATA 157,105,0,133,157,165,158,10  
5,0,133,158,216,32,59,36,104,5416  
1700 DATA 160,0,96,165,145,240,7,192,1  
36,208,3,152,168,96,32,92,7199  
1710 DATA 38,240,191,96,162,39,169,0,1  
57,96,34,202,16,250,96,32,6243  
1720 DATA 14,39,32,135,36,162,16,169,3  
,157,66,3,32,250,37,169,4598  
1730 DATA 4,157,74,3,169,0,157,75,3,13  
3,150,133,151,133,145,32,5941  
1740 DATA 86,228,16,20,162,98,160,40,3  
2,255,36,32,109,36,201,82,5114  
1750 DATA 240,205,201,65,208,245,240,8  
,32,204,38,16,6,32,135,36,3582  
1760 DATA 160,255,96,133,166,32,204,38  
,48,243,201,255,208,6,165,166,2056  
1770 DATA 201,255,240,13,162,131,160,4  
0,32,255,36,32,109,36,76,87,4360  
1780 DATA 39,32,22,38,48,215,169,255,3  
2,22,38,48,208,162,164,160,8348  
1790 DATA 40,32,224,36,230,145,32,204,  
38,16,10,192,136,208,190,32,7544  
1800 DATA 135,36,160,0,96,198,145,133,  
146,133,166,32,204,38,48,173,7760  
1810 DATA 133,147,133,167,201,255,208,  
14,165,166,201,255,208,8,169,2,1206  
1820 DATA 32,5,38,76,142,39,32,204,38,  
48,146,133,148,32,204,38,5144  
1830 DATA 48,139,133,149,165,166,56,23  
3,1,133,166,165,167,233,0,133,9934  
1840 DATA 167,197,151,208,43,165,166,1  
97,150,208,37,160,0,165,148,145,236  
1850 DATA 152,200,165,149,145,152,169,  
4,32,5,38,248,165,164,24,105,6558  
1860 DATA 1,133,164,165,165,105,0,133,  
165,216,32,97,36,76,49,40,3866  
1870 DATA 165,146,32,22,38,16,3,76,87,  
39,165,147,32,22,38,48,240  
1880 DATA 246,165,170,133,152,165,171,  
133,153,165,148,32,22,38,48,231,7782  
1890 DATA 165,149,32,22,38,48,224,165,  
148,133,150,165,149,133,151,32,8771  
1900 DATA 204,38,48,211,32,22,38,48,20  
6,165,147,197,149,144,9,165,8323  
1910 DATA 146,197,148,144,3,76,142,39,  
165,146,24,105,1,133,146,165,6421  
1920 DATA 147,105,0,133,147,76,57,40,3  
5,97,110,7,116,0,111,112,2263  
1930 DATA 101,110,0,102,105,108,101,14  
,0,50,101,116,114,121,0,111,2606  
1940 DATA 114,0,33,98,111,114,116,31,1  
55,46,111,116,0,97,0,98,2238  
1950 DATA 105,110,97,114,121,0,102,105  
,108,101,14,0,0,48,114,101,1315  
1960 DATA 115,115,0,97,0,107,101,121,1  
4,155,0,0,0,0,0,6686  
1970 DATA 0,0,50,101,97,100,105,110,10  
3,0,102,105,108,101,14,14,1785  
1980 DATA 14,155,169,0,133,155,32,135,

```

36,165,162,208,15,165,163,208,240
1990 DATA 11,162,182,160,41,32,255,36,
32,109,36,96,32,14,39,162,2696
2000 DATA 16,169,3,157,66,3,32,250,37,
169,8,157,74,3,169,0,3097
2010 DATA 157,75,3,32,86,228,16,47,192
,167,240,6,32,92,38,240,6964
2020 DATA 219,96,230,155,162,16,169,36
,157,66,3,32,250,37,169,0,4911
2030 DATA 157,74,3,157,75,3,32,86,228,
48,6,32,135,36,76,214,4082
2040 DATA 40,32,92,38,240,222,96,162,2
15,160,41,32,224,36,169,9,7537
2050 DATA 133,146,169,42,133,147,162,1
6,169,11,157,66,3,32,250,37,4938
2060 DATA 169,0,157,72,3,157,73,3,160,
0,177,146,32,86,228,16,4915
2070 DATA 8,32,92,38,240,224,76,135,36
,248,165,159,24,105,1,133,7178
2080 DATA 159,165,160,105,0,133,160,16
5,161,105,0,133,161,216,32,72,7551
2090 DATA 36,165,146,24,105,1,133,146,
165,147,105,0,133,147,197,171,9208
2100 DATA 208,180,165,146,197,170,208,
174,32,135,36,165,155,240,29,162,1016
2110 DATA 16,169,35,157,66,3,32,250,37
,169,0,157,74,3,157,75,4235
2120 DATA 3,32,86,228,16,6,32,92,38,24
0,228,96,32,135,36,162,6273
2130 DATA 239,160,41,32,224,36,32,244,
37,76,109,36,46,111,0,110,3088
2140 DATA 101,101,100,0,116,111,0,114,
101,119,114,105,116,101,14,0,2646
2150 DATA 48,114,101,115,115,0,97,0,10
7,101,121,14,155,0,0,0,9930
2160 DATA 0,0,0,0,55,114,105,116,105
,110,103,0,102,105,108,3399
2170 DATA 101,14,14,14,155,0,0,0,0,0,0
,0,36,111,110,101,8460
2180 DATA 14,0,48,114,101,115,115,0,97
,0,107,101,121,14,155,226,5766
2190 DATA 2,227,2,188,34,0,0,0,0,0,0,0
,0,0,0,0,3574

```

Listing 2.  
Assembly listing.

```

.OPT OBJ,NO LIST
;
;STREAMLINER
;Atari 8-bit Ver 1.00 06-28-86
;Copyright 1986 Analog Computing
;Programmed by James Hague
;
; SYSTEM EQUATES
-----
POKMSK    =    $10
RTCLOCK   =    $14
RAMTOP    =    $6A
SDMCTL    =    $022F
COLDST    =    $0244
SDLSTL    =    $0230
SHFLOK    =    $02BE
INUFLG    =    $02B6
CH         =    $02FC
SKCTL     =    $2D0F
AUDF1     =    $D200
AUDC1     =    $D201
AUDCTL    =    $D208
COLOR0    =    $02C4
COLOR1    =    $02C5
COLOR2    =    $02C6
COLOR3    =    $02C7
COLBAK    =    $02C8
ICCOM     =    $0342
ICBAL     =    $0344

```

```

ICBAH     =    $0345
ICBLL     =    $0348
ICBLH     =    $0349
ICAX1     =    $034A
ICAX2     =    $034B
IRQEN     =    $D20E
IOINV     =    $E465
CIOV      =    $E456
;
;-----
; CONSTANTS
;-----
EOL       =    $9B      ;EOL (CR) char
;
;-----
; VARIBALES
;-----
*= $80
;
FNAME     .DS 16      ;FILENAME
FNAMLEN   .DS 1      ;FILENAME Length
FINDEOF   .DS 1      ;Check EOF flag
START     .DS 2      ;seg START addr
END       .DS 2      ;seg END addr
LSEGEND   .DS 2      ;Last SEG END
LENDPTR   .DS 2      ;Last END PnTR
PERIOD    .DS 1      ;"." typed flag
LOCKED    .DS 1      ;file LOCKED flg
BYTESR    .DS 3      ;bcd BYTES Read
BYTWSW    .DS 3      ;bcd BYTES Writn
EXTRAB    .DS 2      ;bcd EXTRA bytes
EXTRAS    .DS 2      ;bcd EXTRA segts
TEMP      .DS 2      ;Work area
PNT       .DS 2      ;Misc. PoiNter
BPNT      .DS 2      ;Buffer PoiNter
TSAVE     .DS 2      ;Text SAVE area
;
*= $2100
;
;-----
; RESERVED MEMORY
;-----
DISP      .DS 416     ;DISPlay memory
;
;-----
; DISPLAY LIST
;-----
DL        .BYTE 112,112,112
          .BYTE 112,112,112
          .BYTE 71
          .WORD DISP
          .BYTE 112
          .BYTE 6
          .BYTE 112
          .BYTE 2,2,2,2,2,2,2,2
          .BYTE 112
          .BYTE 2,2,2,2
          .BYTE 65
          .WORD DL
;
;-----
; MAIN BODY
;-----
MAIN
      CLD           ;Kill decimal!
      JSR SETUP    ;Go set-up!
LOOP  JSR INIT     ;Get ready,
      JSR GETNAME  ;get name,
      JSR READ     ;read file,
      BMI LOOP     ;and write it
      JSR WRITE    ;if no errors!
      JMP LOOP
;
;-----
; ONE-SHOT SET-UP
;-----
SETUP
      JSR SIOINV   ;Initialize
      LDA #3       ;sound hardware
      STA SKCTL
      LDA #112     ;Disable break
      STA POKMSK  ;key...
      STA IRQEN
      LDX #1       ;Reboot upon
      STX COLDST  ;hitting reset

```

```

DEX
STX AUDC1 ;Clear sound
STX AUDCTL ;channels
STA SDMCTL ;Turn off DMA
;
CLS TXA ;Clear display
STA DISP,X ;memory (416
STA DISP+208,X ;bytes) in 2
INX ;groups of 208
CPX #208 ;bytes each...
BNE CLS
;
PWLAB LDX #31 ;Print title
LDA TITLE,X ;lines...
STA DISP,X
LDA WLAB1,X ;Window 1 label,
STA DISP+32,X
LDA WLAB2,X ;and window 2
STA DISP+288,X ;label...
DEX
BPL PWLAB
;
PLAB LDX #21 ;Print main
LDA LAB2,X ;Print main
STA DISP+131,X ;labels in
LDA LAB3,X ;information
STA DISP+163,X ;window...
LDA LAB4,X
STA DISP+195,X
LDA LAB5,X
STA DISP+227,X
DEX
BPL PLAB
;
SETCLR LDX #4 ;Init color
LDA COLORS,X ;regs...
STA COLOR0,X
DEX
BPL SETCLR
;
LDA # <DL ;Point to new
STA SDL5TL ;display list...
LDA # >DL
STA SDL5TL+1
LDA #33 ;and enable DMA
STA SDMCTL ;for narrow pf
;
;open keyboard for input on
;channel 2
;
LDX #$20 ;Channel 2
LDA #3 ;Set command to
STA ICCOM,X ;"open"
LDA # <KEYBD ;Point to
STA ICBAL,X ;keyboard
LDA # >KEYBD ;filespec...
STA ICBAL,X
LDA #4 ;Specify input
STA ICAX1,X
LDA #0 ;AUX2 is unused
STA ICAX2,X
JMP CIOV ;Call cio!
;
;title & window labels
TITLE .SBYTE "STREAMLINER V1.0"
.SBYTE +192," BY JAMES HAG"
.WLAB1 .SBYTE +192,"UE "
.SBYTE +128," INFO"
.SBYTE +128,"RMATION WINDO"
.SBYTE +128,"W "
.WLAB2 .SBYTE +128," INTE"
.SBYTE +128,"RACTION WINDO"
.SBYTE +128,"W "
;
;status labels
LAB2 .SBYTE "Bytes Read_____"

```

```

LAB3 .SBYTE "_____"
.SBYTE "Bytes Written_____"
LAB4 .SBYTE "_____"
.SBYTE "Extra Bytes_____"
LAB5 .SBYTE "_____"
.SBYTE "Extra Segments_____"
;
;initial colors
COLORS .BYTE $46,$0A,$94,$03,$18
;
;keyboard filespec
KEYBD .BYTE "K:",EOL
;
; SHOW 2 BCD DIGITS
;-----
;in: a - bcd byte
; y - offset from start of
; info window
BCD
PHA ;Save bcd
SEC ;Convert 1st
ROR A ;digit to
LSR A ;a character...
LSR A
LSR A
STA DISP+64,Y ;and show it
INY ;Next position
PLA ;Get bcd back
AND #$0F ;Keep lower half
ORA #$10 ;Convert it and
STA DISP+64,Y ;show it!
INY ;Next space
RTS
;
; SHOW BYTES READ
;-----
SHOBR LDX #2 ;3 bytes total
LDY #87 ;Set position
SBR LDA BYTESR,X ;Get bcd byte
JSR BCD ;and show it!
DEX ;Do next digit
BPL SBR
RTS
;
; SHOW BYTES WRITTEN
;-----
SHOBW LDX #2 ;3 bytes total
LDY #119 ;Set position
SBW LDA BYTESW,X ;Get bcd byte
JSR BCD ;and show it!
DEX ;Get next digit
BPL SBW
RTS
;
; SHOW EXTRA BYTES
;-----
SHOEB LDY #153 ;Set cursor
LDA EXTRAB+1 ;Get 1st byte
JSR BCD ;and show it!
LDA EXTRAB ;Get next one
JMP BCD ;and show it!
;
; SHOW EXTRA SEGMENTS
;-----
SHOES LDY #185 ;Position cursor
LDA EXTRAS+1 ;Get 1st byte
JSR BCD ;and show it
LDA EXTRAS ;Get 2nd byte
JMP BCD ;and display!
;
; GET KEYPRESS
;-----

```

```

GETKEY      LDA #64      ;Clear shift &
            STA SHFLOK   ;control keys
            LDX #520     ;Use IOCB #2
            LDA #507     ;Set to "get
            STA ICCOM,X  ;character" mode
            LDA #0
            STA ICBLH,X ;Buffer length
            STA ICBLH,X ;to zero
            STA INVFLG   ;Inverse key off
            JMP CIOV     ;Get a keypress!
;
;-----
; CLOSE IOCB #1
CLOSE1      LDX #510     ;Set IOCB to 1
            LDA #50C     ;"close" command
            STA ICCOM,X
            JMP CIOV     ;Close it up!
;
;-----
; INITIALIZAION
INIT
            LDA # <BUFFER ;Point to
            STA BPNT     ;start of buffer
            LDA # >BUFFER
            STA BPNT+1
;
            LDA #0       ;Clear file
            STA LOCKED   ;locked flag
            LDX #2
            STA BYTESR,X ;Clear read &
            STA BYTESW,X ;write counters
            DEX
            BPL CLRB
;
            LDX #1       ;Clear extra
            STA EXTRAB,X ;counters...
            STA EXTRAS,X
            DEX
            BPL CLRE
;
            LDX #25      ;Print file
            LDA FLAB,X   ;label in
            STA DISP+99,X ;information
            DEX          ;window...
            BPL PRTNONE
            JSR SHOBR    ;Show all other
            JSR SHOBN   ;status info...
            JSR SHOEB
            JMP SHOES
;
; FLAB      .SBYTE "File _____"
            .SBYTE "_____NONE"
;
;-----
; PRINT MESSAGE
;in: x - text lo byte
;     y - text hi byte
;
PRINT
            STX PNT      ;Save text
            STY PNT+1    ;address
            LDY #0       ;Print text
            LDA (PNT),Y  ;until an
            CMP #EOL     ;EOL is reached
            BEQ PADIT
            STA DISP+352,Y
            INY
            BNE DOCHAR
;
; PADIT    LDA #0        ;Now pad the
            CPY #32      ;rest of the
            BCS PREXIT   ;line with
            STA DISP+352,Y ;blanks...
            INY
            BNE DOPAD
;
PREXIT     RTS
;
;-----
; ERROR SET-UP
;in: x - error message lo byte
;     y - error message hi byte
ERRSET
            TXA          ;Save lo byte...
            PHA
            JSR CLRLINE ;Clear line
;
; Make a "ding" sound
;
            LDX #5AF     ;Initial volume
            LDA #20      ;Set channel 1
            STA AUTF1    ;frequency
            STX AUDC1    ;and control
            LDA #0       ;Wait for a few
            STA RTCLOK   ;jiffies...
            DELAY
            LDA RTCLOK
            CMP #2
            BCC DELAY
            DEX          ;and loop until
            CPX #5A0     ;the volume is
            BCS LOWER    ;zero
;
            PLA          ;Get lo byte
            TAX          ;back & print
            JSR PRINT    ;error message
            JMP CLRKBD   ;Clear keyboard
;
;-----
; GET FILENAME
GETNAME
            LDX # <MSG01 ;Print "Enter
            LDY # >MSG01 ;filename"
            JSR PRINT    ;prompt
            LDX #2       ;Set filename
            STX FNAMEL   ;length
            LDA D1,X     ;Load "D1:"
            STA FNAME,X  ;into FNAME
            SEC          ;Convert char
            SBC #32      ;to internal
            STA DISP+368,X ;and show it
            DEX
            BPL PRTD1
            JSR CLRKBD   ;Clear keyboard
            INX          ;Clear period
            STX PERIOD   ;flag
;
; read filename from keyboard
;
NEXTKEY    LDX FNAMEL   ;Print cursor
            INX          ;in correct
            LDA #63      ;position...
            STA DISP+368,X
            JSR GETKEY   ;Get a keypress
            LDX FNAMEL   ;First char past
            CPX #2       ;"D1:"?
            BEQ FIRSTC   ;Yes, skip this
;
            CMP #EOL     ;EOL?
            BNE NOTEOL   ;No, its not
            LDA FNAME,X  ;Yup! Make sure
            CMP #'.'     ;that the last
            BNE ACCEPT   ;char is not a
            DEC FNAMEL   ;period
            DEX
            ACCEPT
            INX          ;Tack an EOL to
            LDA #EOL     ;the end of the
            STA FNAME,X  ;filename
            JMP PFN      ;"." then leave!
;
NOTEOL     CMP #126     ;Backspace?
            BNE NOBAK    ;No way Jose!
            LDA PERIOD   ;Period flg set?
            BEQ NODOT    ;Nope, ignore it
            DEC PERIOD   ;Yup, dec it!
            NODOT
            LDA #0       ;Print a space

```



```

INX          ;on the screen
STA DISP+368,X ;and shorten
DEC FNAMEL  ;the name length
BNE NEXTKEY ;Get next char!
;
NOBAK       LDY PERIOD  ;Is extension
            CPY #4      ;all done?
            BEQ NEXTKEY ;Yes, ignore!
            CMP #'.'    ;Is key a "."?
            BNE NOPER   ;No, its not
            LDY PERIOD  ;Accept only if
            BNE NEXTKEY ;it is the 1st!
            INC PERIOD  ;Set per flag
            INX         ;Add 1 to name
            STX FNAMEL  ;length
            STA FNAME,X ;Save ","
            LDA #14     ;and show
            STA DISP+368,X ;onscreen
            BNE NEXTKEY ;Get next key!
;
NOPER       CMP #'0     ;Is key a digit?
            BCC NEXT    ;Yes, its legal
            CMP #'!'    ;since its not
            BCC GOODKEY ;the 1st char!
FIRSTC     CMP #'[     ;Is it a letter?
            BCS NEXT    ;Yep, then its
            CMP #'A     ;always good!
NEXT       BCS GOODKEY
            JMP NEXTKEY
;
GOODKEY     LDY PERIOD  ;Period set?
            BNE KEYOK   ;No, its OK!
            CPX #10     ;Any room?
            BEQ NEXT    ;Nope, all full
KEYOK      INX         ;Add 1 to name
            STX FNAMEL  ;length
            STA FNAME,X ;and save char
            SEC         ;Convert to
            SBC #32     ;internal and
            STA DISP+368,X ;show it!
            LDA PERIOD  ;Past a period?
            BEQ NEXT    ;No, just leave!
            INC PERIOD  ;Yes, inc flag
            BNE NEXT    ;and leave!
;
;now print the filename in its
;correct spot in the info window
;
PFN        LDA #14     ;Calculate where
            SEC         ;to start
            SBC FNAMEL  ;printing it
            TAY
PRNAME     LDX #0      ;Now print it!
            LDA FNAME,X ;Get a char
            SEC         ;convert to
            SBC #32     ;internal coding
            STA DISP+110,Y ;and print it
            CPX FNAMEL  ;All done?
            BEQ PRINTED ;Yep, go home!
            INX         ;Else, do
            INY         ;another for
            BNE PRNAME  ;mother!
PRINTED    RTS        ;Bye y'all!
;
;initial filename
;
D1         .BYTE "D1:"
;
;filename prompt
;
MSG01     .SBYTE " Enter filename"
            .BYTE EOL
;
; CLEAR KEYBOARD
;
CLRKBD    LDA #$FF
            STA CH

```

```

RTS
;
; SET FILENAME FOR CIO
;-----
;in: x - IOCB #
SETFILE   LDA # <FNAME
            STA ICBAL,X
            LDA # >FNAME
            STA ICBAN,X
            RTS
;
; INC EXTRA BYTE COUNTER
;-----
;in: a - bcd number to add
ADDEB    SED          ;Decimal mode!
            CLC         ;Add acc. to
            ADC EXTRAB  ;extra byte
            STA EXTRAB  ;counter...
            LDA #0
            ADC EXTRAB+1
            STA EXTRAB+1
            CLD         ;Decimal off!
            JSR SHOEB   ;Print new value
            RTS
;
; PUT BYTE IN BUFFER
;-----
;in: a - byte to put in buffer
;out: y - $FF for error
;       0 for success
;
PUTBUF    LDX RAMTOP   ;Any space in
            CPX BPNT+1 ;buffer?
            BNE NOTFULL ;Yes, put byte
            LDX # <BFMSG ;No, prepare
            LDY # >BFMSG ;for an error
            JSR ERRSET
            JSR GETKEY  ;Wait for a key
            LDY $FF     ;Return error
            RTS        ;code and leave!
;
NOTFULL   LDY #0       ;Put byte into
            STA (BPNT),Y ;ram buffer
            LDA BPNT    ;then add 1 to
            CLC         ;the buffer
            ADC #1      ;pointer...
            STA BPNT
            LDA BPNT+1
            ADC #0
            STA BPNT+1
            LDY #0      ;Return success
            RTS        ;code and leave!
;
;buffer full error message
;
BFMSG     .SBYTE " File too large."
            .SBYTE " Press a key."
            .BYTE EOL
;
; GENERIC IO ERROR HANDLER
;-----
;in: y - error number
;out: y - 0 to retry, else
;       error # (abort)
;
IOERROR   TYA          ;Save error # on
            PHA         ;stack twice...
            PHA
            LDX #39     ;Save text that
            LDA DISP+352,X ;is on the
            STA TSAVE,X ;interaction
            DEX         ;line...

```

```

;
; BPL SAVLIN
LDX # <IOMSG ;Prepare for
LDY # >IOMSG ;error handling
JSR ERRSET
LDA #17 ;Print a '1' on
STA DISP+363 ;text line
PLA ;Get # back
SEC ;Subtract 100...
SBC #100
LDX #0 ;Divide result
CMP #10 ;by 10 with the
BCC DIV10 ;quotient in x
SEC ;and remainder
SBC #10 ;in acc...
INX
BNE DIV10
ORA #16 ;Convert both to
STA DISP+365 ;internal code
TXA ;and print...
ORA #16
STA DISP+364
;
; RORA
JSR GETKEY ;Get a keypress
CMP #'R ;(R)etry?
BNE NOTR ;Nope, not R
PLA ;It's an R!
LDX #39 ;50, restore the
RESTORE LDA TSAVE,X ;old text...
STA DISP+352,X
DEX

```

```

; BPL RESTORE
LDY #0 ;& return 0...
RTS
NOTR CMP #'A ;(A)bort?
BNE RORA ;Nope, wait
PLA ;Yes, return
TAY ;error code...
RTS
;
; IOMSG
.SBYTE " I/O Error R"
.SBYTE "etry or Abort?"
.BYTE EOL
;
; GET BYTE FROM CHANNEL 1
;-----
;out: y - 0=success, or error #
; a - byte read
;
; If FINDEOF is not zero and an
; EOF is found, error processing
; will be bypassed, but the error
; code will still be returned.
GET1
LDX #$10 ;IO channel 1
LDA #7 ;Open command
STA ICOM,X
LDA #0 ;Set length to
STA ICBL,X ;1 char...
STA ICBLH,X
JSR CIOV ;Go get it!
BMI OHNO ;Check error!
PHA ;Save char
SED ;Decimal on!
LDA BYTESR ;Now add 1 to
CLC ;to "bytes read"
ADC #1 ;counter...
STA BYTESR
LDA BYTESR+1
ADC #0
STA BYTESR+1 ;Can u bonk?
LDA BYTESR+2
ADC #0 ;
STA BYTESR+2
CLD ;Decimal off!
JSR SHOBR ;Show new value!
PLA ;Get char back &
LDY #0 ;return success!
RTS
;
; OHNO
LDA FINDEOF ;Error! Flag
BEQ SOWHAT ;EOF? Nope.
CPY #136 ;Yes, is it an
BNE SOWHAT ;EOF? Nope.
TYA ;Yes, return
TAY ;error code!
RTS
SOWHAT JSR IOERROR ;Handle a
BEQ GET1 ;standard error
RTS ;and return.
;
; CLEAR INTERACTION LINE
;-----
CLRLINE LDX #39 ;Clear 40 bytes
LDA #0
STA DISP+352,X
DEX
BPL CLL
RTS
;
; READ/COMPRESS FILE
;-----
;out: y - 0=success, $FF=ugh!
READ
JSR CLRLINE ;Clear line
JSR CLOSE1 ;Close IOCB #1

```

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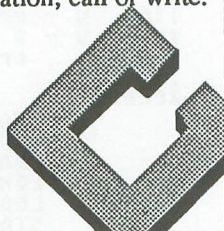
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CIRCLE #109 ON READER SERVICE CARD

```

LDX #510 ;Open IOCB #1:
LDA #3 ;open command...
STA ICCOM,X
JSR SETFILE ;Set filename
LDA #4 ;Open for input
STA ICAX1,X ;only
LDA #0 ;Clear 2nd aux
STA ICAX2,X ;byte as well as
STA LSEGEN ;a few vars...
STA LSEGEN+1
STA FINDEOF
JSR CIOV ;Open it, Nat!
BPL :OPENOK ;No errors!
;
LDX # <OEMSG ;Uh-oh: error!
LDY # >OEMSG ;Do error
:NOSIR JSR ERRSET ;stuff
JSR GETKEY ;Get keypress
CMP #'R ;(R)etry?
BEQ READ ;Ja, retry it!
CMP #'A ;(A)abort?
BNE :NOSIR ;Nah!
BEQ :RETERR ;Yes, stop!
;
;make sure file is binary
:OPENOK JSR GET1 ;Get 1st byte
BPL :NOERR ;No read errors!
:ERR JSR CLOSE1 ;Crud! an error!
:RETERR LDY #$FF ;Return error
RTS ;flag
:NOERR STA TEMP ;Save 1st byte
JSR GET1 ;Get 2nd byte
BMI :ERR ;Check error
CMP #$FF ;Does byte=$FF?
BNE :NOTBIN ;No! Not binary
LDA TEMP ;Check 1st byte
CMP #$FF ;is it $FF?
BEQ :BIN ;Yes! Whew!
:NOTBIN LDX # <NBMSG ;The file
LDY # >NBMSG ;is not binary
JSR ERRSET ;so abort and
JSR GETKEY ;return error
JMP :ERR ;flag in Y.
:BIN JSR PUTBUF ;Well, the file
BMI :ERR ;is binary so
LDA #$FF ;put 2 $FF's in
JSR PUTBUF ;the RAM buffer
BMI :ERR
;
LDX # <RDMSG ;Print
LDY # >RDMSG ;"Reading..."
JSR PRINT ;message
;
;read the segment header
;information and determine
;if a "fake" binary header
;exists
:GETST INC FINDEOF ;EOF=ok
JSR GET1 ;Get a byte
BPL :OK ;No errors!
CPY #136 ;EOF found?
BNE :ERR ;No, an error!
JSR CLOSE1 ;Yes, the file
LDY #0 ;has been read
RTS ;successfully!
:OK DEC FINDEOF ;EOF=bad
STA START ;Save start
STA TEMP ;address 10 byte
JSR GET1 ;Get hi byte
BMI :ERR ;Check error
STA START+1 ;Save byte...
STA TEMP+1
CMP #$FF ;If the start
BNE :GETEND ;address=$FFFF
LDA TEMP ;then its not
CMP #$FF ;the start addr-

```

```

BNE :GETEND ;less and can be
LDA #2 ;removed...
JSR ADDEB
JMP :GETST ;Try again!
;
:GETEND JSR GET1 ;Get end addr-
BMI :ERR ;less 10 byte
STA END ;and save it
JSR GET1 ;Now get hi
BMI :ERR ;byte...
STA END+1
;
;check if this segment can be
;combined with the last one
;
LDA TEMP ;If this seg-
SEC ;ment's start
SBC #1 ;address-1
STA TEMP ;equals the last
LDA TEMP+1 ;segment's end-
SBC #0 ;ing address
STA TEMP+1 ;then the two
CMP LSEGEN+1 ;segments can
BNE :NOCONT ;be combined
LDA TEMP ;(they are
CMP LSEGEN ;contiguous)
BNE :NOCONT
;
LDY #0 ;Combine 'em!
LDA END ;Merge the two
STA (LENDPTR),Y ;segments by

```



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NUMBER OF PLAYERS .....	1
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AGE GROUP .....	10 TO ADULT
CLASS .....	STRATEGY ACTION
SOUND .....	YES
ANIMATED GRAPHICS .....	YES
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CIRCLE #110 ON READER SERVICE CARD

```

        INY                ;making the 1st
        LDA END+1         ;have the 2nd's
        STA (LENDPTR),Y  ;ending adr
        LDA #4            ;Record 4 extra
        JSR ADDEB        ;bytes and
        SED              ;1 extra seg...
        LDA EXTRAS
        CLC
        ADC #1
        STA EXTRAS
        LDA EXTRAS+1
        ADC #0
        STA EXTRAS+1
        CLD
        JSR SHOES        ;Show new value
        JMP :NEWEND     ;Load seg data!

;
; NOCONT
        LDA START        ;Don't combine
        JSR PUTBUF       ;so record the
        BPL :GOOD        ;new segment's
; ERR2
; GOOD
        LDA START+1
        JSR PUTBUF
        BMI :ERR2
        LDA BPNT        ;(save the loc.
        STA LENDPTR     ;of the ending
        LDA BPNT+1      ;address...)
        STA LENDPTR+1
        LDA END
        JSR PUTBUF
        BMI :ERR2
        LDA END+1
        JSR PUTBUF
        BMI :ERR2
; NEWEND
        LDA END          ;Record the new
        STA LSEGEN      ;ending address
        LDA END+1
        STA LSEGEN+1

;
; read the actual segment data
; into RAM
;
; LOAD
        JSR GET1        ;Get a byte...
        BMI :ERR2
        JSR PUTBUF      ;& save it
        BMI :ERR2
        LDA START+1     ;All bytes read?
        CMP END+1       ;If so, try to
        BCC :MORE       ;get another
        LDA START       ;segment!
        CMP END
        BCC :MORE
        JMP :GETST
; MORE
        LDA START       ;Else, add 1 to
        CLC             ;the byte count
        ADC #1          ;and keep on
        STA START       ;readin'!
        LDA START+1
        ADC #0
        STA START+1
        JMP :LOAD

;
; misc. messages
;
; OEMSG
        .SBYTE "Can't open file. "
        .SBYTE "Retry or Abort?"
        .BYTE EOL
; NBMSG
        .SBYTE "Not a binary file"
        .SBYTE ". Press a key."
        .BYTE EOL
; RDMSG
        .SBYTE " Reading f"
        .SBYTE "ile..."
        .BYTE EOL
;
        .LOCAL
;
; WRITE BUFFER TO DISK
;-----
WRITE
        LDA #0          ;Clear locked
        STA LOCKED     ;flag
        JSR CLOSE1     ;Close IOCB #1
        LDA EXTRAB     ;If no bytes
        BNE :OPEN      ;were removed
        LDA EXTRAB+1   ;then there is
        BNE :OPEN      ;no need to
        LDX # <NNMSG   ;rewrite the
        LDY # >NNMSG   ;file...
        JSR ERRSET
        JSR GETKEY
        RTS

;
; open the file for input; if it
; is locked, unlock it
;
; OPEN
        JSR CLRLINE    ;Clear text
        LDX #$10       ;IOCB #1
        LDA #3         ;Open command...
        STA ICCOM,X
        JSR SETFILE    ;Set filename
        LDA #8         ;Input mode...
        STA ICAX1,X
        LDA #0
        STA ICAX2,X
        JSR CIOV       ;Open file!
        BPL :OPENOK    ;No errors!
        CPY #167       ;File locked?
        BEQ :UNLOCK    ;Yes, unlock it!
        JSR IOERROR    ;No, its just a
        BEQ :OPEN      ;standard error
        RTS

;
; UNLOCK
        INC LOCKED     ;Record this
; RETRY
        LDX #$10       ;Use IOCB #1
        LDA #36        ;Unlock command
        STA ICCOM,X
        JSR SETFILE    ;Set filename
        LDA #0         ;Clear aux...
        STA ICAX1,X
        STA ICAX2,X
        JSR CIOV       ;Unlock file!
        BMI :ERR        ;Handle error!
        JSR CLOSE1     ;Close file &
        JMP :OPEN      ;re-open!
; ERR
        JSR IOERROR    ;Handle any
        BEQ :RETRY     ;IO errors
        RTS

;
; now dump the buffer to disk,
; one byte at a time
;
; OPENOK
        LDX # <WRMSG   ;Print
        LDY # >WRMSG   ;"Writing..."
        JSR PRINT      ;message
        LDA # <BUFFER  ;Point to
        STA START      ;start of RAM
        LDA # >BUFFER  ;buffer...
        STA START+1

;
; DUMP
        LDX #$10       ;Prepare to put
        LDA #11        ;a byte to disk
        STA ICCOM,X
        JSR SETFILE    ;Set filename
        LDA #0         ;Set length to 1
        STA ICBLN,X
        STA ICBLH,X
        LDY #0         ;Get byte from
        LDA (START),Y  ;RAM buffer &
        JSR CIOV       ;write to disk!
        BPL :NOERR     ;No errors!
        JSR IOERROR    ;An error!
        BEQ :DUMP      ;R)etry
        JMP CLOSE1     ;A)abort
; NOERR
        SED           ;Decimal on!
        LDA BYTESW     ;Add 1 to the
        CLC           ;"bytes written"
        ADC #1         ;counter...
        STA BYTESW
    
```

```

LDA BYTESW+1
ADC #0
STA BYTESW+1
LDA BYTESW+2
ADC #0
STA BYTESW+2
CLD ;Decimal off!
JSR SHOBN ;Show new value!
LDA START ;Move to next
CLC ;byte in buffer
ADC #1
STA START
LDA START+1
ADC #0
STA START+1
CMP BPNT+1 ;If not last
BNE :DUMP ;byte then keep
LDA START ;on writin!
CMP BPNT
BNE :DUMP
;
;close file & lock if necessary
;
JSR CLOSE1 ;Close up file
LDA LOCKED ;Re-lock it?
BEQ :BYE ;Nah!
LDX #510 ;Prepare IOCB 1
LDA #35 ;for re-locking
STA ICCOM,X ;procedure...
JSR SETFILE
LDA #0
STA ICAX1,X

STA ICAX2,X
JSR CIOV ;Lock 'er up!
BPL :BYE ;No errors!
JSR IOERROR
BEQ :REL ;R)etry
RTS ;)bort
;BYE JSR CLOSE1 ;Close IOCB #1
LDX # <DNMSG ;Print "Done"
LDY # >DNMSG ;message...
JSR PRINT
JSR CLRKBD ;Clear keyboard
JMP GETKEY ;& wait for key

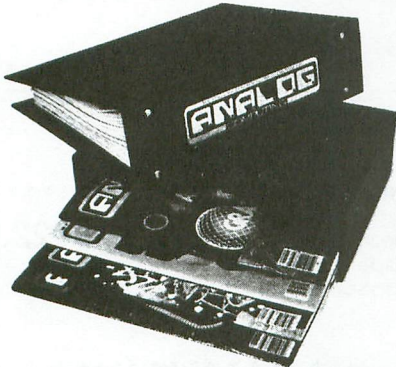
;
;misc. messages
NNMSG .SBYTE "No need to rewrit"
.SBYTE "e. Press a key."
.BYTE EOL
WRMSG .SBYTE " Writing f"
.SBYTE "ile..."
.BYTE EOL
DNMSG .SBYTE " Done. Pres"
.SBYTE "s a key."
.BYTE EOL

;
;BUFFER = *
;
*= $02E0
.WORD MAIN
.END

```

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# Roto-wrench

**A game to realize every homeowner's nightmare.**

by John Hanley

The basement plumbing has gone haywire, and it's up to you to divert the impending disaster. Leaking pipes are bursting around you, and there's no time to call the plumber. Don't let it get the best of you—just grab your **Roto-wrench** and get to work.

### Playing the game.

Upon entering the basement, you'll see a maze of multi-colored, intersecting pipes. The gray pipes are the basic utility lines, while the brass pipes are indestructible. The blue pipes are the adversary; these are the ones that are leaking and wreaking havoc in the basement.

There are three main valves that control the water flow in the basement. Your initial job is to grab a wrench (all of which just happen to be near the *bottom* of the basement) and close one of the valves, thereby decreasing the water flow and reducing the odds of more leaking pipes. Closing the valves will give you time to make the needed repairs, but don't dillydally—the water pressure is building up again, and the valves will only stay off for a short while.

A shortcut through the "alley way" can save some time, but beware—the alley way is also the slickest area of the basement. Entering the alley way from either end will bring you to the opposite side of the basement.

Activating the "roto-warp" device can also get you out of a desperate situation. Pushing the "warp" button will immediately transport you to a random location. Because you are given only five warps to begin with, they should be used

only as a last resort. You can accumulate three additional warps each time one level is completed.

### Points and pointers.

Fixing a leaky pipe (and remember: you'll need a wrench for each one) will chalk up 10 points on the scoreboard, and closing a valve gives you 50 points.

After closing all three valves, the bonus round gives you some extra time to repair any of the remaining leaks. It also gives you a chance at extra bonus points: fixing a leaky pipe during the bonus round gives you 10 points times the level number you're currently playing in. Clearing the screen gives you 200 points times the level number, and completing the round gives you 100 points times the level number.

Here are a few helpful hints for **Roto-wrench** beginners:

- Use the blue leaky pipes to your advantage. Try to leave them in key access areas, to be used later.
- Use the alley way often, but be careful not to get trapped on the other side.
- Stay clear of pipe intersections. A pipe can land on you at any time.
- Don't rely solely on roto-warp to improve your position in the basement. It may get you out of a tight jam some of the time, but it could put you in a tighter jam, too. 🛠

*John Hanley, 24, is an assistant manager for a California record store. He's been programming for three years, enjoys playing and writing games, and recently started a bulletin board. **Roto-wrench** is his first published program.*

(Listing starts on page 48)



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Some program listings reproduced in **ANALOG Computing** may contain "strange" characters not shown on the keyboards of earlier Atari models. These are special characters which use the CTRL, ESC and "ATARI LOGO" (inverse) keys. Shown below is a list of these characters and the keystrokes used to get them.

⬇ --- CTRL ,  
⬆ --- CTRL A  
| --- CTRL B  
| --- CTRL C  
| --- CTRL D  
| --- CTRL E  
| --- CTRL F  
| --- CTRL G  
| --- CTRL H  
| --- CTRL I  
| --- CTRL J  
| --- CTRL K  
| --- CTRL L  
| --- CTRL M  
| --- CTRL N  
| --- CTRL O  
| --- CTRL P  
| --- CTRL Q  
| --- CTRL R  
| --- CTRL S  
| --- CTRL T  
| --- CTRL U  
| --- CTRL V  
| --- CTRL W  
| --- CTRL X  
| --- CTRL Y

⬇ --- CTRL Z  
⬆ --- ESC ESC  
↑ --- ESC CTRL UP-ARROW  
↓ --- ESC CTRL DOWN-ARROW  
← --- ESC CTRL LEFT-ARROW  
→ --- ESC CTRL RIGHT-ARROW  
◆ --- CTRL .  
◆ --- CTRL ;  
⬆ --- ESC SHIFT CLEAR  
⬆ --- ESC BACK S  
⬆ --- ESC TAB  
⬆ --- INVERSE CTRL ,  
⬆ --- INVERSE CTRL A  
⬆ --- INVERSE CTRL B  
⬆ --- INVERSE CTRL C  
⬆ --- INVERSE CTRL D  
⬆ --- INVERSE CTRL E  
⬆ --- INVERSE CTRL F  
⬆ --- INVERSE CTRL G  
⬆ --- INVERSE CTRL H  
⬆ --- INVERSE CTRL I  
⬆ --- INVERSE CTRL J  
⬆ --- INVERSE CTRL K  
⬆ --- INVERSE CTRL L

⬆ --- INVERSE CTRL M  
⬆ --- INVERSE CTRL N  
⬆ --- INVERSE CTRL O  
⬆ --- INVERSE CTRL P  
⬆ --- INVERSE CTRL Q  
⬆ --- INVERSE CTRL R  
⬆ --- INVERSE CTRL S  
⬆ --- INVERSE CTRL T  
⬆ --- INVERSE CTRL U  
⬆ --- INVERSE CTRL V  
⬆ --- INVERSE CTRL W  
⬆ --- INVERSE CTRL X  
⬆ --- INVERSE CTRL Y  
⬆ --- INVERSE CTRL Z  
⬆ --- ESC DELETE  
⬆ --- ESC INSERT  
⬆ --- ESC CTRL TAB (CLR)  
⬆ --- ESC SHIFT TAB (SET)  
⬆ --- INVERSE SPACE  
⬆ --- INVERSE \_  
⬆ --- INVERSE CTRL .  
⬆ --- INVERSE CTRL ;  
⬆ --- INVERSE |  
⬆ --- ESC CTRL Z  
⬆ --- ESC CTRL BACK S  
⬆ --- ESC CTRL INSERT

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II*, in issue 47.

Listing 1.  
BASIC listing.

```

PT 100 REM      ROTO-WRENCH
TM 110 REM      JOHN HANLEY
RI 120 REM      SACTO, CA
TI 130 GRAPHICS 17:POKE 559,0:POKE 16,64
OZ 140 POKE 53774,64:GOTO 1000
SV 150 FOR D=1 TO 250:NEXT D:PX=PLAY:PY=5
IR 160 POKE SCREEN+PX+20*PY,CHA(11)+W
HX 170 POKE SCREEN+389,92
YT 180 REM      MAIN LOOP
UQ 190 IF PEEK(19)>=20 THEN GOSUB 560
PX 200 Z=INT(RND(0)*L2):X=PEEK(53770):IF
Z<112 THEN GOSUB 310
XI 210 ST=PEEK(632):TX=PX+DX(ST):TY=PY+DY
(ST):POS=SCREEN+TX+20*TY
PC 220 IF NOT PEEK(644) THEN GOSUB 660
NX 230 IF PEEK(POS)>204 THEN C=C-1:S=5+10
:POSITION 10,22:? #6;S:GOTO 270
SF 240 IF PEEK(POS)=154 THEN 500
RZ 250 IF PEEK(POS)=92 THEN 450
ZF 260 IF PEEK(POS) THEN 190
NB 270 CHA=CHA(ST):POKE SCREEN+PX+20*PY,0
:POKE POS,CHA+W:PX=TX:PY=TY
DI 280 IF POS=SCREEN+206 THEN GOSUB 400
DQ 290 IF POS=SCREEN+212 THEN GOSUB 420
PD 300 GOTO 190
CC 310 L=PEEK(SCREEN+PIPE(Z,1)):POKE 5376
0,PIPE(Z,2):POKE 53761,100
NY 320 IF L=0 THEN POKE SCREEN+PIPE(Z,1),
PIPE(Z,2):POKE 53761,0:RETURN
LK 330 IF L=9 OR L=11 THEN POKE SCREEN+PI
PE(Z,1),0
JH 340 IF L)=59+W AND L<=62+W THEN 600
UD 350 POKE 53761,0:IF X>L1 THEN RETURN
AL 360 IF Z=51 OR Z=52 THEN RETURN
RD 370 IF L=9 OR L=11 THEN POKE SCREEN+PI
PE(Z,1),L+196:POKE 53761,102:C=C+1:IF
C>L3 THEN 750
ZP 380 RETURN
HX 390 REM      SLIDE!
JM 400 POKE 53762,0:FOR TX=6 TO 13:POKE 5
CREEN+PX+20*PY,0:POKE SCREEN+TX+20*TY,
CHA(7)+W:POKE 53763,TX-5
QM 410 PX=TX:PY=TY:NEXT TX:POKE 53763,0:P
OKE SCREEN+212,11:RETURN
ML 420 POKE 53762,0:FOR TX=12 TO 5 STEP -
1:POKE SCREEN+PX+20*PY,0:POKE SCREEN+T
X+20*TY,CHA(11)+W:POKE 53763,13-TX
HR 430 PX=TX:PY=TY:NEXT TX:POKE 53763,0:P
OKE SCREEN+206,11:RETURN
ZX 440 REM      GET WRENCH
DW 450 POKE SCREEN+PX+20*PY,0:FOR Q=14 TO
0 STEP -1:FOR W=192 TO 64 STEP -64
SL 460 POKE 53760,W-64:POKE 53761,160+Q:P
OKE POS,CHA+W:PX=TX:PY=TY:NEXT W:NEXT
Q:W=64:GOTO 190
EY 490 REM      VALUES
QB 500 IF W<>64 THEN 190
BC 510 W=128:V=V+1:POKE POS+20,CHA(ST)+W:
VALVE=SCREEN+TX+20*TY:POKE VALVE,155:V
(V)=VALVE
NK 520 S=5+50:POSITION 10,22:? #6;S:IF V=
1 THEN POKE 19,0
UY 530 FOR X=10 TO 0 STEP -1:FOR Q=10 TO
20:50ND 0,Q+X,10,X:NEXT Q:NEXT X
AF 540 POKE 77,0:T=PEEK(19):L1=L1-5:IF V=
3 THEN T=254:X=255:GOSUB 800
OT 550 GOTO 170

```

```

CP 560 POKE 19,0:L2=L2-(L<160)*10:IF V=0
THEN RETURN
ZR 570 POKE V(1),154:V(1)=V(2):FOR D=12 T
O 0 STEP -1:50ND 1,D,0,D:NEXT D
FE 580 V=V-1:L1=L1+5:POKE 19,20-T:RETURN
TJ 590 REM      DEATH
SB 600 POKE 711,148:POKE 53765,0
CX 610 FOR D=10 TO 0 STEP -0.2:FOR F=0 TO
128 STEP 128:POKE SCREEN+PIPE(Z,1),PI
PE(Z,2)+F:50ND 0,F,6,D:NEXT F:NEXT D
OZ 620 IF V=3 THEN GOSUB 920:GOTO 150
GM 630 IF PLAY=18 THEN 760
KM 640 W=128:PLAY=PLAY+1:GOTO 150
HX 650 REM      ROTO-WARP
BR 660 IF ST<>15 OR RW=0 THEN RETURN
DC 670 FOR R=0 TO 8:FOR D=254 TO 251 STEP
-1:POKE POS,D:POKE 53760,D:POKE 53761
,160+R:NEXT D:NEXT R
BI 680 POKE POS,0:Z=INT(RND(0)*7):TX=WARP
(Z,1):TY=WARP(Z,2):POS=SCREEN+TX+20*TY
VJ 690 FOR R=8 TO 0 STEP -1:FOR D=251 TO
254:POKE POS,D:POKE 53760,D:POKE 53761
,160+R:NEXT D:NEXT R
MP 700 POKE POS,62+W:RW=RW-1:POSITION 10,
23:? #6;RW;" ":PX=TX:PY=TY:RETURN
TO 740 REM      GAME OVER
FX 750 FOR X=10 TO 0 STEP -1:FOR Q=X TO 0
STEP -0.5:50ND 0,PIPE(Z,2),6,Q:NEXT
Q:NEXT X
RQ 760 POSITION 5,10:? #6;"Game Over"
ZG 770 FOR D=1 TO 4000:IF PEEK(644)=0 THE
N POP:GOTO 1190
MP 780 NEXT D:GOTO 1110
ND 790 REM      BONUS
US 800 Z=INT(RND(0)*L2):IF Z<112 THEN GOS
UB 310
XH 810 POKE 711,INT(RND(0)*14)+138:T=T-2:
POKE 53764,T:POKE 53765,165:IF T=30 TH
EN 910
XQ 820 ST=PEEK(632):TX=PX+DX(ST):TY=PY+DY
(ST):POS=SCREEN+TX+20*TY
HM 830 IF PEEK(POS)>204 THEN C=C-1:B=B+10
:GOTO 860
NB 840 IF C=0 THEN 910
XG 850 IF PEEK(POS) THEN 800
XF 860 CHA=CHA(ST):POKE SCREEN+PX+20*PY,0
:POKE POS,CHA+W:PX=TX:PY=TY
DM 870 IF POS=SCREEN+206 THEN GOSUB 400
DU 880 IF POS=SCREEN+212 THEN GOSUB 420
OX 890 GOTO 800
LC 900 REM      LEVEL/ADD BONUS
KB 910 POKE 711,148:FOR T=50 TO 255 STEP
5:50ND 2,T,10,5:NEXT T:POKE 53765,0
UA 920 IF C=0 THEN POSITION 7,10:? #6;"G
AME":FOR D=1 TO 500:NEXT D:B=B+200
RX 930 POSITION 7,10:? #6;"BONUS"
EG 940 B=(B+100)*LEV:FOR B=B TO 10 STEP -
10:5=5+10:POSITION 10,22:? #6;S:NEXT B
:FOR D=1 TO 250:NEXT D
GL 950 LEV=LEV+1:POSITION 17,3:? #6;LEV:R
W=RW+3:POSITION 10,23:? #6;RW
BU 960 L1=L1+(L1<40)*20:L2=(LEV=2)*225+(L
EV=3)*200+(LEV=4)*175+(LEV=5)*150
RS 970 L3=L3+(L3<25)*3
PB 980 POSITION 7,10:? #6;" ":FOR X=2
3 TO 35 STEP 6:POKE SCREEN+X,154:NEXT
X:V=0:B=0:T=0:RETURN
CJ 990 REM      INITIALIZE
AM 1000 A=PEEK(106)-8:POKE 204,A:POKE 206
,224:POKE 708,8:POKE 709,36:POKE 710,2
2:POKE 711,148
IH 1010 DIM C$(20),D$(20),M5$(100),S$(4),
PIPE(111,2),WARP(7,2),V(3),CHA(15),DX(
15),DY(15)
QS 1020 FOR Q=0 TO 15:DX(Q)=0:DY(Q)=0:NEX
T Q
ZV 1030 DX(11)=-1:DX(7)=1:DY(14)=-1:DY(13
)=1:CHA(7)=59:CHA(13)=60:CHA(11)=61:CH
A(14)=62:V(1)=0:V(2)=0

```



# FOUR STAR SOFTWARE PICKS

Now that we're coming up on the eighth anniversary of the Atari 400 and 800, we can look back and reflect on some of the marvelous software we've seen over the years. The word processors. The development software. The graphics programs. And the games.

How can the 8-bits be dead with software like this? The current XE series still functions as a darned good, inexpensive word processing system, telecommunicating station, low-end development machine, graphics designer and—yes—a dynamite games computer.

We asked several key staffers/Atari users to list their favorite products in any category, from any year, new or old. The votes rolled in for eight different areas:

## Applications

Databases, spreadsheets, general

Entertainment

The games

Graphics

One of the 8-bit strongholds

Languages

Which are the best?

Telecommunications

One of the most oft-used functions

Word processors

Another popular use for the Atari

Miscellaneous

Software in various categories

Hardware

The hackers' favorite products.

Participants asked for input were:

Charles Bachand . . . . .CB  
 Ian Chadwick . . . . .IC  
 Michael DesChenes . . . . .MD  
 Charles F. Johnson . . . . .CFJ  
 Arthur Leyenberger . . . . .AL  
 Steve Panak . . . . .SP  
 Lee H. Pappas . . . . .LHP  
 Matthew Ratcliff . . . . .MR  
 D.F. Scott . . . . .DFS  
 Clayton Walnum . . . . .CW

These "judges" were asked to select their favorite products in each area, and to comment on their selection. The startling fact is the number of older products that made the list . . . most newcomers to the Atari 8-bit line won't find many of these software packages on the shelves—or even in current software lists.

To the more experienced 8-bit user, many titles here will bring back (we hope) fond memories of days gone by. We had to dig deep to recall some of these programs, ourselves.

Our intention is to prove the Atari 8-bit line can still live happily on, with what has been developed for it over the years. We believe that it's still a powerful machine which can accomplish nearly anything a user asks of it. We hope you enjoy our list—and are very interested to see your favorites, or to hear opposing opinions. Let us know!  
 —LHP

## APPLICATIONS

**Creative Process** (Antic/The Catalog) — Outline ideas with this program, which includes a utility package, undo function and compatibility with many word processors.

*"A very nice outline/idea processor"* —IC

**Data Perfect** (LJK) — Keep track of anything, generate reports and do mailing lists with this **Letter Perfect**-compatible database.

*"This program has always done everything I need a database to do, and done it quite well. The report generator is very nice."* —CFJ

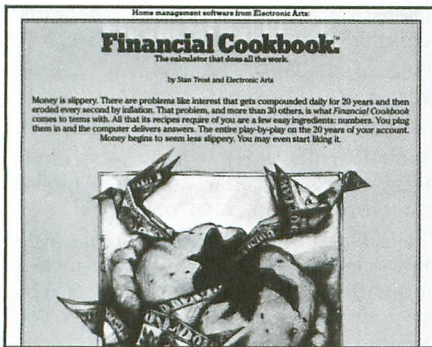
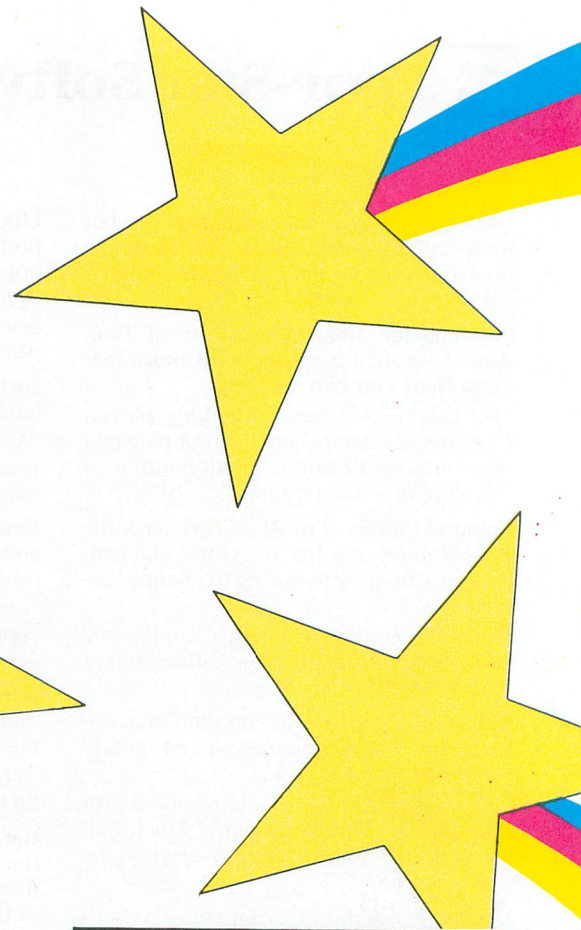
*"This early bird in the 8-bit market still fits the bill nicely, thank you."* —CW

**Financial Cookbook** (Electronic Arts) — A large menu of everyday financial functions is at your fingertips with this popular, easy-to-use program.

*"One of the most useful programs you'll ever own . . ."* —AL

**The Print Shop** (Broderbund) — One of the blockbuster programs for the Atari was this design program, which allowed users to customize their own cards, banners, posters, or whatever.

*"Great for designing cards, posters, menus and the like."* —IC



**Financial Cookbook.**

"Very useful, and easy to learn due to the well-designed menus." —CFJ

"This program is undoubtedly one of the most popular of all time, on all the 6502-based 8-bit machines." —MR

**SynCalc** (Broderbund/Synapse) — This product interfaces with Synapse's own word processor and database. . . a powerful threesome at the time, and still in use by thousands across the land.

"A remarkably powerful spreadsheet." —CFJ

**SynFile/SynFile+** (Broderbund/Synapse) — Easy-to-use database.

"The first, and still the only, point-and-shoot storage/retrieval database system." —DFS

"Easy to use, and complete. What a great combination." —CW

**ENTERTAINMENT**

**Astrochase** (First Star) — A colorful romp through space as you blast away the enemy. . . from the winner of the first Atari Star Award.

"The best shoot-'em-up in this part of the Milky Way." —AL

**Ballblazer** (Epyx) — A different kind of game where you battle it out "on the grid." Two players on-screen at once, each with their own perspective view. Developed by Lucasfilm games division.

"It's the best two-player game for the 8-bit Ataris." —MR

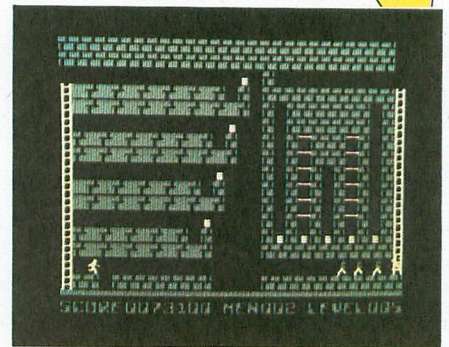
**Blue Max** (Broderbund/Synapse) — Pilot a WWI biplane over hostile terrain in this 3D game.

"A vastly underrated game with an opposing force that must be commanded by an AI routine." —DFS

**Blue Max 2001** (Broderbund/Synapse) — Pilot a WWII flitter over hostile space stuff in this 3D game.

"A refreshing, imposing sequel that compliments the original, though not replacing it." —DFS

**BoulderDash & Super BoulderDash** (Electronic Arts) — Dig underground while avoiding boulders, yet using them to your advantage. Diamonds are the goal here.



**Lode Runner.**

Watch out for the amoeba and butterflies. "I was terrible at it, but I loved watching others play it." —CB

"You gotta love this game. I've played it for hours and still find it fresh—even after two years." —AL

"Hypnotic screen movements, wristbusting close calls and awesome complexity make it as good as anything I've ever played in the arcades." —SP

"Nice graphics, animation, music and sound, coupled with excellent game play and puzzle solving, make this one of the best." —LHP

"This underground arcade puzzle is so realistic, it'll give you dreams." —CW

**Captain Beeble** (InHome) — You probably don't remember it. . . fly with your jet pack. . . pick up the crystals. . . shoot the meanies. . . avoid the moving obstacles. . . get outta there!

# Four-Star Software *continued*

"This game was great. Addiction is what we're talking here. I played it for weeks non-stop. Never could finish the game." —LHP

**Chessmaster 2000** (The Software Toolworks) — Nice graphics with more features than you can think of.

"For the sophisticated, thinking player, **Chessmaster 2000** offers the best play and most options of any computerization of this classic strategy game." —SP

**Colonial Conquest** (SSI) — Turn back the clock and try to relive the world of a century ago, while attempting to change history.

"Sort of a combination Risk, Diplomacy and wargame; this is great either solo or with others." —IC

**Defender** (Atari) — Rescue the pods, destroy the many enemies, avoid nearly everything—lotsa luck.

"Would you believe, an improvement over the original (arcade version)? Much better controls, for a better overall game feel." —DFS

**Drelbs** (Broderbund/Synapse) — What's a Drelb? Why it's a small hapless creature with one eye. What does he do? He attempts to save his buddies from the evil Trollaboars. Flip the grids and watch out for the bad guys.

"A different game with interesting graphics... was always one of my favorites." —LHP

"This game scores 100 percent for originality—amazing in a world where 95 percent of the games are clones of those that have come before." —CW



Defender.

**Drol** (Broderbund) — Fine graphics and sound added to an already fun-to-play game made this a favorite.

"This game didn't receive much attention when it was released, but it's great... worth searching for!" —CFJ

**Flight Simulator II** (subLOGIC) — The premier flight simulator and the most popular... this "game" has it all.

"The program that wrote the book on smooth, adaptable simulators; and the Atari has the best 8-bit version." —DFS

**Fortress** (SSI) — A chesslike tactical challenge; easy to learn—tough to win.

"A unique strategy game that learns from your play and gets better and better; very nicely designed and conceived." —IC

**Gruds in Space** (Sirius Software) — A text and graphics adventure with some animation and a real plot.

"One of the first "animated" graphic adventure games. I played this one over and over." —CB

**Jumpman Junior** (Epyx) — Climb the ladders, go for the points, get away from the nasties.

"The best 'hopping around' game. **Miner 2049er** is a close second." —AL

**Kennedy Approach** (MicroProse) — Take the role of an air traffic controller as you monitor one of four major airfields; one of the best laid out screens of any game, and even the simulated voice of pilots and tower.

"My current favorite (and has been for the past year)... I have played virtually every game that has ever been released for the 8-bit... and I love this game!" —LHP

**Krazy Shootout** (Kbyte) — You patrol a simple electrified maze, blasting robots (who also shoot back) as you make your way towards the exit.

"Remember this cartridge game? It didn't offer the best graphics, it didn't have the best sound effects; just one of the most fun-to-play games I've seen." —LHP

**Leather Goddesses of Phobos** (Infocom) — Tame, suggestive or lewd... these are the three levels of play in this "different" text piece of interactive fiction from the leader.

"Sight, sound and smell are all activated in this raucous and rollicking intergalactic romp. Just don't get caught with it." —SP

**Lode Runner** (Broderbund) — One lone hero must go against the guards of the Bungling Empire to capture the gold, drill holes in bricks and solve over 100 screens. **Championship Lode Runner** features an additional 50 even tougher screens.

"A simple game to learn... a nearly impossible one to master, it's easy to see why this has been one of the best-selling computer games ever, and still lives on in sequels and a version for the Nintendo video game." —LHP



MiG Alley Ace.

**MiG Alley Ace** (MicroProse) — Two MiG fighter pilots on a split screen, seeking each other out.

"Once upon a time, one of the all-time favorites frequently heard echoing in the halls of **ANALOG Computing**" —LHP

**Missile Command** (Atari) — One missile base must protect three cities from a myriad of incoming missiles, bombers, killer satellites and smart bombs.

"This was my favorite arcade game back in the late 70s, and I've been playing it at least once a week since it was made available for the 8-bits." —MD

"One of the best "blow-em-up" games ever. And well executed on the 8-bit." —LHP

**Moon Patrol** (Atari) — Drive the moon buggy across a perilous surface, avoiding craters, rocks and other obstacles.

"The sound effects, dual horizontal scrolling backgrounds and playability of this game all get very high marks... and you can continue the game exactly where you lost the last one." —MR

**M.U.L.E.** (Electronic Arts) — A game of planetary economics, where up to four players struggle to develop land and produce the necessary commodities to ensure the survival of the colony.

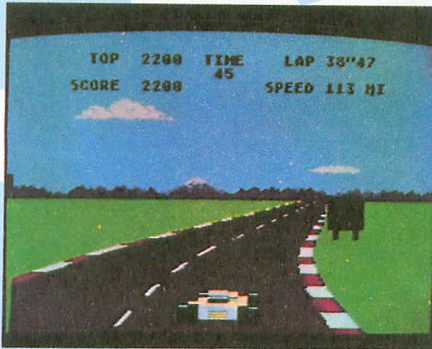
"Simply the best multiplayer computer game on the Earth for any computer." —AL

"Talk about addiction! I've spent more hours with this game than any other piece of entertainment software." —CW

**Pac-Man** (Atari) — The most famous arcade game—eat the dots, avoid the goblins, have a great time.

"Laugh if you want to; I don't care. I've never grown tired of munching my way through the mazes." —CW

**Pinball Construction Set** (Electronic Arts) — Very big in its heyday; build an electronic pinball game complete with flip-



Pole Position.

pers, bonus scoring markers and bumpers—then play it!

"Simply the best single-person computer erector set in this part of the galaxy. I like it a lot." —AL

**Pole Position** (Atari) — The ultimate driving game, with plenty of action and great graphics.

"It has fast action, with a high playability factor that requires more true skill than dumb luck. And you can actually finish this game." —MR

**Poker Tourney** (Artworx) — A poker game pitting you against five computer players.

"After I'm done getting blown away in *River Raid*, I need to play a relaxing game of cards to unwind." —MD

**Powerstar** (Pandora) — A cartridge-based graphics adventure where you must work your way up to a space station and stop it from exploding!

"The only graphics adventure to ever come out on a cartridge." —CB

**River Raid** (Activision) — You know the old saying: if it moves, blow it up! If it ain't moving, blow it up anyway! Those are the instructions for this game.

"Your typical fast-paced shoot-'em-up. It's the fact that I've never reached the end that keeps me playing this old-timer." —MD

**Robotron** (Atari) — Save this family of the future from the onslaught of droves of robots.

"A *Robotron* 'emulator.' If it makes me sweat, it must be good." —DFS

**Seven Cities of Gold** (Electronic Arts) — A game of exploration where you're the first discoverer of America, and it's your job to keep peace with the natives and make big bucks for the Queen back home.

"It's very addictive, trying to be a conquistador, especially when you create new worlds." —IC

"What a masterpiece; this game is fun,

educational and gasp(!) thought provoking, well implemented. You get the idea." —AL

**Spy-vs.-Spy** (Avantage) — Based on the famous characters from *Mad* magazine. You poke around the screen leaving booby-traps and searching for the top secret plans. Two persons play at the same time on separate "windows."

"[This game] and its sequel are the best two-player games available." —SP

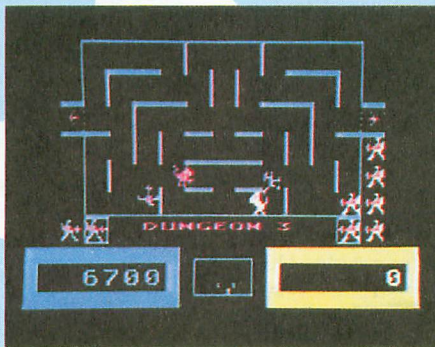
**Star Raiders** (Atari) — Soar through space as you gaze out the spacecraft window and blast the Zylons into minute pixels.

"One of the first, and still one of the best, this game combines incredible 3D graphics with arcade action." —CFJ

"The first reason I bought an 800 back in '79. . . still holds up after all these years." —LHP

**Wizard of Wor** (Roklan) — A fun one- or two-player game, where you roam the maze, try to kill the wizard and move on to a new maze.

"I've finished all of the levels, but I still enjoy this search-and-destroy maze entertainment." —MD



Wizard of Wor.

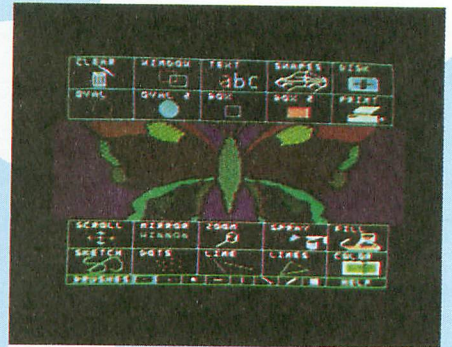
**World Karate Championship** (Epyx) — From the first punch to the last kick, you learn to fine-tune your moves and knock "the other guy" silly.

"I actually like it better than the ST version, because it has a better joystick response." —MR

## GRAPHICS

**Atari Artist** (Atari) — This program is for use with Atari's *Touch Tablet*, and is a fine cartridge-based product.

"Originally marketed as *MicroIllustrator* with the *KoalaPad* touch tablet, then packaged and sold in cartridge form with the *Atari Touch Tablet*. This program set new standards in user-friendliness for Atari 8-bit graphics software." —CFJ



Blazing Paddles.

**Blazing Paddles** (Baudville) — A nifty mini-DEGAS for the 8-bits.

"I compliment Baudville for releasing a fine program when most other companies have forgotten the Atari 8-bits." —LHP

**Fun With Art** (Epyx) — A cartridge-based program with the ability to place text on the same screen as graphics.

"Has all the features that *Atari Artist* lacks, like the ability to put text on the graphics screen and change the color palette on every TV scan line." —CFJ

**MicroIllustrator** (Koala Technologies) — When used with the *KoalaPad*, you can draw with stylus or finger, and produce some great images.

"This is it: the hottest 8-bit drawing program—and you can use a graphics tablet, too!" —CW

**MicroPainter** (DataSoft) — A complete, joystick-driven computer art program.

"One of the first Atari drawing programs, this product has become a classic." —CW

**Movie Maker** (Electronic Arts) — An animation and sequencing program—create up to 60-second movies.

"One of the best creative/useful/fun programs around. A lot to be learned by using this program, especially for a creative youngster." —AL

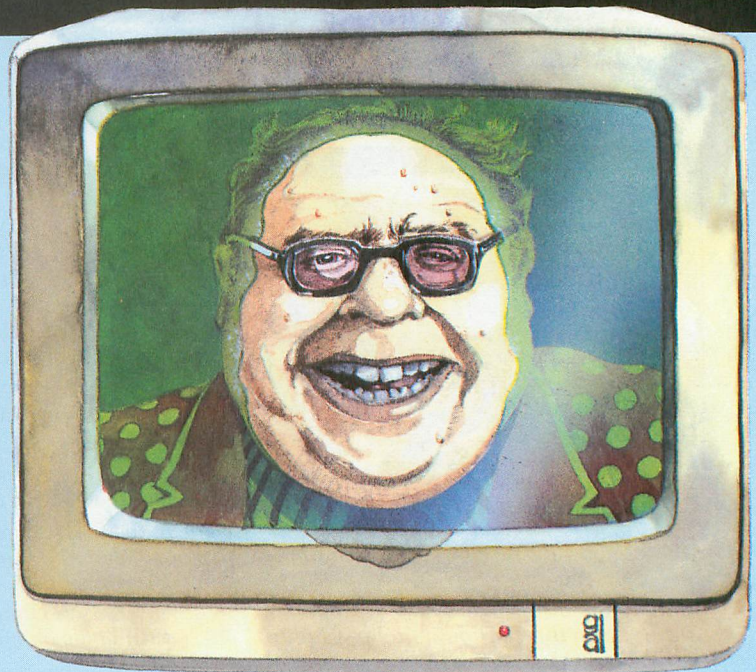
**RAMbrandt** (Antic/The Catalog) — A drawing/electronic-painting program to work with both the joystick and Atari-compatible touch tablet.

"This program does most things you'll ever need in graphics (except GR. 8 for some unknown reason). It has oodles of features and functions." —IC

**Super 3D Plotter II** (Elfin Magic) — A much advanced version of our popular *Solid States* program; many new features make this a nice 3D software package.

"Its speed and versatility are astounding, considering the fact that it runs on a 'mere' 6502." —MR

(continued on page 86)



## A utility set for use with *Cheep Talk*.

by Anthony A. Nogas

Listening to computer-produced speech can be a lot of fun. Programming a computer to talk, on the other hand, is not much fun. Speech synthesis is a complicated task, and numerous trade-offs are made to produce practical voice synthesizers. These exchanges often result in a need for difficult programming, which is where a good utility package can come to the rescue. Such a package won't remove all programming problems, but it will minimize them, thus allowing a programmer to produce vocal code much more quickly and accurately.

**Talker** is a set of utility programs for use with the **Cheep Talk** voice synthesizer by Lee Brilliant, M.D. (see **ANALOG Computing's** issue 29). The first program here creates a device handler for the voice synthesizer. This "T:" device allows output to the voice synthesizer to be accomplished internally by Central Input-Output, eliminating the numerous DATA, PEEK and POKE statements required in the programs of the original **Cheep Talk**.

The second listing is a string editor, which takes input in the form of speech sounds (allophones) and translates that input into code to be used by the voice synthesizer. This translated code is stored into another string and sent as a BASIC listing to a storage device. The BASIC lines can then be merged with the programmer's own BASIC program, which will operate to produce vocal output. The string editor should have the "T:" device handler loaded into memory, although it will work without it.

### The **Talker** device handler.

Listing 1 is the BASIC data used to create your copy of the **Talker** voice synthesizer device handler. Please see **M/L Editor** on page 10 for typing instructions. You should create the file under the name **AUTORUN.SYS**. This program requires DOS 2.0 or 2.5.

The **Talker** device created by Listing 1 is a standard Atari device handler. Upon power-up, the **AUTORUN.SYS** file containing the handler will load into memory, and the handler will initialize itself. This device handler supports the functions normally available for any output-only device: **OPEN**, **CLOSE**, **PUT** and **STATUS**. The **GET** statement is not supported and will cause an error. There are no special functions for this handler.

Errors returned by the device handler itself are those listed in the BASIC reference manual. These may be of three types:

**INVALID COMMAND** (error 132) is returned on an attempt to **OPEN** that is not for output only. The device handler will accept an attempt to open from **BASIC** only in the form of **OPEN #1,8,0,"T:"** (the choice of channel is up to the programmer).

**DEVICE TIMEOUT** (error 138) is returned if the speech synthesizer fails to respond within two-thirds of a second to an attempt by the computer to send it data. Failure of the voice synthesizer to return to a ready status after an output operation will also yield a **DEVICE TIMEOUT**. The normal cause of this error is a loose joystick port plug.

**FUNCTION NOT IMPLEMENTED** (error 146) is returned if a function call is for **GET** or special functions. **Cheep Talk** is an output-only device, and these function calls are not supported.

The **Talker** device handler can be addressed as you would a printer. Speech data can be sent 1 byte at a time, using the **PUT** statement. The data can also be stored in a string, then sent to **Cheep Talk** using **PRINT** statements. This allows speech data to occupy less space in your program—and to be sent in blocks, rather than in individual bytes. In either case, only the actual data needs to be sent to the synthesizer. The device handler performs all the functions required to control output of the voice synthesizer.





# Talker

To allow proper handling by BASIC of vocal data in strings, the quotation mark character (ATASCII 34) cannot be contained within the string. The data value 34 is a legal allophone value, thus provision must be made to allow its storage in data strings. The device handler is programmed to recognize the character *b* (ATASCII 98) as equivalent to the quotation mark, and will translate this character before sending it to the synthesizer. This substitution prevents the truncation of data strings by the BASIC string-handling routines.

Upon a CLOSE command, the device handler will turn off the sound output from **Cheep Talk**. This also ensures that an END statement will cause sound output from the voice synthesizer to cease.

## The **Talker** string editor.

Like the characters in machine language strings, the characters in speech data strings must be the ATASCII equivalents of the numeric data to be sent. This encoding of the speech data strings is a time-consuming job. The second program here (Listings 2 and 3) is designed to automate this process.

Listings 2 and 3 create the **Talker** string editor. It's written in Atari BASIC, with machine language subroutines. Correct typing of the program is critical for proper operation.

Type the **Talker** string editor program, using the following method.

Type in Listing 3, using **BASIC Editor II** (see issue 47) and run it. This will create a listing of the critical decode and machine language lines (under the filename MACHINE.LST). Set the disk with this listing aside, in a safe place.

Type in Listing 2, using **BASIC Editor II**.

ENTER the listed program lines produced by Listing 3 into the program created from Listing 2. Be sure to save this program before running it.

The **Talker** string editor should be saved on the same disk as the device handler AUTORUN.SYS file. Boot this file, then run the string editor program. You can use the editor without the device handler in memory, but won't be able to hear the results of your encoding—which limits the editor's effectiveness.

The first screen is the title screen. You'll be asked if you want to review the program. This review will show you the grammar symbols used by the editor.

The editor's grammar is designed to make input of allophones as similar as possible to writing a normal English sentence. The slash (/) is used to separate allophones within a word. The space ( ) is used to separate words. It causes a 50-millisecond (ms.) pause to be placed between words. The comma (,) is used to separate clauses and places a longer pause (100 ms.) between words. The period (.) is used to end sentences, where it inserts a long pause (200 ms.). The semi-colon (;) will continue an allophone input on the next input prompt, in the same way as when it's used within PRINT statements.

The **Talker** string editor uses the BASIC line buffer, which is limited to three screen lines. Therefore, long vocal outputs must be input in segments. The vocal string output buffer is 240 bytes long, with the remaining free buffer size displayed on the input screen.

*Do not overrun this buffer.* Doing so will generate an error and cause the loss of the present data string input. I do not recommend using long output strings, as the editor will only allow you to edit three-line input strings. Allophone inputs in multiple segments can only be changed by re-entering the entire set of strings.

After reviewing (or bypassing) the grammar screens, you will get the set-up screen. This screen will ask you a number of questions, the first being the filespec for output. Include the device specification in this answer.

The next question is what string variable name you wish

to use for storing vocal strings. The default name is T\$. Pressing RETURN in response to this question gives you the default name, or you can type in your own. This must be a legal string-variable name, of twenty characters or less.

Next, you'll be asked to supply a channel number (between 1 and 5) for your program to use for vocal output. This completes the set-up section of the screen, with values to be used for all output from the editor.

You have now reached the actual editor routines. These encode the allophone string into a BASIC listing, to be merged into your own programs. You'll be asked for the line number to be used for the output listing, for each allophone line encoded. Keep your line numbers separated from each other by at least five.

The input screen will be displayed after the line number is confirmed. This screen shows the entire allophone table available for your use, with examples of words including that allophone sound. At the bottom of this screen is a five-line window for input of your allophone code. Note that hitting Q allows you to exit the program.

Type in your allophone code, using the proper grammar. Upon completion of input, the string will be encoded (assuming no errors). If it's not a string to be continued (ended with a semi-colon) and the "T:" device handler is in memory, the speech synthesizer will vocalize the string. You can repeat this vocal output as many times as desired, to confirm that the string is correct. You're then given a choice of saving, editing or re-entering this allophone string.

If you choose to edit the string, the last allophone input will be displayed, with the cursor at the beginning of the line. This allows you to make changes in your input and listen to the results—without having to enter the entire line. Just use the cursor, INSERT and DELETE keys to edit the line, as you would to edit a BASIC program line.

In the event of an input error, the type of error will be shown, and the last line entered will be displayed, with the location of the error highlighted in inverse video. You'll then be given the choice of editing or re-entering the line.

Next you'll be asked the line number for your next allophone input. You must enter a number, even if you wish to quit the program—although, in that case, the number will never be used. Always exit the program from the allophone input screen by typing Q. If you accidentally exit the program, you should type in the immediate mode statement GOTO QUIT. This will properly terminate the program and prevent loss of output data.

### Using Talker listings.

The listings produced by the Talker string editor are intended for use in other BASIC programs. It is the programmer's duty to ensure proper conditions for using these listings are met. If you follow the steps below, you can write programs that talk. The following conditions must be met:

The "T:" device handler must be in memory. This means you must have the device handler AUTORUN.SYS file created by Listing 1 in disk drive 1 on system start-up.

The string variable used for vocal output must be properly dimensioned. Setting the dimension of this

variable to 240 is always safe, as that's the longest vocal string the editor is capable of producing.

The listings produced by the Talker string editor must be properly merged into your program.

### Advanced user notes.

Machine language programmers can call the "T:" device handler in the same manner they call the printer handler. Ensure that, when you OPEN a channel for vocal output, the ICAUX byte of the IOCB is set to 8, or an error will be generated. If a machine language program is appended to the device handler AUTORUN.SYS file, your code must perform a Jump-To-Subroutine (JSR) to address \$1DE7, to initialize the handler. If your program "steals" the DOS initialization vector (address \$0C), you must ensure that the code pointed to by this address includes a JSR to address \$1E23. This will make certain that the device handler and DOS are reinitialized on a SYSTEM RESET.

Machine language programmers will find the editor of less use than will BASIC writers. I suggest changing the editor program's Lines 240-270 to PRINT OUTBUF\$(1,X) to the disk. This will store the vocal strings separated by EOL characters (ATASCII 155). Machine language programmers can then write a short BASIC program to print out these character values.

### Final note.

The Cheep Talk voice synthesizer is a powerful accessory for your Atari. Adding the Talker device handler and string editor can unleash the synthesizer's full power.

GG2/UH/DD1 LL/AX/KK2.  
(GOOD LUCK).

I hope you enjoy using these programs. ☐

*Anthony A. Nogas is a radiological protection and nuclear chemistry technician at the Pilgrim nuclear power station in Plymouth, Massachusetts. He spent twelve years in the U.S. Navy as an engineering laboratory technician, and has his B.F.A. in Theatre from the University of Connecticut. Married with two children, he's been programming Atari computers for over four years.*

The two-letter checksum code preceding the line numbers here is *not* a part of the BASIC program. For further information, see the *BASIC Editor II* in issue 47.

### Listing 1. M/L Editor data.

```
1000 DATA 255,255,252,28,41,30,10,29,5
5,29,106,29,111,29,153,29,227
1010 DATA 106,29,76,35,30,189,74,3,201
,8,240,6,32,56,29,160,2164
1020 DATA 132,96,173,2,211,41,251,141,
2,211,169,127,141,0,211,32,7078
1030 DATA 211,29,173,2,211,9,4,141,2,2
11,32,211,29,32,172,29,2972
1040 DATA 168,96,169,0,32,112,29,32,21
8,29,173,2,211,41,251,141,6715
1050 DATA 2,211,169,0,141,0,211,32,211
,29,173,2,211,9,4,141,3720
1060 DATA 2,211,32,211,29,173,0,211,16
```

```

,8,32,224,29,176,219,160,7245
1070 DATA 138,96,160,1,96,169,0,160,14
6,96,72,32,218,29,173,0,3943
1080 DATA 211,16,10,32,224,29,176,246,
104,169,138,48,18,32,218,29,5111
1090 DATA 104,201,155,208,2,169,0,41,6
3,32,158,29,32,196,29,157,3325
1100 DATA 67,3,168,96,188,67,3,96,72,9
,64,141,0,211,32,211,4136
1110 DATA 29,104,141,0,211,96,32,218,2
9,173,0,211,16,8,32,224,4276
1120 DATA 29,176,246,169,138,96,32,218
,29,169,0,32,158,29,173,0,3539
1130 DATA 211,16,7,32,224,29,176,246,1
44,233,169,1,96,141,10,212,8277
1140 DATA 141,10,212,96,169,168,141,24
,2,96,24,173,24,2,105,128,2634
1150 DATA 96,162,0,160,12,189,26,3,201
,84,240,34,201,0,240,7,5632
1160 DATA 232,232,232,136,208,239,96,1
69,84,157,26,3,169,252,157,27,8754
1170 DATA 3,169,28,157,28,3,169,35,133
,12,169,30,133,13,169,41,2482
1180 DATA 133,128,141,231,2,169,30,133
,129,141,232,2,96,32,231,29,5986
1190 DATA 76,64,21,0,226,2,227,2,231,2
9,0,0,0,0,0,0,0,6573
1200 REM * 320 BYTES

```

Listing 2.  
BASIC listing.

```

KP 0 REM TALKER STRING EDITOR-by A.A. NOG
A5
BG 1 REM Copyright 1985 by ANALOG 400/800
Corporation.
DP 10 GOSUB 3010:GOSUB TITLE:GOSUB SETUP:
?:TRAP QUIT:IF FILE$(1,1)="C" THEN T=
2095
ZY 20 REM LINE NUMBER INPUT
VQ 30 POKE 764,255:?"LINE NUMBER FOR NEX
T INPUT":INPUT INBUF$
CK 35 IF INBUF$="" THEN ? CHR$(253);"LINE
NUMBER INPUT REQUIRED.":GOTO 30
LB 40 IF INBUF$(1,1)<"0" OR INBUF$(1,1)>"
9" THEN ? :? CHR$(253);"ILLEGAL INPUT-
try again.":GOTO 30
LQ 50 LINENUM=VAL(INBUF$):IF LINENUM>3275
0 THEN ? CHR$(253);"LINE NUMBER TOO LA
RGE-try again.":GOTO 30
LR 60 ? :? "YOUR LINE NUMBER IS ";LINENUM
:? :? "Is that correct?":GOSUB YESNO:IF
YES=0 THEN GOTO 30
IU 70 OPEN #3,12,0,"E:"
RD 80 REM ALLOPHONE INPUT
SF 90 GOSUB SCREEN?:INPUT ALLOPHONE COD
E/Q=QUIT. BUF:";240-PEEK(1537)

```

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RU 100 POKE 764,255:ERR=0:INPUT #3,INBUF$
:IF INBUF$="Q" THEN GOTO QUIT
AT 110 INBUF$(LEN(INBUF$)+1)="*":X=USR(ADR
R(MATCH$),ADR(ALLO$),ADR(INBUF$),ADR(O
UTBUF$)):IF PEEK(1536)=1 THEN GOTO 90
QH 120 IF X>250 THEN GOTO ERROR
UX 130 Z=PEEK(128)+PEEK(129)*256:IF Z<>77
21 AND Z<>2095 THEN GOTO 180:REM "T:"
DEVICE NOT PRESENT
RX 140 ? "Press SPACE BAR to repeat voi
ce.":? "Press any other key to continu
e."
RH 150 OPEN #2,8,0,"T":? #2;OUTBUF$(1,X)
:CLOSE #2:POKE 764,255
ZC 160 IF PEEK(764)=255 THEN GOTO 160
AH 170 IF PEEK(764)=33 THEN GOTO 150:REM
-SPACE BAR
JM 180 ? :? :? "WHAT WOULD YOU LIKE TO DO
?":IF ERR=0 THEN ? "5-SUVE VOCAL STRIN
G."
BL 190 ? "E-EXTI VOCAL STRING.":? "R-RE-E
NTER VOCAL STRING.":POKE 764,255
PF 200 Y=PEEK(764):IF Y=255 THEN GOTO 200
PR 210 IF Y=40 THEN POKE 1536,0:POKE 1537
,0:GOTO 90:REM RE-ENTER
HC 220 IF Y=42 THEN GOTO 290:REM EDIT
QX 230 IF Y<>62 OR ERR=1 THEN POKE 764,25
5:GOTO 200
IM 240 FOR Y=1 TO X STEP 80:Z=Y+79:IF Z>X
THEN Z=X:REM -SAVE VOCAL STRING
SW 245 ? #1;LINENUM;" ";VAR$;:IF Y=1 AND
Z=X THEN GOTO 260
HI 250 ? #1;"(";Y;:IF Z<>X THEN ? #1;"";
Z;
BC 255 ? #1;"")";
SE 260 ? #1;"=";CHR$(34);OUTBUF$(Y,Z);CHR
$(34):LINENUM=LINENUM+1:NEXT Y
WF 265 ? #1;LINENUM;" IF PEEK(128)+PEEK(1
29)*256=";T;" THEN OPEN #";CHAN;"8,0,
";CHR$(34);"T";CHR$(34);
HM 270 ? #1;"":? #";CHAN;"";VAR$;"CLOSE
#";CHAN:CLOSE #3:POKE 1537,0:GOTO 30
YA 280 REM -EDIT VOCAL STRING
DZ 290 GOSUB SCREEN:? "EDIT ALLOPHONE STR
ING.":? INBUF$(1,LEN(INBUF$)-1)
JH 300 POSITION 2,20:? CHR$(28);:GOTO 100
CP 400 REM SCREEN FOR INPUT
EM 410 Y=PEEK(88)+PEEK(89)*256:IF PEEK(Y+
2)=52 THEN GOTO 430:REM CHECK FOR SCRE
EN SCROLLING
EX 420 GOSUB SCR
DE 430 Z=USR(ADR(ERASE$),Y+40*19):POKE 82
,2:POSITION 2,19:RETURN
ZD 600 REM SCREEN SETUP
UJ 610 POKE 82,0:?"K TALKER STRING EDIT
OR-Copyright 1985.":?"((((((((((( ALL
OPHONE TABLE ))))))))))))"
SZ 620 ? CHR$(28);" PA1-10ms HH1-hey *
AE-act NG-anger":? " PA2-30ms HH2-h
oe *A0-song OR-for"
TS 630 ? " PA3-50ms KK1-can AR-farm
OW-snow":? " PA4-100ms KK2-sky AW-d
own OY-voice"
KT 640 ? " PA5-200ms KK3-crane *AX-lapel
PP-pow":? " BB1-rib NN1-thin AY-sk
y SH-ship"
QH 650 ? " BB2-best NN2-no CH-chip *
55-best":? " DD1-end RR1-read *EH-e
nd *TH-thin"
KF 660 ? " DD2-do RR2-brain EL-ill *
UH-book":? " DH1-this TT1-parts EY-t
ray VU-vest"
SM 670 ? " DH2-bathe TT2-to *FF-food
WH-white":? " ER1-inner UW1-to *IH-
sit HW-we"
BH 680 ? " ER2-burn UW2-food IY-see
XR-pair":? " GG1-gate YY1-cute JH-d
odge YR-hear"

```

```

WX 690 ? " GG2-green YY2-yes LL-like
ZH-beige":? " GG3-wig *AA-hot MM-
milk ZZ-zoo"
FW 700 ? " >>>> Allophones with * may be do
ubled<<<<<<":POKE 82,2:RETURN
SJ 1000 REM TITLE SCREEN
RW 1010 ? "K ***** TALKER STRING EDITOR
*****":? :? :? "For use with the TAL
KER DEVICE"
JY 1020 ? "HANDLER by A. A. Nogas and the
":? "CHEEP TALK voice synthesizer by"
JF 1030 ? "Lee Brilliant M.D.":? :? :? "
copyright 1986 by"
WP 1040 ? "ANALOG COMPUTING MAGAZINE":RET
URN
BR 1200 REM GRAMMAR SCREEN 1
TT 1210 ? "K**** TALKER RESERVED CHARACTE
R5 *****":? :? "The characters listed b
elow are"
LS 1220 ? "recognized by the TALKER STRIN
G":? "EDITOR and perform the following
":? "functions:"
EP 1230 ? :? "1.Slash_____Separates allop
hones":POKE 85,14:?"within a word."
FQ 1240 ? "2.Space_____Separates words-in
serts a":POKE 85,14:?"50 ms pause."
JH 1250 ? "3.Comma_____Separates clauses-
inserts":POKE 85,14:?"a 100 ms pause.
"
ZJ 1260 ? "4.Period_____Ends sentences-ins
erts a":POKE 85,14:?"200 ms pause."
SV 1270 ? "5.Semicolon_____Indicates allophon
e":POKE 85,14:?"string is to be"
QA 1280 POKE 85,14:?"continued-similar t
o":POKE 85,14:?"its usage in PRINT":P
OKE 85,14:?"statements."
BE 1290 RETURN
CU 1400 REM GRAMMAR SCREEN 2
FK 1410 ? "KUsing the reserved character
set will":? "allow you to encode a voi
ce string in"
KC 1420 ? "a way that is similar to writi
ng a":? "normal sentence."
QT 1430 ? :? "The TALKER STRING EDITOR cr
eates":? "output command lines for you
r program"
JL 1440 ? "that operate like LPRINT state
ments":? "to a printer. It is not nece
ssary to"
ZX 1450 ? "end a voice string with a peri
od. The":? "period is mandatory for se
ntences"
MI 1460 ? "that end within the string.":?
:?"NOTE: The computer's text buffer
is"
KE 1470 ? "limited. Do not type more th
an":? "three screen lines of code when
asked"
US 1480 ? "to input the allophones. Use t
he ;":? "operator to continue the stri
ng on"
SJ 1490 ? "the next input prompt.":RETURN
JF 1600 REM SETUP ROUTINE
GV 1610 POSITION 2,16:GOSUB WAIT:?"KDO Y
OU WANT TO REVIEW THE PROGRAM?":GOSUB
YESNO
JE 1620 IF YES=1 THEN GOSUB GRAMMAR1:GOSU
B WAIT:GOSUB GRAMMAR2:GOSUB WAIT
OO 1630 ? "KSETUP FOR VOCAL STRING OUTPUT
:"
HU 1640 ? :? "PLACE A DISK IN DRIVE"
TR 1650 GOSUB WAIT:?" WARNING -INCLUD
E DEVICE AND DEVICE":? "NUMBER IN FILE
SPEC.":?
EM 1660 ? "WHAT IS THE FILESPEC TO BE USE
D FOR":? "OUTPUT OF YOUR CODE";
WX 1670 POKE 764,255:TRAP 1680:INPUT FILE
$:OPEN #1,8,0,FILES:GOTO 1710

```

```

TQ 1680 ERR=PEEK(195);? CHR$(253);:IF ERR
=165 THEN ? :? "FILENAME ERROR "
OU 1690 IF ERR<>165 THEN ? :? "ERROR -PL
EASE CORRECT AND RE-ENTER":? "FILESPEC
. ERROR NUMBER IS ";ERR;" "
GZ 1700 CLOSE #1:TRAP 40000:GOTO 1660
PO 1710 TRAP 40000:ERR=0: ? :? "WHAT STRIN
G VARIABLE NAME DO YOU WANT":? "TO USE
IN YOUR PROGRAM (PRESS RETURN"
PN 1715 ? "FOR DEFAULT NAME)":;INPUT INBU
F$:IF INBUF$="" THEN ? "DEFAULT VAR. N
AME T$ CHOSEN.":GOTO 1750
EY 1720 Y=LEN(INBUF$):IF INBUF$(1,1)<"A"
OR INBUF$(1,1)>"Z" OR INBUF$(Y)<"$" T
HEN ERR=1
EG 1730 IF ERR=1 THEN ? CHR$(253);"NOT A
LEGAL STRING VARIABLE":? :GOTO 1710
UJ 1740 VAR$=INBUF$
CA 1750 TRAP 1790: ? :? "TO WHICH CHANNEL
SHOULD THE VOCAL":? "OUTPUT BE DIRECTE
D";:INPUT CHAN
KC 1760 CHAN=INT(CHAN):IF CHAN>=1 AND CHA
N<=5 THEN RETURN
OM 1770 ? :IF CHAN<8 THEN ? "CHANNELS 0,6
AND 7 ARE RESERVED FOR THE COMPUTER
'S USE."
UU 1780 ? "PLEASE USE A CHANNEL BETWEEN 1
AND 5.":GOTO 1750
IU 1790 ? CHR$(253);"ILLEGAL INPUT-try ag
ain.":TRAP 40000:GOTO 1780
TY 1800 REM YES/NO CHECK
KU 1810 ? :? "Press Y for yes or N for no
.":POKE 764,255

```

```

AP 1820 IF PEEK(764)=255 THEN 1820
DQ 1830 IF PEEK(764)=43 THEN YES=1:RETURN
:REM -YES
ET 1840 IF PEEK(764)=35 THEN YES=0:RETURN
:REM -NO
SL 1850 GOTO 1820
XC 2000 REM WAIT ROUTINE-checks for keypr
ESS
HK 2010 ? :? "Press any key to continue."
:POKE 764,255
SE 2020 IF PEEK(764)=255 THEN 2020
AJ 2030 RETURN
GF 2200 REM ERROR ROUTINE
YU 2210 ERR=1: ? CHR$(253);:IF X=512 THEN
GOTO 2250
SA 2220 IF X=768 THEN GOTO 2260
SW 2230 IF X<>256 THEN ? "PROGRAM FAILUR
E.":GOTO QUIT
XS 2240 GOSUB SCREEN: ? "ERROR -DELIMITER
MISSING":GOTO 2270
JE 2250 GOSUB SCREEN: ? "ERROR -ILLEGAL A
LLOPHONE":GOTO 2270
TU 2260 GOSUB SCREEN: ? "ERROR -OUTPUT BU
FFER OVERFLOW:"
NF 2270 ? INBUF$(1,LEN(INBUF$)-1):POKE 76
4,255:GOTO 180
IO 2400 REM QUIT PROGRAM
ZI 2410 CLOSE #1:CLOSE #2:CLOSE #3:END
AL 3000 REM INITIALIZATION ROUTINE
QZ 3010 DIM INBUF$(120),OUTBUF$(240),VAR$(
20),ALLO$(160),FILE$(20):VAR$="T$"
TJ 3020 DIM MATCH$(400),ERASE$(30)
QN 3030 SCREEN=410:SCR=610:TITLE=1010:GRA

```

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CIRCLE #125 ON READER SERVICE CARD

## Talker continued

```

4448B253D34E4EB24848B24FD241D259D24747
B245CC4242B280,4935
I J 1005 DATA 229B33313030204D415443482428
312C3738293D2268A2066895CACAD0FAAD0006
F01CA900A2029D,3522
MMARI=1210:GRAMMAR2=1410:SETUP=1610:YE
SNO=1810:WAIT=2010
D J 3040 ERROR=2210:QUIT=2410:T=7721
E L 3050 REM -MACHINE LANGUAGE & DECODE ST
RINGS BELOW
L G 3060 REM -ALLOPHONE DECODE STRING
A R 3150 POKE ADR(MATCH$)+239,34:REM -PLAC
E QUOTATION MARK INTO STRING
D Y 3160 REM -WINDOW ERASE MACHINE CODE
I L 3180 OUTBUF$=CHR$(0):OUTBUF$(240)=CHR$
(0):OUTBUF$(2)=OUTBUF$:POKE 1536,0:RET
URN
I W 9999 REM TALKER STRING EDITOR-by A.A.
NOGAS
    
```

Listing 3.  
 BASIC listing.

```

K I 0 REM TALKER STRING EDITOR DECODE AND
MACHINE LANGUAGE LISTER-by A.A. NOGAS
Q B 1 REM Copyright 1986.
J J 10 SUM=0:LINE=0:CHAR=1:DIM DATUM$(80),
HEX$(2),DAT$(750):? "KCHECKING DATA LI
NES:"? "Please stand by."
F V 20 READ DATUM$:IF DATUM$="X" THEN GOTO
70
N O 30 READ CKSUM:FOR I=1 TO LEN(DATUM$) S
TEP 2:HEX$=DATUM$(I,I+1):GOSUB 120
Q Q 40 SUM=SUM+BYTE:SOUND 0,BYTE,10,8:DAT$
(CHAR)=CHR$(BYTE):CHAR=CHAR+1:NEXT I
J U 50 SOUND 0,0,0,0:IF SUM=CKSUM THEN SUM
=0:LINE=LINE+1:GOTO 20
A Z 60 ? :? "ERROR IN DATA LINE ";LINE+100
0:?"Please check your typing."END
X X 70 ? :? "INSERT A FORMATTED DISKETTE":
? "IN DISK DRIVE #1.":? "Press any key
to continue.":POKE 764,255
T I 80 IF PEEK(764)=255 THEN GOTO 80
R O 90 OPEN #1,8,0,"D:MACHINE.LST"
G L 100 ? "KCREATING MACHINE LANGUAGE":? "
LISTING FILE.":? "Please stand by."
Y W 110 ? #1;DAT$;:CLOSE #1:END
Y W 120 A=ASC(HEX$(1,1))-48:IF A>9 THEN A=
A-7
F D 130 BYTE=A*16:A=ASC(HEX$(2,2))-48:IF A
>9 THEN A=A-7
F P 140 BYTE=BYTE+A:RETURN
U B 150 REM MACHINE LANGUAGE DATA BELOW
M T 1000 DATA 3330373020414C4C4F2428312C38
31293D225041B15041B25041B35041B45041B5
4FD941D945C84B,3482
P G 1001 DATA 4BB350D04AC84E4EB149C85454B2
5252B141D84DCD5454B14448B149D945D94444
B15557B141CF41,4909
C C 1002 DATA C15959B241C54848B14242B154C8
55C85557B2229B3330383020414C4C4F242838
322C313630293D,3559
B O 1003 DATA 2241D74444B24747B356D64747B1
53C85AC85252B246C64B4BB24B4BB150DA4EC7
4CC57D758D257,4958
J K 1004 DATA C85959B143C84552B14552B24FD7
    
```

```

JN 1006 DATA 0006E8E010D0F8AE01068E02069D
1006E8E0F0D0F8F0078A9D00006E8D0FAA9008D
05068D04068D08,4455
YD 1007 DATA 068D09068D0A06AC0306A200B1CD
C920F033C9229B33313130204D415443482428
37392C31353429,2979
PZ 1008 DATA 3D222CF02FC92EF02BC92FF027C9
3BF023C92AF01FE003F0089D0806E8C838B0DA
AC0606B1CD0980,4763
UR 1009 DATA 91CDA20086D4E886D560B0B18D07
06C88C0306A9008D0C068D0D068D0E06A200AC
0406B1CF30229B,4003
WF 1010 DATA 33313230204D4154434824283135
352C323330293D22089D0C06E8C838B0F4297F
9D0C06C88C0406,2939
XU 1011 DATA AD0806CD0C06D013AD0906CD0D06
D00BAD0A06CD0E06D00338B021EE0506AD0506
C941F00338B0B3,3511
ML 1012 DATA AC0606B1CD098091CDA20086D4E8
E886D560229B33313330204D41544348242832
33312C33303629,3717
EC 1013 DATA 3D22B096AE0206AD0506C920D002
0940C940D00338B00B9D1006EE0206E8E0F0F0
3CAD0706C92FD0,4085
RJ 1014 DATA 0338B029C920D008A9029D100638
B015C92CD008A9039D100638B009C92ED02EA9
049D1006EE229B,3661
EC 1015 DATA 33313430204D4154434824283330
37293D220206E8E0F0F009AD03068D060638B0
A4AC0606B1CD09,3222
VH 1016 DATA 8091CDC8CC0306D0F4A20086D4A2
0386D560C93BD0098E0106A9018D000660A900
9D10068D000685,4126
ZH 1017 DATA D5E886D4A4D488B9100691CBC000
D0F660229B33313730204552415345243D2268
6885CC6885CBA9,4677
NI 1018 DATA 00A891CBC8D0FB8556A9028555A9
13855460229B,2473
BG 1019 DATA X

```

```

.WORD NOFUNC-1 ;GET NOT IMP
.WORD PUT-1
.WORD STATUS-1
.WORD NOFUNC-1
JMP INIT

;
;OPEN ROUTINE STARTS HERE
OPEN LDA IOCB+10,X ;GET CMND CODE
CMP #8 ;OUTPUT ONLY?
BEQ OPEN2 ;YES,PERFORM OPEN
JSR CLOSE ;NO,ABORT OPEN
LDY #INVCOM ;SIGNAL INVALID
RTS ;RETURN ERROR
OPEN2 LDA PACTL ;GET PORT CONTROL
AND #251 ;SETUP TO PROGRAM
; DATA LINES
; STA PACTL
LDA #127
STA PORTA
JSR PIADLY ;GIVE PIA TIME
; TO RESPOND
; LDA PACTL ;RESTORE PORT
; CONTROL REGISTER
; ORA #4
STA PACTL ;PORTA RESTORED
JSR PIADLY ;GIVE PIA TIME
JSR DEVCHK ;CHECK RESPONSE
TAY ;RETURN STATUS
RTS

;
;CLOSE ROUTINE STARTS HERE
CLOSE LDA #0 ;SIGNAL SILENCE
JSR PUT
JSR SETCLK ;SET TIMEOUT CNTR
LDA PACTL ;GET PORT CNTRL
AND #251 ;DATA LINES
; STA PACTL
LDA #0 ;SET FOR INPUT
STA PORTA
JSR PIADLY ;GIVE PIA TIME
LDA PACTL
ORA #4 ;RESET PORT CNTRL
STA PACTL ;PORTA RESTORED
JSR PIADLY ;GIVE PIA TIME
LDA PORTA
BPL CLSAT ;CLOSE SUCCESSFUL
JSR CKCLK ;CHECK IF TIMEOUT
BCS CLLOOP ;NOT CLOSED
LDY #TIMOUT ;ERROR TIMEOUT
RTS ;RETURN ERROR
CLSAT LDY #1 ;FLAG SUCCESS
RTS ;RETURN STATUS

;
;GET AND SPECIAL ROUTINES NOT
;IMPLIMENTED-ROUTINE STARTS HERE
NOFUNC LDA #0
LDY #NOTIMP ;NO FUNCTION
RTS ;RETURN ERROR

;
;PUT ROUTINE STARTS HERE
PUT PHA ;SAVE OUTPUT DATA
JSR SETCLK ;SET TIMEOUT
LDA PORTA ;DEVICE READY?
BPL OUT ;BRANCH IF READY
JSR CKCLK ;CHECK IF TIMEOUT
BCS PUT2 ;CONTINUE
PLA ;CLEAR STACK
LDA #TIMOUT ;SET ERROR CODE
BMI SETSTA ;SET ERROR CODE
OUT JSR SETCLK ;SET TIMER
PLA ;GET DATA
CMP #155 ;IS IT EOL?
BNE OUT2 ;NO, SEND DATA
LDA #0 ;YES, SO SILENCE
AND #63 ;CONVERT TO 6-BIT
JSR SEND ;SEND DATA
JSR DCHK3 ;CHECK RESPONSE
SETSTA STA IOCB+3,X ;STORE STATUS

```

Listing 4.  
Assembly listing.

```

;"T:" DEVICE HANDLER FOR "CHEEP
; TALK" BY ANTHONY A. NOGAS
; Copyright 1985 by ANALOG CORP.
;
;SYSTEM EQUATES
DOSINI = $0C ;DOS INIT VECTOR
LOMEM = $80 ;LO MEM POINTER
CLOCK = $0218 ;SOFTWARE TIMER 1
RUNVEC = $02E0 ;RUN VECTOR
MEMLO = $02E7 ;0.5. LO MEM PNTR
HATABS = $031A ;HANDLER TABLE
IOCB = $0340 ;I/O CNTRL BLOCKS
DOSST = $1540 ;DOS INIT
PORTA = $D300 ;JOYSTICK PORTS
PACTL = $D302 ;PORT CONTROLLER
WSYNC = $D40A ;WAIT HORIZ SYNC
;
;ERROR CODES RETURNED
INVCOM = 132 ;INVALID COMMAND
TIMOUT = 138 ;DEVICE TIMEOUT
NOTIMP = 146 ;NO FUNCTION IMP
;
;"T:" DEVICE HANDLER STARTS HERE
* = $1CFC
VECTAB .WORD OPEN-1
.WORD CLOSE-1

```

```

STA BUFIN,X
INX ;UPDATE COUNTERS
INY
SEC ;FLAG BRANCH
BCS LOOP5 ;ALWAYS TAKEN
;
;ERROR -- INPUT BUFFER OVERFLOW
ERR1 LDY OLDAL ;GET POINTER
LDA (INVEC),Y ;FIRST CHAR
ORA #128 ;CONVERT
STA (INVEC),Y ;STORE BACK
LDX #0 ;CLEAR F.P.

```

```

INX
INX ;2=ILLEGAL ALLO
STX ERRFG ;SET ERROR CODE
RTS
;
;PASS BRANCH BACK TO GET2
GET3 BCS GET2
;
;PERFORM ANY TRANSLATION
STORE LDX OUTOFF
LDA ENCODE ;GET CODE COUNTER
CMP #34 ;ASCII QUOTATION?

```

```

TAY
RTS
;
;STATUS ROUTINE STARTS HERE
STATUS LDY IOCB+3,X ;GET STATUS
;
; OF LAST OPERATION
RTS ;RETURN STATUS

```

```

STA DOSINI
LDA #INIT/256
STA DOSINI+1
;
; MEM
LDA #FINISH&$FF ;RESET LO MEM
STA LOMEM
STA MEMLO

```

```

STORE2 BNE STORE2 ;NO, NULL MATCH?
ORA #64 ;CONVERT TO "b"
CMP #64
BNE STORE3 ;STORE ALLO CODE
SEC
BCS DLOUT ;NO OUTPUT
STORE3 STA BUFOUT,X ;CODED ALLO
INC OUTOFF ;UPDATE BUF PNTR
INX
CPX #$F0 ;BUFFER OVERFLOW?
BEQ ERR3 ;GO ERROR ROUTINE
;
;PERFORM DELIMITER FUNCTIONS
;X = OFFSET INTO OUTPUT BUFFER
DLOUT LDA DELIM ;RECOVER DELIMITR
CMP #SLASH
BNE DLOUT2
SEC
BCS LPBK2
;
;CHECK FOR SPACE
DLOUT2 CMP #SPACE
BNE DLOUT3
LDA #2 ;50 ms silence
STA BUFOUT,X
SEC
BCS LPBK
;
;CHECK FOR COMMA
DLOUT3 CMP #COMMA
BNE DLOUT4
LDA #3 ;100 ms silence
STA BUFOUT,X
SEC
BCS LPBK
;
;CHECK FOR PERIOD
DLOUT4 CMP #PERIOD
BNE DLOUT5
LDA #4 ;200 ms silence
STA BUFOUT,X
;
;RETURN FOR NXT ALLOPHONE ROUTINE
LPBK INC OUTOFF ;MOVE OUTPUT PNTR
INX
CPX #$F0 ;BUFFER OVERFLOW?
BEQ ERR3
LPBK2 LDA INOFF
STA OLDAL ;ERROR OFFSET
SEC
BCS GET3
;
;ERROR -- OUTPUT BUF OVERFLOW
ERR3 LDY OLDAL
LOOP7 LDA (INVEC),Y
ORA #128
STA (INVEC),Y
INX
CPY INOFF ;ARE WE DONE?
BNE LOOP7 ;NO, CONTINUE
LDX #0 ;F.P. REGISTER 0
STX FR0
LDX #3 ;ERROR CODE
STX ERRFG
RTS
;
;CONTINUATION OF DELIMITER FUNC
;CHECK FOR SEMICOLON
DLOUT5 CMP #SEMI
BNE DLOUT6
STX OLDLEN ;SET BUFF POINTER
LDA #1
STA CONTFG ;FLG CONTINUATION
RTS
;
;DELIMITER MUST BE * (EOL)
DLOUT6 LDA #0
STA BUFOUT,X ;10 ms silence

```

```

STA CONTFG ;CLEAR FLAG
STA ERRFG ;CLEAR ERRORS
INX ;CONVERT OFFSET
STX FR0 ;STORE LENGTH
LDY FR0 ;GET COUNT
DEY ;UPDATE POINTER
LDA BUFOUT,Y ;GET DATA
STA (OUTVEC),Y ;PUT INTO STR
CPY #0 ;ARE WE DONE?
BNE MOVBUF
RTS
.END

```

Listing 6.  
Assembly listing.

```

;WINDOW ERASE - STRING EDITOR
;Copyright 1985
;
;ERASE ROUTINE STARTS HERE
*= $E000
PLA ;NUM. OF ARGS
PLA ;HI BYTE WINDOW
STA $CC ;STORE ZERO PAGE
PLA ;LO BYTE WINDOW
STA $CB
LDA #0 ;CLEAR CHARACTER
TAY ;SET COUNTER
LOOP STA ($CB),Y ;CLEAR WINDOW
INX ;UPDATE COUNTER
BNE LOOP ;IF NOT DONE
;CLEAR NEXT SCREEN LOCATION
STA $56 ;SET CURSOR LOC
LDA #2
STA $55
LDA #19
STA $54
RTS

```

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# Panak strikes!

## Reviews of the latest software

by Steve Panak

The amount and quality of software available for Atari computers is simply amazing.

Take a look at your favorite dealer's titles. At least four baseball games. . . three football games. . . two karate games. . . not to mention the vast fantasy collection. Infocom's library has expanded beyond my wildest expectations, and Electronic Arts continues to pump out hits. Only arcade games dwindle in number (fortunately, those that survive do so due to superior quality).

The result of this explosion is that the overall quality of games has increased dramatically in the past year. There's less junk, less chance of being rudely ripped off. And the large selection makes it less likely dealers will have to push bad stuff. They have enough of the good. The market has become so diversified that virtually anyone, regardless of how truly bland or totally bizarre their tastes may be, can find exactly what they want. As demonstrated by this month's games.

### Warship and Battle Cruiser

by Gary Grigsby  
SSI

1046 North Rengstorff Avenue  
Mountain View, CA 94043  
48K Disk \$59.95 each

These two games demonstrate specialization better than any others I could find. Written ten by Gary Grigsby, they define a whole new—and possibly undesirable—dimension in software. Though I doubt that even the most rabid war simulation enthusiast will want both of these games, I'm certain the fanatic who knows just what he wants won't be disappointed.

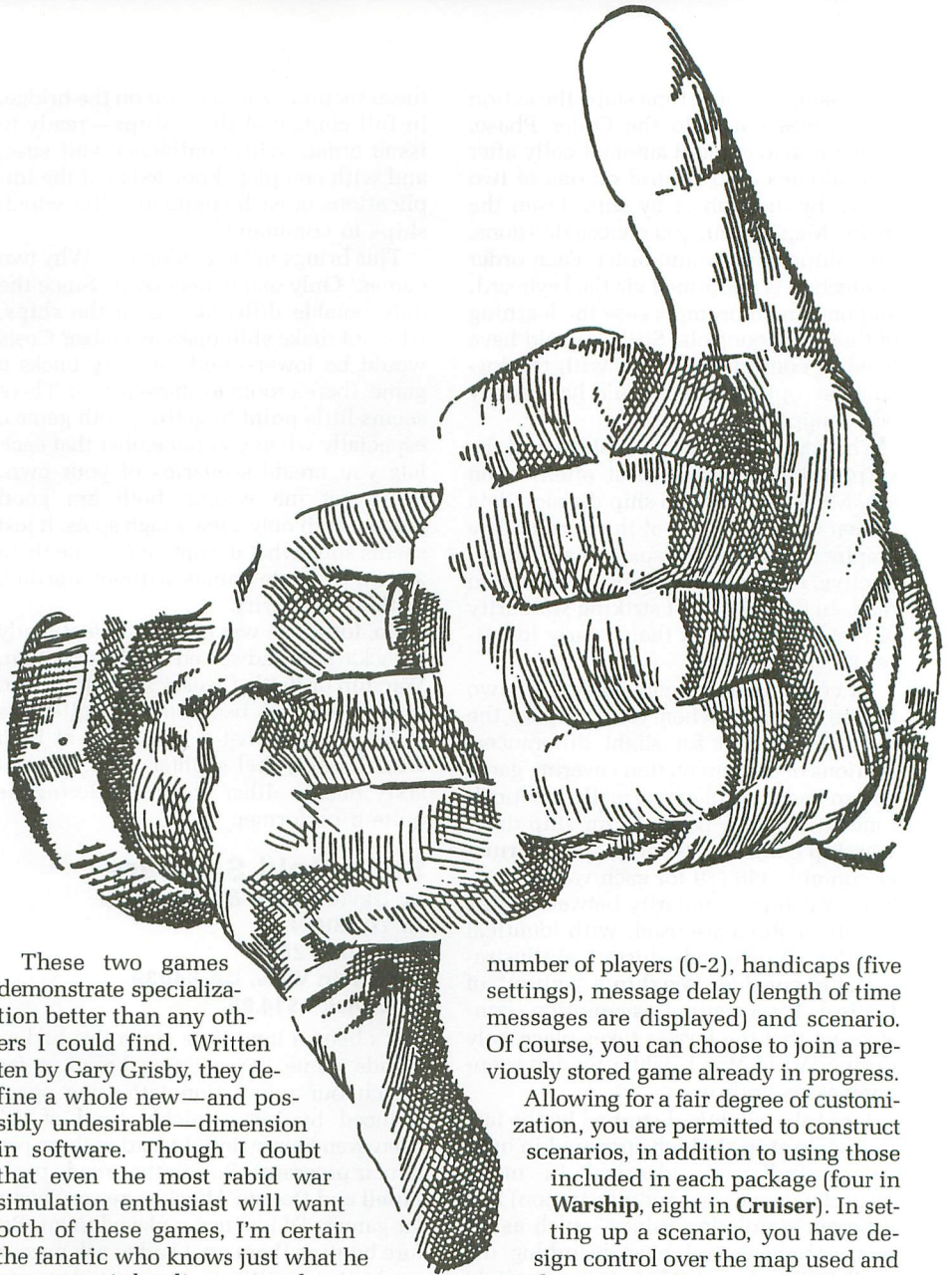
Both take place on the high seas, **Warship** covering combat in the Pacific Ocean during 1941-1945, **Battle Cruiser** taking place in the Atlantic during both world wars. Realistically, the only practical difference between the two is in the nations represented.

These advanced-level games offer an incredible number of variables, resulting in simulations so real you can smell the salty sea air and hear the missiles sailing past your ear. But, although advanced in level, these games are designed to be simple to play. They follow identical menu structures which allow you to easily initiate and then control the simulation. The first step is setting up—you choose the

number of players (0-2), handicaps (five settings), message delay (length of time messages are displayed) and scenario. Of course, you can choose to join a previously stored game already in progress.

Allowing for a fair degree of customization, you are permitted to construct scenarios, in addition to using those included in each package (four in **Warship**, eight in **Cruiser**). In setting up a scenario, you have design control over the map used and general game conditions, such as time and date (controlling visibility and availability of certain war technology, respectively). Length, type and size of battle, as well as a fog factor and repair ability, can be preset. Finally, you're given full control over the design of ships—type and strength of armor and armament, speed and seaworthiness, and starting positions. After deployment, it's off to war.

Once battle has begun, unlike many of their SSI predecessors, these two games force you to keep track of only two phases: the Order and the Action Phase. In a further simplification, you issue your orders only from the former. If you've ever played one of SSI's earlier games, you'll appreciate having to work with only one phase.





Pressing O at any time stops the action and moves you into the Order Phase, which is also entered automatically after two minutes. You control on one of two levels, by division or by ship. From the main "Map" menu, you choose divisions, then ships to view and order. Each order or function is performed via the keyboard, and on-screen prompts ease the learning of those key controls. Still, I would have liked to control the action with the joystick, an option which could have easily been supported.

The screen displays your ships and the surrounding terrain—most often, open sea. Message lines and ship/division data appear on the bottom of the screen. The graphics were rather spartan and unattractive, although messages were easy to read. In fact, the most striking similarity of these games is in their nearly identical screen displays.

Of course, the resemblance of the two is also apparent when you compare the manuals. Except for slight differences, portions of documentation covering game design and control are virtually identical. I mean, page for page. As for ship data, **Warship** contains 79 ships, while **Cruiser** contains 158 (79 for each world war). There's enough similarity between ships (identical ships are used, with identical—although reversed—historical illustrations) to consider **Warship** a "subset" of **Cruiser**. It's a natural assumption, considering that the former takes place only during World War I, while the latter encompasses both wars.

I was also slightly disturbed by the fact that some ships (which appeared in both games and were identical in many respects: name, type and illustration) had different simulation values—such as armor, armaments and, most disturbing, the availability of radar. This brings to light another shift in SSI simulations apparent here: less basis in historical fact. While previous SSI manuals have often included vast sections full of background information, these games contain little to no historical data. Really, only the ships and the passages on each scenario seem even remotely tied to fact.

The manuals are organized to teach the complex games quickly and easily, with ample tables and charts. In fact, it's not the difficulty of play which makes these games advanced in level, but the degree of realism supported. Numerous passages in the manuals detail the calculations and modifications applied to determine movement, firepower and damage. Studying

these sections will put you on the bridge, in full control of these ships—ready to issue orders with confidence and ease, and with complete knowledge of the implications of each command. But which ships to command?

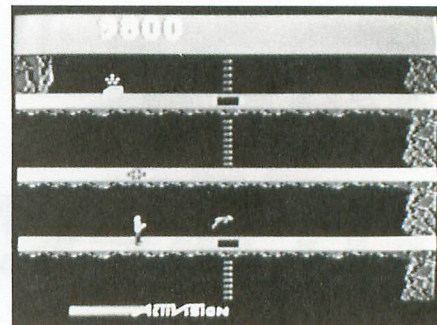
This brings me to a dilemma. Why two games? Only one is necessary. Since the only notable difference is in the ships, why not make ship disks available? Costs would be lower—and, at sixty bucks a game, there's room to shave prices. There seems little point in getting both games, especially when you remember that each lets you create scenarios of your own. Don't get me wrong: both are good games, with only a few rough spots. It just seems somewhat deceptive to issue them as two separate games without warning of their similarity.

So, for those war buffs who feel ready to tackle some advanced-level simulation, **Warship** or **Battle Cruiser** should fill your order. I say "or" because the similarities make it likely that a purchaser of both would surely feel slighted. But, even at sixty bucks, either of these offerings is quite a performer.

**Solid Gold Software**  
by David Crane & Rob Fulop  
**ACTIVISION**  
P.O. Box 7287  
Mountain View, CA 94039  
48K Disk \$14.95

It's been a long time since I've had an arcade game. It's a dying breed, a fad which our population (attention spans reduced by Mtv) quickly tired of. It's been even longer since I heard of these particular programs. But, in the arcade peak, **Pitfall** and **Demon Attack** were very popular games; I'd just never played them. Before booting them up, I had to ask myself: could these artifacts survive today; and what is Activision doing, pumping out this old schlock?

What Activision is doing is supplying the market with yet another alternative. Unfortunately, it's an alternative I'd rather not take. For, when these two came out, little was required to make a game successful. Colorful, fast-moving graphics was all we needed to satisfy an action itch. While keeping this ancient tradition, these games offer little more. In **Pitfall**, Pitfall Harry must find his way through the jungle, avoiding obstacles and picking up treasures for points. In **Demon Attack**, you're stranded on an ice planet, blasting demons as they fall toward you from the sky.



Pitfall.

In each game, one or two may play, using one or two sticks. These games look like direct translations from the old 2600 cartridge-based games of eons ago. The graphics are boxy, although quite colorful. **Pitfall** seemed to cycle through the same screens, the same conflicts, endlessly. Jumping over rolling logs, running over alligators, swinging over pits on a vine—over and over and over. It got old *real* fast.

**Demon Attack**, on the other hand, was slightly better. You move left and right across the bottom of the screen, while the demons circle above you, dropping searing streams of plasma energy. Get touched by a stream, and it's all over. **Demon Attack** also offers ten play options, combining one or two players with tracer shots (which can be controlled after they leave your cannon, like guided missiles). Two modes allow the two players to alternate control of the same cannon.

Still, the games are little more than unenhanced reincarnations of their former selves. They're bare bones, lacking even the most rudimentary of features, like a pause key. So don't even ask for a high-game-save feature. To further raise frustration levels, you can't leave one game for the other without rebooting. This implies that very little effort was put forth for the reissue. Even the sparse manual betrays the simplicity of the games.

So, overall, I cannot recommend **Solid Gold Software**. Its games were dated and boring, even in view of the low price. And, while they were inarguably great at original issue, they're now more at home in a museum than in your software library. Let's just let these old games rest in peace.



# BBK Artist

## A graphics 7+ graphic arts program.

by Barry Kolbe and Bryan Schappel

By now most everyone has heard of ANTICS mode \$0E. This is commonly referred to as mode 7+. In this display mode, you can make four-color pictures with a screen resolution of 160x192. Granted, this is no ST—but you can make some pretty intricate drawings in this mode. (Just look at **Alternate Reality** sometime.)

Now, unless you have an XL or XE, you can't access this mode directly from BASIC. And who would want to make a work of art with a program of PLOT and DRAWTO statements? This is where the **BBK Artist** comes in.

Fondly known as **BKA**, this program contains a menu screen with twenty-five commands, twenty-one of which are used to help create computer art. You can load in a screen previously created with **MicroIllustrator**, **MicroPainter** or **Magniprint**. You can create boxes, lines, circles/ellipses, rays, plot text on the screen in any character set you design (in any size you desire), and touch up your painting with our "Enlarge" mode. This is a feature-packed offering. Let's continue!

The entire program is joystick operated, using as little keyboard input as possible. Just move the cursor over the option you want and press the button. What could be simpler?

### Typing it in.

Listing 1 is the BASIC data used to create the BBKART.COM file on your disk. Please refer to the **M/L Editor** on page 10, for instructions on keying in the data. Once the typing has been done, refer to your DOS manual for instructions on loading a binary file. You must have the BASIC cartridge disabled to allow **BKA** to function properly. (On XL or XE computers, press and hold down the OPTION key while booting your system.)

As soon as you binary load the BBKART.COM file, you're ready to go!

You're presented first with the main menu of the program. To select a command, just move the cursor over the option you want and press the fire button.

### The drawing commands.

#### Draw mode (Draw).

This simply allows you to perform "freehand" drawing, in your current brush and fill pattern. You can roam freely about the screen by moving the stick in the direction desired. To draw, simply hold the fire button down and move the stick.

The following commands are what are known as "Rubberband" mode commands. In this mode, you must first move the cursor to the screen position at which you want an endpoint (in the case of circles/ellipses, it's the center) and press fire. Then the image you are working with can be expanded or contracted on-screen without destroying the already formed underlying graphics. When the image is what you want, press fire again to make it permanent.

A note of caution: if you don't want a line to appear where you're currently drawing one, press OPTION. The command will abort, and you'll return to the main menu—no harm done. Once a rubberband object is made "solid," it can't be *undone*.

#### Lines (Line).

Using the stick, you will move a rubberband line around on the screen. The final line is drawn from the starting point to the current cursor position. When the line is just right, press fire to make it permanent.

#### Circles/Ellipses (Circle).

After selecting the center position for a circle/ellipse, the crosshairs you've been seeing will disappear. Move the stick to expand the size of the ellipse. After you've made the ellipse solid, the cursor reappears at the middle of the screen.

#### Boxes (Box).

This will create a rubberband box. Select the position of one corner of the box and move the stick. The box can

be stretched in any direction, and pressing fire makes it permanent.

### **Rubberband Rays (Rays).**

Rays are almost the same as Lines, except that they all share the same starting point. This function is useful in producing a circular starburst. Just press OPTION to return to the main menu.

### **Screen enlargement.**

#### **Enlarge or Magnify (Nlarge).**

This is one of the nicer commands in the BKA. It allows you to view and change your work on a screen, with each pixel blown up to a graphics-0-size character. The screen is divided into two sections. The top contains an actual-size view of what's currently blown up on the bottom of the screen.

You're free to move the cursor anywhere on-screen and draw just as you did in the Draw mode. But, when you push on one of the screen's edges, the screen will scroll. You may think of Nlarge as being a window made of a magnifying glass that you can move over your picture.

Naturally, the *real-size* view of your picture scrolls also, but as you move from the left to the right of your picture, the real-size window will jump along the top of the screen, giving you a relative "feel" for where you are along the X-axis of your picture. When you enter this mode, you're in the upper left corner of your picture.

### **Putting text on your screens.**

The text commands are quite powerful. They allow you to put text on your screens, in any fill pattern, in any size, in any font, anywhere!

#### **Text Parameters (ParmS).**

This allows you to set the parameters for the text-plotting routines. First, you type in your text, twenty characters maximum—all characters are acceptable, except DELETE and RETURN. Next, you select the rotation of the text. Move the stick in the direction you want the text to be drawn, and hit fire. Finally, use the stick to determine the height and width of each plotted character. These numbers can be set between 4 and 99. After this, you're returned to the main menu.

#### **Plot text (Text).**

Using this command, you can plot the message defined with ParmS. Move the cursor to the location where you want the *lower left-hand corner of the first character* to be, then press fire. The text will be drawn in your current fill pattern—and only the character will be plotted, thus leaving the background intact. Because of this feature, it's quite easy to produce special effects, such as shadowed text.

To shadow text, make a large box filled with a light color, then plot the message in black. Next, select a different color (say, red) and plot the text slightly to the upper right of the black text. You have shadowed text—instantly. Look out, DEGAS!

*Hint #1.* At the bottom of the draw screens is a line that tells you the X,Y-coordinates of the cursor, the pattern number you're working with and which reflection mode you're in. When you plot the *black* text, write down the X,Y-coordinates, then use these numbers as a reference for plotting the next layer of text.

*HINT #2.* To center or block right text, all you need is a calculator. Take the length of your string and multiply it by the width of your characters; this yields exactly how long the plotted string will be. Now subtract this number from 159. To center the text, divide the remainder by 2. Now, just move the cursor to the calculated X-coordinate and hit fire. *Voilà*, centered text. To block to the right, you just don't divide by 2. Use the same procedure to center text vertically—multiply by the height and subtract from 191.

#### **Load a new font (Font).**

This lets you load in any 1024-byte character set. (These sets can be designed using issue 16's **Create-A-Font** or one of the *COMPUTE!* editors.) The program will give you a directory of *all* the files on the disk with a .FNT extension. To load a font (or any file) into BKA, follow the instructions in the next section.

### **Loading files.**

The load screen is composed of two parts: the directory screen and the load menu. First, get the file you want to load on the directory screen, by using the "More" option of the menu. When the name's on-screen, select the "Load" option from the menu. At this point, the first filename in the directory screen is highlighted; you may move this "cursor" to the filename you want to load, by using the joystick. When the name of the file to be loaded is highlighted, just press fire. The load will commence, and you'll be returned to the main menu.

If the file you want to load isn't on this particular disk, select the "Exit" option to return to the main menu.

If you selected Load by accident, there are two ways to abort: (1) press OPTION; and (2) move the cursor either to a blank line or to the "Free Sectors" line, and hit fire.

### **Filling screen areas.**

#### **Fill (Fill).**

When you select Fill, you enter the drawing screen. Move the cursor to any point within the area you want to fill and hit fire. The program will begin to fill over the area you selected. The fill routine is good at going around corners and finding "leaks" in your drawing. However, you may run into a few problems.

*Problem #1.* If you try to fill an entirely blank screen from the center, the fill will start to expand—then suddenly stop. This is because the routine ran into too many "critical points." To continue the fill, move the cursor to another blank portion and hit fire again. Another way around this problem: start the fill from a corner.

*Problem #2.* If the fill pattern you're using contains one of the colors you're filling over, the fill may also stop. (This usually occurs when your fill pattern is striped.) Again, to solve this problem, start the fill elsewhere.

*Problem #3.* You'll find it impossible to fill over a fill pattern. This is because the BKA fills over any color—until it hits another color. At best, you will plot one point this way.

#### **Choosing a Fill Pattern/Texture (Ttexture).**

BKA contains seventeen fill patterns: four solid colors, twelve quilts and one user-definable pattern. When the Ttexture box is clicked, the main menu dims and a wedge-shaped cursor at the bottom of the screen lights up. Move

this cursor over the pattern you want to use and press fire. You'll be returned to the main menu.

#### **Defining a Texture (DefTxt).**

This lets you define your own fill pattern. The user-defined pattern is to the far right of the screen (its default is vertical blue bars). After clicking this box, you're asked to enter the pattern data. Type four numbers (0 through 3) and hit RETURN. If all goes well, the user pattern is redefined on the menu screen. The four numbers are the color registers used to plot the pattern.

Here's an example: at the prompt, type 1122. When you return to the screen, the last pattern will be made of alternating yellow and green horizontal stripes. To make the stripes vertical, you would enter 1212. To make it a yellow and green quilt, type 1221. Experiment a little.

#### **Setting reflection modes.**

##### **Toggle Horizontal Reflection (Horz).**

When you click on this box, a small arrow appears next to "Horz," indicating that this reflection mode is on. It reflects each point plotted about the Y-axis. All of the reflection modes work with text, lines, circles, etc.

To turn off a reflection mode, click it again or select another reflection mode.

##### **Toggle Vertical Reflection (Vert).**

Selecting this mode reflects each pixel written to the screen about the X-axis. This gives interesting effects. Text is plotted as a mirror image, looking much like the reflection of trees in a lake. Try it.

##### **Toggle Four-way Reflection (Four).**

This mode reflects every point into each of the four quadrants of the screen. When used with text, you get undesirable results. Try it to find out why.

#### **Extras.**

##### **Selecting a Brush (Brush).**

BKA contains eight different "brushes" you can paint with. When you click this box, the brush line will light up. Move the black cursor until it's over the brush you want, and press fire. You'll return to the main menu.

##### **Changing a color (SetClr).**

There are two steps to changing a color. First, you must choose a register to change, by moving the cursor over the "Color #" and pressing fire. Now, move the stick up or down to change luminance, and right or left to change hue. Press the fire button when the color you want is reached.

##### **Erasing your work (Erase).**

When you click this, you're transferred to another screen that asks if you're sure. If you click the yes half of the prompt, your picture is erased. Otherwise, nothing happens.

##### **Oops (Undo).**

You accidentally said yes to an erase, or you filled something you shouldn't have. Well, just Undo it. When you click this, your last action is undone. There's one exception, of course. Any rubberband object, once made solid, can't be undone. If you don't like a rubberband object, press OPTION to abort.

##### **Let's take a look (View).**

This lets you look at your beautiful art. It's used to see what an Undo did—if you don't like the picture after the

Undo, simply Undo it. To return to the menu, press the fire button again.

##### **Rainbow effects (Rainbw).**

This will "rainbow" the last changed color register, in all 256 glorious colors. If you haven't changed a color, Rainbow will work on the background color. To Rainbow another color, use SetColor to select a color register, and hit fire twice.

#### **Picture I/O.**

##### **Saving your work (Save).**

All you do here is supply a name and hit RETURN. The picture will be saved in compacted **MicroIllustrator** format with a .PIC extension. *Be careful:* you aren't asked if you want to replace a file that already exists on the disk.

##### **Loading a MicroIllustrator picture (Koala).**

This will give you a directory of all the files on the disk with a .PIC extension. Follow the instructions under Font to load a file. You use this command to load a file saved with BKA, too.

##### **Loading a MicroPainter picture (Micro).**

This works the same way Koala does, except you get a directory of all files with a .MIC extension.

##### **Loading a Magniprint picture (Magni).**

This option was put in for a friend of mine (it also fills the menu), but it lets you load a picture from a **Magniprint** disk—or any graphics 7+ or 8 picture saved from BASIC with the SCSAVE.LST file on the **Magniprint** disk. An extension of .MP is used for **Magniprint** files.

That sums up the commands. . . Let's take some notes.

#### **Words to the wise.**

*Note 1.* It would be a good idea to type in the **Picture Storage Techniques** program from **ANALOG Computing's** issue 50. This allows you to use pictures generated with BKA in your own programs.

*Note 2.* When you're in any drawing mode, you can use the arrow keys to finely move the cursor to a specific screen position. This affords you maximum control over the cursor, though it is slow.

*Note 3.* When drawing on the screen, press SELECT to change the intensity of the cursor. This is useful if you're drawing over a light background.

*Note 4.* Pressing TAB while either in Nlarge or on the Draw screen changes your current fill pattern to the next in line. After you pass number 16, you're returned to 0.

*Note 5.* When setting text parameters, it's a good idea to keep these things in mind: if you set the height/width of a character below 8, some pixels are "knocked out." When the numbers are above 8, some of the characters' definitions are repeated, making the characters a little chunky. Use Nlarge to touch them up. Setting the height/width to 8 gives you graphics-1-size characters; setting the height to 16 and width to 8 yields graphics-2-size characters.

*Note 6.* The text routine can plot all characters, including inverse and control characters. If you don't load in a special font of your own, the standard ROM set is used.

You will notice that, when you enter text, what you're typing is appearing in your character set—but the prompt is in the ROM set.

*Note 7.* The circle/ellipse routine has one limitation: the

radius of your circle/ellipse must be less than 63. This isn't so bad, seeing as an ellipse that big almost fills the screen!

Well folks, that's all. I can't think of anything I left out. And if I *did* forget something, I'll see you in **Reader comment**. Happy drawing! ☺

Barry Kolbe is a mathematics teacher in Madison, WI. He uses the Atari to demonstrate graphing in his classroom. His former student, Bryan Schappel, is studying Computer Science at the University of Wisconsin.

Listing 1.  
M/L Editor data.

```

1000 DATA 255,255,40,42,199,75,76,22,6
8,0,6,14,28,56,112,96,9416
1010 DATA 0,0,96,112,56,28,14,6,0,0,24
,24,231,24,24,0,6591
1020 DATA 0,0,0,0,60,60,60,0,0,0,24,24
,24,24,24,0,3660
1030 DATA 0,0,0,0,24,0,0,0,0,0,0,219
,0,0,0,3997
1040 DATA 0,0,16,62,126,62,16,0,0,81,8
2,82,82,82,82,9902
1050 DATA 82,82,82,82,82,82,82,82,82,8
2,82,82,82,82,82,2202
1060 DATA 82,82,82,82,82,82,82,82,82,8
2,82,82,82,82,82,2212
1070 DATA 69,124,128,128,128,128,128,1
28,128,128,128,128,128,180,232,855
1080 DATA 229,128,162,162,171,128,161,
242,244,233,243,244,128,128,128,128,49
36
1090 DATA 128,128,128,128,128,128,128,
128,124,124,128,128,226,249,154,128,17
80
1100 DATA 162,225,242,242,249,128,171,
239,236,226,229,128,225,238,228,128,86
92
1110 DATA 162,242,249,225,238,128,179,
227,232,225,240,240,229,236,128,128,85
37
1120 DATA 124,90,82,82,82,82,82,82,82,
82,82,82,82,82,2330
1130 DATA 82,82,82,82,82,82,82,82,82,8
2,82,82,82,82,2282
1140 DATA 82,82,82,82,82,82,82,82,67,8
6,36,114,97,119,0,0,246
1150 DATA 6,5,46,108,97,114,103,101,6,
5,44,105,110,101,0,0,9126
1160 DATA 6,5,35,105,114,99,108,101,6,
5,34,111,120,0,0,0,7799
1170 DATA 66,86,48,97,114,109,115,0,6,
5,52,101,120,116,0,0,9041
1180 DATA 6,5,38,111,110,116,0,0,6,5,3
8,105,108,108,0,0,7698
1190 DATA 6,5,50,97,121,115,0,0,66,86,
40,111,114,122,0,0,9455
1200 DATA 6,5,54,101,114,116,0,0,6,5,3
8,111,117,114,0,0,8019
1210 DATA 6,5,52,120,116,117,114,101,6
,5,36,101,102,52,120,116,2172
1220 DATA 66,86,34,114,117,115,104,0,6
,5,51,101,116,35,108,114,1338
1230 DATA 6,5,37,114,97,115,101,0,6,5,
53,110,100,111,0,0,8556
1240 DATA 6,5,54,105,101,119,0,0,66,86
,50,97,105,110,98,119,2504
1250 DATA 6,5,51,97,118,101,0,0,6,5,43
,111,97,108,97,0,9140
1260 DATA 6,5,45,105,99,114,111,0,6,5,
45,97,103,110,105,0,4
1270 DATA 66,86,0,72,0,6,5,0,73,0,6,5,
0,74,0,6,3782
1280 DATA 5,0,13,0,6,5,0,70,0,6,5,0,71
,0,6,5,3152
1290 DATA 0,76,0,6,5,0,75,0,66,86,163,
239,236,239,242,128,223
1300 DATA 148,128,6,5,35,111,108,111,1
14,0,16,0,6,5,35,111,7878
1310 DATA 108,111,114,0,17,0,6,5,35,11
1,108,111,114,0,18,0,7846
1320 DATA 66,86,0,40,117,101,0,34,108,
97,99,107,0,0,0,7496
1330 DATA 16,16,0,0,6,5,0,0,0,44,117
,109,105,110,97,9426
1340 DATA 110,99,101,0,16,16,0,0,66,0,
0,5,85,85,170,170,346
1350 DATA 175,255,255,86,0,0,36,101,10
2,105,110,101,0,52,101,120,2757
1360 DATA 116,45,111,100,101,0,48,97,1
14,97,109,101,116,101,114,115,4795
1370 DATA 0,0,66,86,36,105,114,26,0,0,
0,0,6,5,40,4527
1380 DATA 103,116,26,0,16,24,0,6,5,55,
100,116,26,0,16,24,6114
1390 DATA 0,0,66,0,0,0,0,56,26,0,16,16
,16,0,0,57,3758
1400 DATA 26,0,16,16,16,0,0,48,52,46,2
6,0,16,16,0,0,3648
1410 DATA 50,37,38,44,26,0,13,0,0,0,0,
95,92,94,93,40,7732
1420 DATA 202,148,70,0,0,10,4,0,0,146,
68,162,6,6,6,6,6716
1430 DATA 1,11,21,31,1,6,11,16,21,26,3
1,36,54,74,94,114,8080
1440 DATA 134,154,174,194,60,68,76,84,
92,100,108,116,124,132,140,148,7428
1450 DATA 156,164,172,180,188,0,0,0,0,
0,85,85,170,170,255,255,8560
1460 DATA 68,68,136,136,204,204,102,10
2,119,119,187,187,34,34,34,4924
1470 DATA 204,204,17,17,153,153,136,13
6,51,51,0,0,0,0,0,6893
1480 DATA 0,0,85,85,170,170,255,255,17
,17,34,34,34,34,153,153,4536
1490 DATA 221,221,238,238,68,68,204,20
4,153,153,102,102,221,221,221,221,5698
1500 DATA 51,51,0,0,0,0,0,0,1,1,1,1,
2,2,2,1789
1510 DATA 2,3,3,3,3,1,0,0,1,2,0,0,2,3,
0,0,1657
1520 DATA 2,1,2,2,1,1,3,3,1,2,3,3,2,0,
2,1,1764
1530 DATA 0,0,2,3,0,3,0,2,1,0,1,1,2,2,
1,3,1731
1540 DATA 1,2,0,3,1,0,3,0,3,64,0,32,96
,32,64,0,5290
1550 DATA 96,255,127,63,31,15,7,3,1,13
,40,54,38,112,112,112,9868
1560 DATA 66,107,42,2,2,130,112,79,0,4
2,66,11,43,79,0,42,7795
1570 DATA 66,51,43,79,0,42,66,91,43,79
,0,42,66,131,43,79,9907
1580 DATA 0,42,66,171,43,207,0,42,112,
79,0,42,66,211,43,207,4410
1590 DATA 0,42,112,79,0,42,66,35,44,79
,0,42,48,79,0,42,7412
1600 DATA 66,251,43,79,0,42,224,0,79,0
,42,72,75,44,72,75,341
1610 DATA 44,112,78,247,44,14,78,247,4
4,14,78,247,44,14,78,247,6174
1620 DATA 44,14,78,247,44,14,78,247,44
,14,78,247,44,14,78,247,5988
1630 DATA 44,207,0,42,65,159,45,32,112
,112,78,0,92,14,14,14,8918
1640 DATA 14,14,14,14,14,14,14,14,14,1
4,14,14,14,14,14,14,3544
1650 DATA 112,72,0,6,8,8,8,8,8,8,8,8,
8,8,8,2938
1660 DATA 8,8,8,8,8,8,136,66,149,44,65

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,25,46,112,112,112,1742  
1670 DATA 112,112,112,79,0,42,66,85,44  
79,0,42,112,79,0,6,8400  
1680 DATA 15,15,15,15,15,15,112,79,  
0,42,66,117,44,79,0,8283  
1690 DATA 42,65,79,46,112,112,112,112,  
112,112,79,0,42,66,6,47,504  
1700 DATA 79,0,42,112,79,0,42,66,38,47  
79,0,42,112,48,79,9349  
1710 DATA 0,6,15,15,15,15,15,15,65,  
118,46,112,112,112,112,1348  
1720 DATA 79,0,42,66,70,47,79,0,42,48,  
66,0,6,2,2,2,5126  
1730 DATA 2,2,2,2,48,79,0,42,66,102,47  
79,0,42,65,158,9970  
1740 DATA 46,112,112,112,112,79,0,42,6  
6,134,47,79,0,42,48,79,135  
1750 DATA 0,42,66,38,47,79,0,42,112,79  
0,6,15,15,15,15,5969  
1760 DATA 15,15,15,65,195,46,112,112,1  
12,112,112,112,112,79,0,3954  
1770 DATA 42,66,166,47,79,0,42,48,79,0  
42,66,198,47,79,0,85  
1780 DATA 42,65,232,46,86,51,97,118,10  
1,0,38,105,108,101,0,0,596  
1790 DATA 6,5,38,111,114,109,97,116,26  
43,111,97,108,97,0,38,1614  
1800 DATA 105,108,101,66,86,37,110,116  
101,114,0,36,97,116,97,0,1859  
1810 DATA 0,0,0,6,5,50,37,52,53,50,46,  
0,116,111,0,37,7971  
1820 DATA 120,105,116,66,86,44,111,97,  
100,0,38,105,108,101,0,0,405  
1830 DATA 6,5,38,111,114,109,97,116,26  
0,0,0,0,0,0,5469  
1840 DATA 0,0,0,66,86,45,111,114,101,0  
0,0,0,6,5,5572  
1850 DATA 44,111,97,100,0,0,0,6,5,37  
120,105,116,0,0,7747  
1860 DATA 0,0,0,66,86,52,101,120,116,1  
17,114,101,0,36,101,102,2864  
1870 DATA 105,110,101,0,6,5,48,105,99,  
107,0,20,0,35,111,108,9818  
1880 DATA 111,114,115,66,86,0,0,0,0,0,  
0,37,114,97,115,101,9883  
1890 DATA 0,57,111,117,114,0,48,105,99  
116,117,114,101,0,0,0,570  
1900 DATA 0,0,0,66,86,46,111,0,0,0,0,  
0,0,0,0,3647  
1910 DATA 0,0,0,6,5,57,101,115,0,0,0,0  
0,0,0,0,3928  
1920 DATA 0,0,0,66,35,104,97,114,0,38,  
111,110,116,0,43,111,1424  
1930 DATA 97,108,97,0,38,105,108,101,4  
5,105,99,114,111,48,97,105,4080  
1940 DATA 110,116,45,97,103,110,105,48  
114,105,110,116,46,70,78,84,3869  
1950 DATA 155,46,80,73,67,155,46,77,73  
67,155,46,77,80,155,14,3186  
1960 DATA 19,24,29,48,48,48,230,240  
250,4,47,47,47,48,1,2283  
1970 DATA 12,22,69,32,83,69,67,160,198  
233,236,229,243,240,229,227,7981  
1980 DATA 186,160,160,212,229,248,244,  
245,242,229,186,160,160,160,160,78  
29  
1990 DATA 212,229,248,244,186,57,48,67  
48,77,48,174,50,11,51,236,5687  
2000 DATA 50,46,52,169,1,133,170,169,1  
18,141,48,2,169,46,141,49,5083  
2010 DATA 2,32,126,56,32,250,48,173,22  
4,75,201,155,240,11,32,145,8969  
2020 DATA 48,169,8,32,157,73,32,240,61  
32,147,73,76,235,72,166,7301  
2030 DATA 170,189,33,48,133,161,189,37  
48,133,162,162,0,160,0,189,6871  
2040 DATA 224,75,157,9,75,201,155,240,  
3,232,208,243,177,161,157,9,2112

2050 DATA 75,201,155,240,4,232,200,208  
243,96,173,37,228,72,173,36,1065  
2060 DATA 228,72,96,166,170,189,41,48,  
133,161,189,45,48,133,162,160,8941  
2070 DATA 9,177,161,153,91,47,136,16,2  
48,169,158,141,48,2,169,46,6620  
2080 DATA 141,49,2,32,126,56,32,147,73  
169,6,76,157,73,169,0,3742  
2090 DATA 170,157,0,6,232,208,250,96,1  
60,0,32,140,55,160,8,132,6183  
2100 DATA 212,162,10,169,32,32,105,58,  
232,224,32,208,248,162,0,134,9705  
2110 DATA 171,169,95,32,97,58,32,188,4  
8,166,171,201,155,240,51,201,1334  
2120 DATA 126,208,16,224,0,240,232,169  
32,32,97,58,202,32,97,58,5850  
2130 DATA 76,17,49,164,231,208,14,41,1  
27,201,32,144,210,201,96,240,1929  
2140 DATA 206,201,123,176,202,228,212,  
240,198,157,224,75,32,97,58,232,2675  
2150 DATA 208,189,157,224,75,169,0,133  
231,169,32,76,97,58,32,114,5966  
2160 DATA 49,29,139,45,166,173,96,32,1  
14,49,29,143,45,166,173,96,6251  
2170 DATA 72,42,42,42,42,41,3,134,173,  
170,104,41,159,96,169,42,5680  
2180 DATA 141,224,75,169,155,141,225,7  
5,76,145,48,169,0,133,170,32,7080  
2190 DATA 240,48,32,128,49,76,166,49,1  
69,1,208,241,169,2,208,237,1237  
2200 DATA 169,3,208,233,32,197,48,169,  
0,133,174,133,175,32,248,49,9028  
2210 DATA 32,68,50,173,132,2,240,46,17  
3,120,2,201,15,240,244,201,1562  
2220 DATA 11,208,10,198,174,16,22,169,  
2,133,174,208,16,201,7,208,8154  
2230 DATA 226,230,174,165,174,201,3,20  
8,4,169,0,133,174,32,248,49,8395  
2240 DATA 32,18,69,76,181,49,165,174,2  
01,2,208,3,76,147,73,201,8075  
2250 DATA 1,240,33,76,178,49,169,102,1  
60,47,162,32,32,216,55,166,7314  
2260 DATA 174,189,49,48,170,160,7,189,  
102,47,9,128,157,102,47,232,7431  
2270 DATA 136,16,244,96,32,167,57,173,  
224,75,201,155,208,1,96,32,8006  
2280 DATA 145,48,169,4,32,157,73,48,19  
165,170,10,170,189,93,48,5871  
2290 DATA 141,60,50,189,94,48,141,61,5  
0,32,255,255,32,147,73,76,7110  
2300 DATA 235,72,169,0,133,176,133,165  
169,6,133,166,165,175,240,1,405  
2310 DATA 96,32,240,48,162,32,169,5,15  
7,66,3,169,224,157,68,3,5919  
2320 DATA 169,75,157,69,3,169,29,157,7  
2,3,169,0,157,73,3,32,2031  
2330 DATA 86,228,16,3,230,175,96,160,4  
185,231,75,217,52,48,208,8  
2340 DATA 5,136,16,245,230,175,160,0,1  
85,224,75,32,96,49,145,165,8828  
2350 DATA 200,192,13,208,243,165,165,2  
4,105,16,133,165,144,2,230,166,9911  
2360 DATA 230,176,165,176,201,16,240,3  
76,86,50,96,162,32,169,7,5393  
2370 DATA 157,66,3,169,0,157,68,3,157,  
72,3,169,4,157,73,3,2373  
2380 DATA 169,37,157,69,3,32,86,228,76  
147,73,162,32,169,7,157,6303  
2390 DATA 66,3,169,0,157,72,3,157,73,3  
76,86,228,132,172,32,5922  
2400 DATA 205,50,48,3,164,172,96,104,1  
04,96,32,97,52,48,23,32,1834  
2410 DATA 205,50,48,18,141,197,44,160,  
0,32,223,50,48,8,153,193,5898  
2420 DATA 44,200,192,3,208,243,76,147,  
73,32,131,70,169,0,133,177,7940  
2430 DATA 133,179,133,161,133,183,169,  
129,133,178,133,180,133,182,24,105,939

2440 DATA 30,133,184,160,0,32,223,50,1  
53,224,75,200,192,27,208,245,2837  
2450 DATA 160,4,185,237,75,153,193,44,  
136,16,247,173,231,75,133,187,2334  
2460 DATA 208,6,32,97,52,76,147,73,160  
,0,132,188,132,186,132,190,9981  
2470 DATA 32,223,50,24,42,38,190,74,13  
3,185,208,10,32,223,50,133,7425  
2480 DATA 186,32,223,50,133,185,165,19  
0,240,32,32,223,50,145,181,166,1608  
2490 DATA 187,224,2,208,6,32,22,52,76,  
128,51,32,176,51,198,185,6596  
2500 DATA 208,232,165,186,240,198,198,  
186,16,224,32,223,50,133,189,165,3072  
2510 DATA 189,145,181,166,187,224,2,20  
8,6,32,22,52,76,164,51,32,3954  
2520 DATA 176,51,198,185,208,233,165,1  
86,240,162,198,186,16,225,165,181,6132  
2530 DATA 24,105,80,133,181,165,182,10  
5,0,133,182,165,181,197,183,208,4041  
2540 DATA 44,165,182,197,184,208,38,16  
5,188,208,35,230,188,165,179,24,2742  
2550 DATA 105,40,133,181,165,180,105,0  
,133,182,165,183,24,105,40,133,8036  
2560 DATA 183,165,184,105,0,133,184,23  
0,179,208,2,230,180,96,198,188,4106  
2570 DATA 165,179,133,181,133,183,165,  
180,133,182,24,105,30,133,184,165,767  
2580 DATA 177,24,105,40,170,165,178,10  
5,0,197,182,208,224,228,181,208,5821  
2590 DATA 220,104,104,96,230,181,208,2  
,230,182,165,178,24,105,30,170,215  
2600 DATA 165,177,228,182,208,199,197,  
181,208,195,240,229,32,205,50,48,3606  
2610 DATA 8,201,14,240,5,201,24,240,1,  
96,160,3,32,223,50,136,6570  
2620 DATA 16,250,160,0,32,223,50,153,1  
93,44,200,192,5,208,245,160,2581  
2630 DATA 203,32,223,50,136,208,250,16  
0,78,32,223,50,136,16,250,162,1133  
2640 DATA 32,169,7,157,66,3,169,0,157,  
68,3,169,129,157,69,3,4302  
2650 DATA 169,0,157,72,3,169,30,157,73  
,3,76,86,228,173,132,2,6026  
2660 DATA 240,13,32,224,71,32,9,69,32,  
234,61,208,240,169,1,8,6504  
2670 DATA 32,177,69,40,96,166,141,189,  
8,76,133,128,189,200,76,133,9754  
2680 DATA 129,165,140,72,41,3,170,104,  
74,74,168,138,73,3,170,177,7375  
2690 DATA 128,202,48,5,74,74,76,179,52  
,41,3,96,32,196,69,32,2934  
2700 DATA 63,60,32,127,52,208,6,32,213  
,52,76,196,52,169,255,141,41  
2710 DATA 252,2,96,169,0,133,204,160,1  
,165,140,153,136,77,133,202,544  
2720 DATA 133,196,165,141,153,136,78,1  
33,203,133,197,132,205,32,152,53,644  
2730 DATA 133,195,166,210,224,4,176,5,  
197,198,208,1,96,32,174,53,8214  
2740 DATA 185,136,77,133,196,185,136,7  
8,133,197,173,31,208,201,6,208,2004  
2750 DATA 3,76,183,53,230,196,165,196,  
201,160,176,8,32,152,53,208,823  
2760 DATA 3,32,130,53,198,196,198,196,  
165,196,201,255,240,8,32,152,3409  
2770 DATA 53,208,3,32,130,53,230,196,2  
30,197,165,197,201,192,176,8,3810  
2780 DATA 32,152,53,208,3,32,130,53,19  
8,197,198,197,165,197,201,255,5940  
2790 DATA 240,8,32,152,53,208,3,32,130  
,53,198,205,240,4,200,76,9270  
2800 DATA 2,53,164,204,240,79,132,205,  
185,136,80,153,136,78,185,136,2006  
2810 DATA 79,153,136,77,136,208,241,16  
0,1,169,0,133,204,76,2,53,6695  
2820 DATA 32,174,53,230,204,240,55,164  
,204,165,196,153,136,79,165,197,4415

2830 DATA 153,136,80,164,172,96,32,163  
,53,32,151,52,164,172,197,195,812  
2840 DATA 96,132,172,165,196,133,140,1  
65,197,133,141,96,32,163,53,32,8265  
2850 DATA 69,73,164,172,96,165,203,133  
,141,165,202,133,140,96,32,183,1509  
2860 DATA 53,104,104,96,169,0,133,177,  
169,129,133,178,169,0,133,179,475  
2870 DATA 169,97,133,180,162,29,160,0,  
177,177,145,179,200,208,249,230,6489  
2880 DATA 178,230,180,202,16,242,96,16  
9,0,133,179,169,129,133,180,169,2692  
2890 DATA 0,133,177,169,97,133,178,208  
,219,165,234,201,2,144,33,32,212  
2900 DATA 34,54,165,207,72,165,209,72,  
169,191,56,229,209,133,209,169,4967  
2910 DATA 191,56,229,207,133,207,32,34  
,54,104,133,209,104,133,207,96,483  
2920 DATA 165,207,197,209,176,9,168,16  
5,209,56,229,207,76,56,54,164,1006  
2930 DATA 209,165,207,56,229,209,24,10  
5,2,170,224,192,144,2,162,191,1593  
2940 DATA 192,0,240,1,136,185,200,76,1  
33,162,185,8,76,133,161,56,8763  
2950 DATA 233,0,133,163,165,162,233,12  
9,133,164,165,163,24,105,0,133,9212  
2960 DATA 163,165,164,105,97,133,164,1  
60,39,177,163,145,161,136,16,249,1951  
2970 DATA 165,163,24,105,40,133,163,14  
4,2,230,164,165,161,24,105,40,7990  
2980 DATA 133,161,144,2,230,162,202,22  
4,255,208,220,96,32,196,69,32,1857  
2990 DATA 63,60,32,198,53,32,127,52,20  
8,13,32,152,59,32,161,59,4575  
3000 DATA 208,22,32,234,61,208,6,32,23  
3,53,76,207,52,173,132,2,7192  
3010 DATA 208,235,32,177,69,76,148,54,  
32,224,71,32,138,59,165,208,8877  
3020 DATA 133,150,165,209,133,151,32,6  
6,71,76,175,54,169,12,141,209,8903  
3030 DATA 44,173,132,2,240,40,173,120,  
2,201,7,208,11,164,210,200,825  
3040 DATA 192,17,208,15,160,0,240,11,2  
01,11,208,224,164,210,136,16,781  
3050 DATA 2,160,16,132,210,32,4,55,32,  
18,69,76,206,54,78,209,5745  
3060 DATA 44,96,165,210,10,10,168,162,  
0,185,71,45,149,198,200,232,1805  
3070 DATA 224,4,208,245,96,32,253,69,1  
69,195,141,48,2,169,46,141,8837  
3080 DATA 49,2,169,57,141,47,2,160,2,3  
2,140,55,160,4,32,1,1319  
3090 DATA 49,173,224,75,201,155,208,1,  
96,160,0,185,224,75,201,155,1997  
3100 DATA 240,246,41,127,56,233,48,48,  
239,201,4,176,235,153,224,75,2935  
3110 DATA 200,192,4,208,230,160,0,32,1  
23,55,141,27,45,141,26,45,4105  
3120 DATA 160,2,32,123,55,141,66,45,14  
1,67,45,160,3,185,224,75,7358  
3130 DATA 153,135,45,136,16,247,76,4,5  
5,185,224,75,10,10,25,225,6312  
3140 DATA 75,133,211,10,10,10,10,5,211  
,96,185,87,48,133,163,185,8203  
3150 DATA 88,48,133,164,169,187,133,23  
6,32,240,48,133,231,168,177,163,4605  
3160 DATA 132,84,32,105,58,200,192,11,  
208,244,96,32,199,69,32,177,9515  
3170 DATA 69,173,132,2,208,251,76,18,6  
9,32,199,69,32,177,69,166,7754  
3180 DATA 131,208,2,162,5,202,152,141,  
10,212,157,22,208,200,173,132,2222  
3190 DATA 2,208,243,76,18,69,133,165,1  
32,166,160,0,177,165,41,127,9262  
3200 DATA 145,165,200,202,208,246,96,3  
2,85,56,32,126,56,169,232,141,546  
3210 DATA 48,2,169,46,141,49,2,169,0,1  
33,211,32,53,56,173,132,6533



3220 DATA 2,240,38,173,120,2,164,211,2  
01,11,208,7,136,16,15,160,7024  
3230 DATA 1,208,11,201,7,208,231,200,1  
92,2,208,2,160,0,132,211,480  
3240 DATA 32,53,56,32,18,69,76,0,56,16  
5,211,240,3,32,131,70,5637  
3250 DATA 76,190,69,169,198,160,47,162  
32,32,216,55,162,1,165,211,9779  
3260 DATA 240,2,162,17,160,12,189,198,  
47,9,128,157,198,47,232,136,530  
3270 DATA 16,244,96,162,29,169,0,133,1  
61,169,129,133,162,169,0,133,9687  
3280 DATA 163,169,97,133,164,160,0,177  
161,72,177,163,145,161,104,145,1891  
3290 DATA 163,200,208,243,230,162,230,  
164,202,16,236,96,32,253,69,169,3916  
3300 DATA 57,141,47,2,96,166,131,240,7  
202,189,193,44,76,149,56,9346  
3310 DATA 173,197,44,72,41,14,133,133,  
104,74,74,74,41,15,133,3848  
3320 DATA 132,32,207,56,76,190,56,165,  
132,10,10,10,10,5,133,166,3962  
3330 DATA 131,240,5,202,157,193,44,96,  
141,197,44,96,166,133,160,35,9638  
3340 DATA 189,59,74,153,35,44,189,60,7  
4,153,36,44,96,165,132,10,5541  
3350 DATA 133,134,10,10,24,101,134,24,  
101,132,170,160,6,189,75,74,6729  
3360 DATA 153,35,44,232,200,192,17,208  
244,96,32,177,69,169,6,141,9819  
3370 DATA 206,44,10,141,208,44,32,42,5  
7,173,132,2,240,74,173,120,8512  
3380 DATA 2,201,7,240,6,201,11,208,240  
240,20,164,131,200,192,4,1937  
3390 DATA 208,2,160,0,132,131,32,42,57  
32,18,69,76,251,56,164,5913  
3400 DATA 131,136,16,240,160,3,208,236  
169,251,160,43,162,40,32,216,1882  
3410 DATA 55,166,131,189,210,44,170,16  
0,7,189,251,43,9,128,157,251,2240  
3420 DATA 43,232,136,16,244,76,135,56,  
32,18,69,32,177,69,173,132,7053  
3430 DATA 2,208,6,32,177,69,76,52,73,1  
73,120,2,201,11,208,9,6003  
3440 DATA 166,132,202,16,17,162,15,208  
13,201,7,208,14,166,132,232,264  
3450 DATA 224,16,208,2,162,0,134,132,7  
6,155,57,201,14,208,12,164,8313  
3460 DATA 133,200,200,192,16,208,16,16  
0,0,240,12,201,13,208,191,164,1595  
3470 DATA 133,136,136,16,2,160,14,132,  
133,32,169,56,32,135,56,32,4177  
3480 DATA 18,69,76,80,57,169,0,133,174  
32,73,58,32,177,69,173,6629  
3490 DATA 120,2,201,7,208,12,230,174,1  
65,174,201,16,208,49,169,0,9912  
3500 DATA 240,45,201,11,208,8,198,174,  
16,39,169,15,208,33,201,14,7321  
3510 DATA 208,13,165,174,56,233,2,16,2  
2,24,105,16,76,241,57,201,6973  
3520 DATA 13,208,20,165,174,24,105,2,2  
01,16,144,3,56,233,16,133,6381  
3530 DATA 174,32,73,58,32,18,69,173,13  
2,2,240,8,32,234,61,240,8745  
3540 DATA 51,76,177,57,32,60,58,160,2,  
177,161,41,127,32,105,49,5217  
3550 DATA 153,222,75,201,32,240,5,200,  
192,10,208,237,169,155,153,222,5585  
3560 DATA 75,160,7,177,161,41,127,32,1  
05,49,217,45,48,208,10,200,8128  
3570 DATA 192,12,208,239,169,155,141,2  
24,75,96,165,174,10,10,10,10,6038  
3580 DATA 133,161,169,6,133,162,96,169  
0,160,6,162,255,32,216,55,9720  
3590 DATA 32,60,58,160,14,177,161,9,12  
8,145,161,136,16,247,96,72,9150  
3600 DATA 138,24,105,11,133,84,104,72,  
134,237,132,238,32,76,66,165,9612  
3610 DATA 84,133,165,169,6,133,166,160

,0,162,0,165,162,24,101,236,9734  
3620 DATA 133,162,177,161,69,195,129,1  
65,165,165,24,105,32,133,165,200,1602  
3630 DATA 192,8,208,238,104,166,237,16  
4,238,96,142,66,149,44,65,0,8885  
3640 DATA 41,155,70,251,63,142,54,74,6  
0,213,58,126,65,202,67,141,9096  
3650 DATA 49,190,52,74,59,174,59,178,5  
9,182,59,206,54,23,55,190,8068  
3660 DATA 73,236,56,233,55,85,56,173,5  
5,187,55,101,48,154,49,158,8091  
3670 DATA 49,162,49,32,196,69,32,63,60  
32,198,53,32,127,52,208,6416  
3680 DATA 13,32,152,59,32,161,59,208,2  
2,32,234,61,208,6,32,233,8472  
3690 DATA 53,76,207,52,173,132,2,208,2  
35,32,177,69,76,219,58,32,8705  
3700 DATA 224,71,32,138,59,165,206,133  
150,165,209,133,151,32,66,71,9937  
3710 DATA 165,208,133,150,165,207,133,  
151,32,66,71,165,209,133,141,165,2539  
3720 DATA 208,133,150,165,209,133,151,  
32,66,71,165,208,133,140,165,207,3551  
3730 DATA 133,141,165,208,133,150,165,  
209,133,151,32,66,71,165,206,133,2166  
3740 DATA 140,165,207,133,141,76,246,5  
8,32,196,69,32,63,60,32,198,7408  
3750 DATA 53,32,127,52,208,16,32,152,5  
9,32,198,53,32,161,59,208,7580  
3760 DATA 19,32,234,61,208,6,32,233,53  
76,207,52,173,132,2,208,9546  
3770 DATA 235,76,91,59,32,224,71,32,13  
8,59,165,208,133,150,165,209,2714  
3780 DATA 133,151,32,66,71,76,110,59,1  
65,140,133,206,165,141,133,207,2874  
3790 DATA 32,251,53,76,227,59,165,140,  
133,208,165,141,133,209,96,173,4198  
3800 DATA 120,2,201,15,208,5,173,252,2  
201,255,96,169,1,208,6,296  
3810 DATA 169,2,208,2,169,3,197,234,20  
8,2,169,0,72,165,234,240,3076  
3820 DATA 17,10,10,10,168,104,72,208,4  
169,128,208,2,169,0,153,8029  
3830 DATA 89,43,104,133,234,240,9,10,1  
0,10,168,169,255,153,89,43,9148  
3840 DATA 96,32,69,73,166,234,240,248,  
202,208,12,32,45,60,32,37,7308  
3850 DATA 60,32,69,73,76,54,60,202,208  
16,32,45,60,169,191,56,7044  
3860 DATA 229,141,133,141,32,69,73,76,  
54,60,32,252,59,165,140,72,7818  
3870 DATA 165,141,72,32,37,60,32,69,73  
32,255,59,104,133,141,104,7465  
3880 DATA 133,140,96,169,159,56,229,14  
0,133,140,96,165,140,133,232,165,4546  
3890 DATA 141,133,233,96,165,232,133,1  
40,165,233,133,141,96,165,147,133,4509  
3900 DATA 160,169,0,133,147,76,39,70,3  
2,196,69,32,63,60,32,67,3556  
3910 DATA 60,32,198,53,32,127,52,208,2  
1,165,140,133,224,165,141,133,2230  
3920 DATA 225,32,253,69,32,161,59,208,  
22,32,234,61,208,6,32,233,9267  
3930 DATA 53,76,207,52,173,132,2,208,2  
35,32,177,69,76,80,60,32,7029  
3940 DATA 224,71,165,140,72,133,220,16  
5,141,72,133,221,165,220,56,229,5212  
3950 DATA 224,176,5,165,224,56,229,220  
133,226,201,63,144,4,169,62,1899  
3960 DATA 208,246,56,165,221,229,225,1  
76,5,165,225,56,229,221,133,227,7490  
3970 DATA 165,225,24,101,227,201,192,1  
44,2,169,191,133,209,165,225,56,4601  
3980 DATA 229,227,201,192,144,2,169,0,  
133,207,32,251,53,165,227,201,4200  
3990 DATA 63,144,4,169,62,133,227,169,  
0,133,218,133,216,133,217,169,5031  
4000 DATA 3,133,219,166,219,189,136,61  
133,214,189,140,61,133,215,164,4859

4010 DATA 218,166,227,185,168,61,32,14  
4,61,166,214,208,11,133,222,165,3597  
4020 DATA 225,56,229,222,176,5,144,32,  
24,101,225,133,221,169,64,56,498  
4030 DATA 229,218,168,166,226,185,168,  
61,32,144,61,166,215,208,16,133,2233  
4040 DATA 222,165,224,56,229,222,176,1  
0,169,0,133,216,76,93,61,24,8442  
4050 DATA 101,224,133,220,166,216,208,  
16,165,220,133,140,165,221,133,141,590  
6  
4060 DATA 32,227,59,230,216,76,93,61,1  
65,220,133,150,165,221,133,151,4916  
4070 DATA 32,66,71,165,150,133,140,165  
,151,133,141,165,217,240,11,198,4689  
4080 DATA 218,16,32,198,217,230,218,76  
,120,61,230,218,165,218,201,65,5905  
4090 DATA 208,17,230,217,198,218,198,2  
19,16,9,104,133,141,104,133,140,1824  
4100 DATA 76,118,60,76,229,60,1,1,0,0,  
1,0,0,1,133,213,1844  
4110 DATA 134,222,169,0,133,223,162,7,  
70,213,144,3,24,101,222,106,9520  
4120 DATA 102,223,202,16,243,96,0,6,13  
,19,25,31,38,44,50,56,887  
4130 DATA 62,68,74,80,86,92,98,104,109  
,115,121,126,132,137,142,147,460  
4140 DATA 152,157,162,167,172,177,181,  
185,190,194,198,202,206,209,213,216,93  
6  
4150 DATA 220,223,226,229,231,234,237,  
239,241,243,245,247,248,250,251,252,73  
19  
4160 DATA 253,254,255,255,255,255,255,  
255,173,31,208,201,3,96,162,26,4132  
4170 DATA 189,96,63,157,229,159,202,16  
,247,162,4,189,193,44,157,242,4516  
4180 DATA 159,202,16,247,162,32,169,15  
9,157,69,3,169,229,157,68,3,9643  
4190 DATA 169,27,157,72,3,169,30,157,7  
3,3,169,129,133,129,169,0,7831  
4200 DATA 133,128,169,160,133,135,169,  
0,133,134,169,0,133,239,133,240,3700  
4210 DATA 133,241,165,128,133,243,165,  
129,133,244,160,0,132,190,177,128,4618  
4220 DATA 133,242,200,177,128,197,242,  
240,6,169,128,133,198,242,160,7761  
4230 DATA 0,177,128,166,190,208,15,197  
,242,208,33,32,67,63,144,239,2253  
4240 DATA 165,190,240,24,208,9,197,242  
,240,5,133,242,76,93,62,56,703  
4250 DATA 165,128,233,1,133,128,165,12  
9,233,0,133,129,165,128,133,245,3954  
4260 DATA 165,129,133,246,165,245,56,2  
29,243,133,239,165,246,229,244,133,903  
4270 DATA 240,165,240,240,20,169,0,5,1  
90,32,47,63,165,240,32,47,7714  
4280 DATA 63,165,239,32,47,63,76,180,6  
2,165,239,48,232,5,190,76,668  
4290 DATA 165,62,165,190,208,11,165,24  
2,32,47,63,32,67,63,76,237,8811  
4300 DATA 62,165,243,133,128,165,244,1  
33,129,160,0,177,128,32,47,63,9065  
4310 DATA 198,239,165,239,201,255,208,  
2,198,240,165,239,208,4,165,240,8384  
4320 DATA 240,6,32,67,63,76,203,62,32,  
87,63,165,241,208,3,76,8761  
4330 DATA 52,62,162,32,165,134,56,233,  
229,157,72,3,141,247,159,165,3780  
4340 DATA 135,233,159,157,73,3,141,248  
,159,169,11,162,32,157,66,3,8238  
4350 DATA 76,86,228,169,0,133,177,169,  
129,133,178,169,0,133,179,169,3075  
4360 DATA 160,133,180,32,214,53,169,0,  
141,236,159,240,220,145,134,230,6863  
4370 DATA 134,208,2,230,135,165,135,20  
1,190,176,1,96,104,104,76,21,8981  
4380 DATA 63,230,128,208,14,230,129,16  
5,129,201,159,208,6,169,1,133,1795

4390 DATA 241,56,96,24,96,165,245,133,  
128,165,246,133,129,96,255,128,5374  
4400 DATA 201,199,26,0,1,2,14,0,40,0,1  
92,0,2,4,6,8,7964  
4410 DATA 27,30,0,0,155,155,155,155,16  
2,166,207,165,206,74,74,197,3878  
4420 DATA 235,240,7,133,235,32,232,63,  
165,235,133,177,24,125,8,76,3  
4430 DATA 133,128,189,200,76,105,0,133  
,129,169,92,133,178,169,0,133,527  
4440 DATA 179,169,6,133,180,162,19,160  
,9,177,128,145,177,145,179,136,2983  
4450 DATA 16,247,165,179,24,105,10,133  
,179,165,128,24,105,40,133,128,6980  
4460 DATA 165,129,105,0,133,129,165,17  
7,24,105,40,133,177,165,178,105,1471  
4470 DATA 0,133,178,202,16,209,96,165,  
206,24,101,148,133,140,165,207,3861  
4480 DATA 24,101,149,133,141,96,169,0,  
168,153,0,92,153,0,93,153,8127  
4490 DATA 0,94,153,0,95,200,208,241,96  
,32,198,53,32,232,63,32,9315  
4500 DATA 209,69,169,0,133,206,133,207  
,133,235,169,20,133,148,74,133,2527  
4510 DATA 149,169,25,141,48,2,169,46,1  
41,49,2,169,12,141,192,2,6290  
4520 DATA 169,3,141,8,208,32,170,64,32  
,123,63,76,129,64,173,120,8295  
4530 DATA 2,162,7,221,22,75,240,50,202  
,16,248,162,3,173,252,2,1324  
4540 DATA 201,44,240,32,221,30,75,240,  
33,202,16,248,173,31,208,201,3895  
4550 DATA 5,208,56,173,192,2,24,105,2,  
41,15,141,192,2,32,18,3388  
4560 DATA 69,76,48,64,32,44,72,76,48,6  
4,138,10,170,189,71,65,6388  
4570 DATA 141,124,64,189,72,65,141,125  
,64,32,255,255,32,207,52,32,11  
4580 DATA 217,63,32,183,72,32,123,63,3  
2,170,64,32,234,61,208,1,7776  
4590 DATA 96,173,132,2,208,9,32,217,63  
,32,227,59,32,123,63,32,6177  
4600 DATA 9,69,32,9,69,76,48,64,32,253  
,69,165,148,10,10,24,4683  
4610 DATA 105,44,141,0,208,165,149,10,  
10,10,24,105,47,168,169,64,6615  
4620 DATA 32,204,64,169,160,32,204,64,  
169,64,162,7,153,0,36,200,8616  
4630 DATA 202,16,249,96,198,149,16,8,2  
30,149,165,207,240,2,198,207,5344  
4640 DATA 96,230,149,165,149,201,20,14  
4,247,198,149,32,217,63,165,141,4206  
4650 DATA 201,191,240,236,230,207,208,  
232,198,148,16,228,230,148,165,206,960  
8  
4660 DATA 240,222,56,233,4,133,206,169  
,3,133,148,208,211,230,148,165,6360  
4670 DATA 148,201,40,144,203,198,148,3  
2,217,63,165,140,201,159,240,192,7000  
4680 DATA 165,206,24,105,4,133,206,169  
,36,133,148,208,179,32,214,64,2148  
4690 DATA 76,15,65,32,214,64,76,250,64  
,32,227,64,76,15,65,32,5951  
4700 DATA 227,64,76,250,64,15,65,250,6  
4,214,64,227,64,47,65,59,8701  
4710 DATA 65,53,65,65,65,164,228,185,1  
89,44,141,123,44,96,169,117,1212  
4720 DATA 160,44,162,32,32,216,55,166,  
174,189,49,48,170,160,3,189,841  
4730 DATA 117,44,9,128,157,117,44,232,  
136,16,244,96,32,126,56,169,69  
4740 DATA 79,141,48,2,169,46,141,49,2,  
160,4,32,140,55,32,87,4261  
4750 DATA 65,169,0,133,236,133,174,169  
,117,160,44,162,32,32,216,55,298  
4760 DATA 160,20,230,231,32,1,49,173,2  
24,75,201,155,240,242,160,19,4516  
4770 DATA 185,224,75,153,199,75,136,16  
,247,32,96,65,173,132,2,240,1111

4780 DATA 38,173,120,2,162,0,201,7,240  
,22,201,11,208,4,162,2,7750  
4790 DATA 208,14,201,14,208,4,162,1,20  
8,6,201,13,208,222,162,3,480  
4800 DATA 134,228,32,87,65,208,213,230  
,174,32,240,65,230,174,32,96,3486  
4810 DATA 65,32,177,69,169,0,133,162,1  
60,230,162,17,165,174,201,2,2172  
4820 DATA 208,3,136,162,27,132,161,160  
,0,177,161,168,173,132,2,240,2948  
4830 DATA 51,173,120,2,201,14,208,9,20  
0,192,100,144,15,160,4,208,583  
4840 DATA 11,201,13,208,231,136,192,4,  
176,2,160,99,152,72,32,236,1263  
4850 DATA 67,157,118,44,152,157,117,44  
,134,171,32,18,69,166,171,104,9568  
4860 DATA 168,76,14,66,152,160,0,145,1  
61,96,160,0,132,195,132,162,1553  
4870 DATA 32,96,49,201,0,16,4,198,195,  
41,127,133,161,6,161,38,8111  
4880 DATA 162,6,161,38,162,6,161,38,16  
2,165,162,24,105,37,133,162,9614  
4890 DATA 96,166,228,208,27,24,165,206  
,101,183,133,191,165,184,105,0,2706  
4900 DATA 133,192,56,165,207,229,188,1  
33,193,169,0,229,189,133,194,96,5974  
4910 DATA 202,208,27,56,165,206,229,18  
8,133,191,169,0,229,189,133,192,6657  
4920 DATA 56,165,207,229,183,133,193,1  
69,0,229,184,133,194,96,202,208,7393  
4930 DATA 27,56,165,206,229,183,133,19  
1,169,0,229,184,133,192,24,165,4755  
4940 DATA 207,101,188,133,193,165,189,  
105,0,133,194,96,24,165,206,101,2507  
4950 DATA 188,133,191,165,189,105,0,13  
3,192,24,165,207,101,183,133,193,4501  
4960 DATA 165,184,105,0,133,194,96,133  
,128,132,129,169,0,133,163,133,1727  
4970 DATA 164,24,165,128,101,163,133,1  
63,169,0,101,164,133,164,202,208,4890  
4980 DATA 240,56,165,163,233,1,133,163  
,165,164,233,0,133,164,56,165,3078  
4990 DATA 163,229,129,133,163,168,165,  
164,233,0,133,164,170,96,134,185,4872  
5000 DATA 132,186,134,181,169,0,133,18  
2,162,3,24,38,181,38,182,202,917  
5010 DATA 208,248,160,255,200,56,165,1  
81,229,186,133,181,165,182,233,0,6897  
5020 DATA 133,182,16,240,134,181,96,16  
9,0,133,190,230,190,164,190,185,7061  
5030 DATA 198,75,201,155,208,1,96,32,7  
6,66,165,229,133,196,198,196,5061  
5040 DATA 166,196,224,255,240,229,164,  
229,32,32,67,132,197,165,229,166,6735  
5050 DATA 190,164,196,32,233,66,132,18  
3,134,184,169,255,133,202,230,202,9437  
5060 DATA 166,202,228,230,240,216,164,  
230,32,32,67,132,203,164,203,177,6459  
5070 DATA 161,69,195,164,197,57,194,67  
,240,35,165,230,162,1,164,202,4728  
5080 DATA 32,233,66,132,188,134,189,32  
,115,66,166,191,164,193,165,192,5821  
5090 DATA 208,11,165,194,208,7,132,141  
,134,140,32,227,59,76,128,67,230  
5100 DATA 1,2,4,8,16,32,64,128,32,196,  
69,32,63,60,32,127,4455  
5110 DATA 52,208,22,165,140,133,206,72  
,165,141,72,133,207,32,73,67,409  
5120 DATA 104,133,141,104,133,140,76,2  
08,67,96,160,0,132,245,201,100,3114  
5130 DATA 144,7,56,233,100,230,245,208  
,245,72,165,245,9,16,133,245,5583  
5140 DATA 104,201,10,144,6,56,233,10,2  
00,208,246,9,16,72,152,9,8663  
5150 DATA 16,168,104,96,216,32,131,70,  
32,198,53,32,114,75,169,112,9041  
5160 DATA 141,0,41,141,1,41,169,32,141  
,2,41,169,78,141,3,41,5135  
5170 DATA 169,0,141,4,41,169,129,141,5

,41,162,198,169,14,157,5,8469  
5180 DATA 41,202,208,250,162,6,189,156  
,58,157,198,41,202,16,247,169,4687  
5190 DATA 78,141,101,41,169,0,141,102,  
41,169,144,141,103,41,32,6,6489  
5200 DATA 74,32,7,70,169,0,162,127,149  
,128,202,16,251,169,8,133,1546  
5210 DATA 229,133,230,230,210,32,4,55,  
169,6,160,61,162,69,32,92,8122  
5220 DATA 228,32,235,72,32,235,68,173,  
120,2,201,7,240,68,201,11,593  
5230 DATA 240,77,201,14,240,47,201,13,  
240,20,173,132,2,208,232,32,2053  
5240 DATA 30,69,32,235,72,32,177,69,32  
,21,69,76,137,68,165,130,8244  
5250 DATA 24,105,5,201,25,144,3,56,233  
,25,133,130,32,235,68,32,8369  
5260 DATA 18,69,76,137,68,165,130,56,2  
33,5,16,238,24,105,25,76,7432  
5270 DATA 188,68,230,130,165,130,201,2  
5,208,2,169,0,76,188,68,198,1575  
5280 DATA 130,165,130,16,247,169,24,20  
8,243,169,11,160,43,162,200,32,2532  
5290 DATA 216,55,165,130,10,10,10,170,  
160,5,189,12,43,9,128,157,7001  
5300 DATA 12,43,232,136,16,244,96,169,  
0,133,20,165,20,240,252,96,2672  
5310 DATA 32,190,69,162,8,32,9,69,202,  
16,250,96,32,190,69,32,7927  
5320 DATA 177,69,32,207,52,165,130,10,  
170,189,163,58,141,56,69,189,1384  
5330 DATA 164,58,141,57,69,32,255,255,  
76,21,69,169,0,133,168,133,814  
5340 DATA 77,160,4,185,196,2,153,22,20  
8,136,16,247,165,169,208,8,2859  
5350 DATA 166,147,189,222,44,141,0,208  
,76,95,228,72,134,167,142,10,1371  
5360 DATA 212,166,168,224,3,240,25,224  
,4,208,7,169,0,141,26,208,639  
5370 DATA 240,39,189,203,44,141,24,208  
,189,206,44,141,23,208,208,25,2633  
5380 DATA 162,4,189,193,44,157,22,208,  
202,16,247,173,209,44,141,18,2376  
5390 DATA 208,166,210,189,230,44,141,0  
,208,230,168,166,167,104,64,72,3468  
5400 DATA 169,4,141,10,212,141,24,208,  
169,10,141,23,208,104,64,173,1114  
5410 DATA 132,2,240,251,169,1,141,132,  
2,76,21,69,169,0,141,31,6809  
5420 DATA 208,96,32,198,53,169,41,141,  
49,2,169,0,141,48,2,169,6961  
5430 DATA 64,141,14,212,169,161,141,0,  
2,169,69,141,1,2,169,192,9271  
5440 DATA 141,14,212,32,253,69,160,4,1  
85,193,44,153,196,2,136,16,9991  
5450 DATA 247,169,12,141,192,2,230,169  
,76,9,69,162,0,138,157,0,8333  
5460 DATA 36,232,208,250,96,32,253,69,  
141,0,208,169,32,141,7,212,2051  
5470 DATA 169,1,141,111,2,169,58,141,4  
7,2,169,14,141,192,2,169,8791  
5480 DATA 3,141,29,208,96,32,253,69,14  
1,8,208,166,147,189,34,75,1575  
5490 DATA 170,160,120,132,149,189,58,7  
5,153,0,36,232,200,192,125,208,4801  
5500 DATA 244,166,147,169,255,133,137,  
133,138,189,42,75,133,136,189,50,3051  
5510 DATA 75,133,139,169,128,133,148,1  
69,93,133,141,169,80,133,140,224,5102  
5520 DATA 0,208,10,169,126,133,148,169  
,95,133,141,208,12,224,4,208,3370  
5530 DATA 8,169,97,133,141,169,4,133,1  
38,165,148,141,0,208,76,183,2702  
5540 DATA 72,169,129,133,129,169,0,133  
,128,162,29,169,0,168,145,128,1286  
5550 DATA 200,208,251,230,129,202,16,2  
43,96,32,196,69,32,39,70,32,8444  
5560 DATA 224,71,173,132,2,240,9,32,9,  
69,32,234,61,208,240,96,1514

5570 DATA 32,184,70,76,169,70,165,147,  
10,170,189,50,71,141,207,70,1671  
5580 DATA 189,51,71,141,208,70,32,227,  
59,32,41,74,32,255,255,76,1365  
5590 DATA 50,74,230,140,32,227,59,230,  
141,32,227,59,198,140,32,227,4253  
5600 DATA 59,198,141,96,32,38,71,76,66,  
71,32,26,71,76,66,71,4436  
5610 DATA 32,26,71,165,141,56,233,4,13  
3,151,76,66,71,32,26,71,6503  
5620 DATA 165,141,24,105,4,133,151,76,  
66,71,230,140,230,140,32,227,3618  
5630 DATA 59,230,140,230,140,76,227,59,  
165,140,24,105,4,133,150,165,1919  
5640 DATA 141,133,151,96,165,141,24,10  
5,4,133,151,165,140,133,150,96,2038  
5650 DATA 229,70,212,70,230,70,236,70,  
242,70,255,70,12,71,229,70,2945  
5660 DATA 32,41,74,165,151,197,141,144  
1,11,56,229,141,133,145,169,1,1912  
5670 DATA 133,153,208,11,165,141,56,22  
9,151,133,145,169,255,133,153,165,7096  
5680 DATA 150,197,140,144,11,56,229,14  
0,133,144,169,1,133,152,208,11,1995  
5690 DATA 165,140,56,229,150,133,144,1  
69,255,133,152,169,0,133,155,133,4767  
5700 DATA 154,165,144,197,145,144,10,1  
33,156,133,157,74,133,155,76,156,3011  
5710 DATA 71,165,145,133,156,133,157,7  
4,133,154,165,156,240,61,165,155,5700  
5720 DATA 24,101,145,176,9,133,155,197  
1,157,144,14,165,155,56,229,157,4322  
5730 DATA 133,155,165,141,24,101,153,1  
33,141,165,154,24,101,144,176,9,1107  
5740 DATA 133,154,197,157,144,14,165,1  
54,56,229,157,133,154,165,140,24,3504  
5750 DATA 101,152,133,140,32,227,59,19  
8,156,208,195,76,50,74,173,120,3375  
5760 DATA 2,162,7,221,22,75,240,42,202  
16,248,162,3,173,252,2,2490  
5770 DATA 201,44,240,54,221,30,75,240,  
25,202,16,248,173,31,208,201,5141  
5780 DATA 5,240,1,96,173,192,2,24,105,  
2,41,15,141,192,2,76,6238  
5790 DATA 18,69,138,10,170,189,98,75,1  
41,36,72,189,99,75,141,37,9403  
5800 DATA 72,32,255,255,32,183,72,76,2  
07,52,230,210,165,210,201,17,5896  
5810 DATA 208,4,169,0,133,210,32,4,55,  
32,18,69,76,38,72,230,6835  
5820 DATA 140,165,140,197,136,176,8,23  
0,148,165,148,141,0,208,96,198,4952  
5830 DATA 140,96,198,140,165,140,197,1  
37,240,8,198,148,165,148,141,0,3982  
5840 DATA 208,96,230,140,96,198,141,16  
5,141,197,138,240,17,162,6,198,4849  
5850 DATA 149,164,149,185,0,36,153,255  
35,200,202,16,246,96,230,141,5818  
5860 DATA 96,230,141,165,141,197,139,1  
76,17,162,6,230,149,164,149,185,5794  
5870 DATA 4,36,153,5,36,136,202,16,246  
96,198,141,96,32,65,72,9830  
5880 DATA 76,103,72,32,65,72,76,131,72  
32,84,72,76,103,72,32,5621  
5890 DATA 84,72,76,131,72,166,234,189,  
155,45,141,184,44,165,210,32,3524  
5900 DATA 236,67,141,175,44,140,174,44  
165,140,32,236,67,141,158,44,2011  
5910 DATA 140,157,44,165,245,141,156,4  
4,165,141,32,236,67,141,166,44,2789  
5920 DATA 140,165,44,165,245,141,164,4  
4,96,169,45,141,49,2,169,159,1238  
5930 DATA 141,48,2,169,64,141,14,212,1  
69,93,141,0,2,169,69,141,9494  
5940 DATA 1,2,169,192,141,14,212,169,5  
8,141,47,2,160,4,185,198,1397  
5950 DATA 44,153,196,2,136,16,247,32,2  
53,69,133,169,141,192,2,141,2922

5960 DATA 8,208,160,7,169,255,153,127,  
36,185,147,45,153,201,36,136,3204  
5970 DATA 16,242,169,6,141,207,44,141,  
208,44,10,141,206,44,165,160,2827  
5980 DATA 133,147,96,164,141,192,192,1  
76,71,185,8,76,133,128,185,200,4945  
5990 DATA 76,133,129,165,140,201,160,1  
76,55,72,74,74,24,101,128,133,504  
6000 DATA 128,165,129,105,0,133,129,10  
4,41,3,170,165,141,41,1,10,6629  
6010 DATA 133,211,165,140,41,1,5,211,1  
68,185,198,0,168,189,255,74,4933  
6020 DATA 57,3,75,133,134,189,251,74,1  
60,0,49,128,5,134,145,128,672  
6030 DATA 96,162,32,169,12,157,66,3,76  
86,228,72,32,147,73,104,8859  
6040 DATA 162,32,157,74,3,169,3,157,66  
3,169,75,157,69,3,169,8478  
6050 DATA 7,157,68,3,169,0,157,75,3,76  
86,228,32,177,69,169,233  
6060 DATA 6,141,206,44,10,141,207,44,1  
73,120,2,201,7,240,19,201,1982  
6070 DATA 11,240,33,173,132,2,208,240,  
165,147,133,160,32,52,73,76,1193  
6080 DATA 18,69,230,147,165,147,201,8,  
208,2,169,0,133,147,32,18,8998  
6090 DATA 69,76,202,73,198,147,165,147  
16,2,169,7,133,147,32,18,8074  
6100 DATA 69,76,202,73,169,128,133,135  
169,216,133,134,162,0,165,134,4320  
6110 DATA 24,105,40,157,8,76,133,134,1  
65,135,105,0,133,135,157,200,2755  
6120 DATA 76,232,224,192,208,232,96,16  
5,140,133,158,165,141,133,159,96,6448  
6130 DATA 165,158,133,140,165,159,133,  
141,96,16,16,18,16,20,16,3814  
6140 DATA 22,16,24,17,16,17,18,17,20,3  
4,108,97,99,107,0,0,2435  
6150 DATA 0,0,16,16,50,117,115,116,0,0  
0,0,0,16,17,50,226  
6160 DATA 101,100,13,47,114,110,103,0,  
16,18,36,114,107,13,47,114,4829  
6170 DATA 110,103,0,16,19,50,101,100,0  
0,0,0,0,0,16,20,9012  
6180 DATA 36,114,107,13,44,97,118,101,  
0,16,21,35,111,98,13,34,3618  
6190 DATA 108,117,101,0,16,22,53,108,1  
16,13,34,108,117,101,0,16,4317  
6200 DATA 23,45,101,100,13,34,108,117,  
101,0,16,24,36,114,107,13,4227  
6210 DATA 34,108,117,101,0,16,25,34,10  
8,117,101,13,39,114,121,0,5085  
6220 DATA 17,16,47,108,105,118,13,39,1  
14,110,0,17,17,45,101,100,4774  
6230 DATA 13,39,114,110,0,0,17,18,36,9  
7,114,107,13,39,114,110,5383  
6240 DATA 0,17,19,47,114,110,103,13,39  
114,110,0,17,20,47,114,4305  
6250 DATA 97,110,103,101,0,0,17,21,6  
3,207,243,252,192,48,12,304  
6260 DATA 3,0,85,170,255,68,58,80,73,6  
7,84,85,82,69,83,46,7211  
6270 DATA 80,73,67,155,7,11,14,13,6,5,  
10,9,7,6,14,15,8567  
6280 DATA 0,5,10,15,20,25,30,35,160,15  
9,160,156,156,156,156,160,2894  
6290 DATA 192,191,188,192,192,188,192,  
192,32,32,216,32,32,192,192,0,2516  
6300 DATA 0,0,128,128,128,128,128,248,  
0,0,0,0,8,16,32,64,3316  
6310 DATA 128,128,64,32,16,8,168,0,0,0  
0,128,0,0,0,9854  
6320 DATA 65,72,84,72,103,72,131,72,15  
9,72,165,72,171,72,177,72,1377  
6330 DATA 169,255,160,39,153,0,42,136,  
16,250,200,132,161,132,163,132,4718  
6340 DATA 165,169,32,133,162,141,244,2  
169,37,133,164,169,224,133,166,6157

6350 DATA 162,3,177,165,145,161,145,16  
 3,200,208,247,230,162,230,164,230,2542  
 6360 DATA 166,202,16,238,160,7,169,128  
 ,153,40,32,169,1,153,48,32,8523  
 6370 DATA 185,99,42,153,248,35,136,16,  
 237,160,55,185,43,42,153,48,789  
 6380 DATA 34,136,16,247,96,155,226,2,2  
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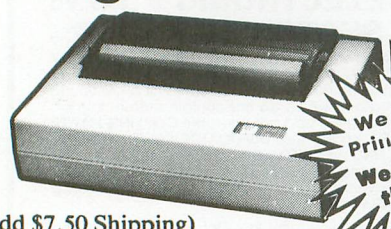
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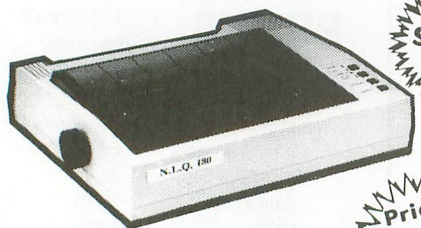
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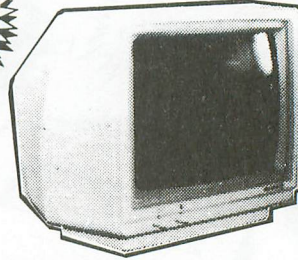
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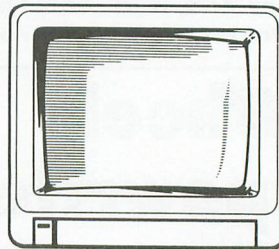


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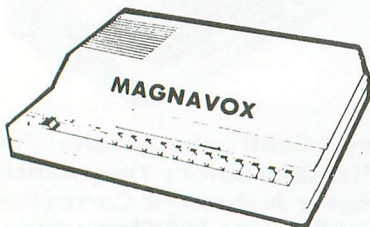
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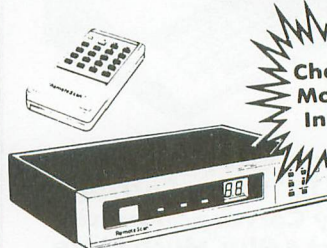
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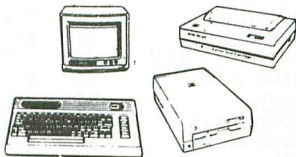
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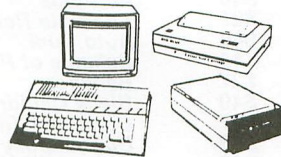
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# The End User

**THIS MONTH:  
A blast from  
the past,  
playing a new  
game, and  
Atari's  
credibility.**

by Arthur Leyenberger

I was cleaning up my office recently, when I came across an official Atari press kit. It happened to be dated January 5, 1985, from the first Consumer Electronics Show at which the "New Atari" exhibited. Although it's somewhat difficult to capture the the *zeitgeist* of late 1984, it is interesting to reflect back to that uncertain time, especially after three years with Jack Tramiel and family at the helm.

After the Tramiel purchase of Atari, from Warner Communications in the summer of 1984, little information was forthcoming regarding recently announced products, new products or the future of the company. However, as I talked to what few contacts I still had at Atari, they assured me that, to use the catch phrase of the movie *2010*, "something wonderful is going to happen."

Most readers of **ANALOG Computing** know that CES is held twice yearly: in Las Vegas in January and Chicago in June. Arriving at CES in January 1985, attendees were greeted by billboards displaying the message "Welcome to Atari Country! Regards, Jack." Others proclaimed the slogan "Power Without the Price" for the first time anywhere. However, the real action was at the Atari booth.

Until January 5th, Atari had kept the lid on a secret that was to become the ST and XE lines of home computers. In addition to unveiling one new and one slightly new line, Atari announced the *Explorer* magazine, several peripherals, the "new" Atari-

soft label and the **Learning Phone** (Plato) cartridge. As usual, a certain amount of vaporware was also shown.

The ST computer line consisted of the 130ST and 520ST. Both were said to deliver "power without the price," used the Motorola 68000 microprocessor and featured a visually oriented user interface—GEM. As we now know, the 130ST was never seen again. But the 520ST was, and still is, a knockout. Looking back, it's easy to see that Jack performed a real coup by offering an Apple Macintosh look-alike for one-third the price.

A family of 8-bit computers were shown that January, as well. The 64K-byte 65XE was essentially an 800XL in a restyled package that was much cheaper to manufacture. The 130XE was the exciting 8-bit product at the time. With 128K memory, it was the lowest priced 128K computer of its kind. The 130XE was the first of the new breed to become available in the U.S. and has since become quite successful.

There was some doubt, however, about the 65XE. It was apparently first released in Canada, and took about a year to come out in the States. Rumor was that Atari was waiting until they could clear their warehouses of thousands of 800XLs to introduce the 65XE in the U.S.

The 65 and 130XEs were the stars of the 8-bit family. As in most families, though, there were also some disappointments. Take the 65XEP, for example. This was an 8-bit computer in a portable case. It featured 64K of memory; one 3½-inch disk drive; a 5-inch, 40-column monochrome

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Arthur Leyenberger is a human factors psychologist and free-lance writer living in New Jersey. He has been an Atari enthusiast for more than five years. When not computing, he enjoys playing with robotic toys.

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monitor; and a shoulder strap. No specifications like weight or price were given. To call it an abomination is to be kind.

The other stillborn computer was the 8-bit 65XEM. This was supposed to "bring out the Beethoven in you." Imagine a 65XE with the so-called AMY music chip, with eight voices and audio output. Keep imagining.

With the advent of Jack Tramiel and the new Atari management team came the loss of customer support. The toll-free user support number was disconnected; Atari service centers were shut down; nonexistent or dealer-supplied warranties arrived; and the existing 8-bit user was abandoned. A classic example of this is contained in the press release that discussed the then-new *Explorer*.

According to Neil Harris, publisher of the *Explorer* at the time, "We can reach thousands of our most active users at once. [*Explorer*] is a mass-market approach to user support." Indeed it was. Nor was it the only mass marketing that was to become both an asset and a liability to Atari, as the STs eventually made their way into Toys 'R' Us and elsewhere. Mass marketing keeps the price down—but at the cost of in-store support and reputation for the Atari name. What self-respecting business is going to buy a computer, albeit a very powerful computer, in a toy store?

Atari also announced that it would become "a major force in the third-party peripherals market." Dot-matrix printers in color and black-and-white, disk drives and monitors were to be brought to market under the Atarisoft brand name in 1985. Available at "rock-bottom prices," these peripherals were to be compatible with Apple, Commodore and IBM computers. Unless I've been asleep for the last two years and missed these products, I don't believe they ever existed anywhere but in Jack Tramiel's mind.

Not only did some announced products never reach the development lab (let alone the market), some products that *did* come out took years. The XM-301 300-baud modem looked like a viable product when announced, in 1985. It was not seen in the marketplace till late 1986. The Plato cartridge took years (it seems) before it was finally released. Ironically, Plato is now out of business. So it goes.

Another press release seemed inadvertently humorous. James Copland, ex-Vice President of Marketing, was credited as announcing "the worldwide implementation of a new, revolutionary color coding

approach, which makes the selection and purchase of Atari personal computers, peripherals and software as easy as 1, 2, 3." Sam Tramiel was quoted as saying, "The new color code method will enable the consumer to make their own intelligent choice when adding on compatible components or selecting software. . ." What was this revolutionary marketing gimmick? XE products in red boxes and ST products in blue boxes. Wow!

Unfortunately, amid the humor is a sobering thought, as stated by the press release. "Color coding is an extension of the 'self-service' method of conducting business." Atari's continued emphasis on "self service," mass marketing and minimal user support has ultimately hurt the company in the eyes of many users. Of course, we now also realize that Atari acquired thousands of unpaid customer support personnel, in the form of user group members. Atari has relied on—is still relying on—these people to provide support to new users. What have the user groups received from Atari in return? If I think of something, I'll let you know.

### Time warp.

It is now June 1987. I'm traveling at 40,000 feet from Chicago to Newark, returning from the 1987 Summer CES. So what's new in the world of Atari? Games! As far as Atari was concerned, the 1987 Summer CES was a "game show."

The XE game system was first shown last January in Las Vegas. It's a \$150 65XE computer cum game system, with detachable keyboard and a light gun for shooting games. It's packaged in an attractive gray box with "Miami Vice" inspired pastel Start, Option, Reset and Help buttons. A double-sided, double-density XE disk drive, 300/1200-baud modem and an 80-column adapter were also shown.

No Mega STs were shown, nor was the Atari laser printer (and all through the night, not a blitter was in sight). The CD-ROM drive (shown nearly two years ago) was also conspicuous by its absence. Atari had on display their PC clone, to be available by August. My personal view is: the Atari PC is a doomed product, because it lacks expansion slots. Sure it's the only "cheap" PC clone with EGA (Enhanced Graphics Adapter, a high-resolution graphics standard), but the type of people who buy cheap MS-DOS PCs probably won't care. Without the EGA, the Atari PC becomes just another clone, with no slots for expansion—and "from a game company," at that.

Based on history, the prognosis for the


roundup of new Atari products seems mixed. The XE game system will probably come out this fall, just in time for Christmas sales. Although it seems an interesting product, it's really nothing more than a repackaged 65XE. A savvy consumer could easily buy a 65XE, the light gun and a couple games—and have the equivalent of the XE system for less. If you already own a 65XE or 130XE, all you need to do is buy the light gun and some new game cartridges.

The XEP80 80-column adapter is supposedly available now in limited quantities, but, since it doesn't currently work with any 8-bit word processors, not even *AtariWriter*, there seems no need to hold your breath for better product availability. Who knows when the 300/1200-baud modem will be out? Your guess is as good as mine. Likewise, for the double-sided, double-density disk drive for XE computers. This is the latest incarnation of the on-again, off-again 3½-inch drive for the 8-bits. And the Mega machines are supposed to reach your dealer's shelves by summer. No specific year was mentioned.

I discussed some of the above concerns with Sam Tramiel, Jerry Brown (the new Vice President of U.S. Operations) and Neil Harris. The conclusion we came to was twofold. First, for many new Atari releases, the development time is no longer (or shorter) than that for other major computer equipment manufacturers. However, whereas other companies tend to be secretive about products before they're ready to ship, Atari seems to announce products shortly after they get the idea.

Two fairly current examples of other companies' products come to mind. IBM recently introduced the Personal Computer System/2 series of four MS-DOS-based computers. Within weeks, you could go to a computer retailer and buy two of the new models. IBM announced that the other two computers, the high-end models, would be available this summer. You can believe they *will* be. Likewise, Apple's announcement of the Mac II and Mac SE was followed very shortly by product availability.

Both Sam Tramiel and Jerry Brown agreed that premature announcements of new products have hurt Atari's credibility. The good news: Atari will be striving not to announce or discuss new products until they're reasonably sure they can deliver the items to consumers in a timely manner.

I look forward to this new era in Atari credibility. 




## Music Painter

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by Clayton Walnum

Music programs come in two varieties. The first requires some knowledge of music theory, forcing the user to compose in much the same way he would if he were writing the music out on paper. Keys and time signatures are set, and the traditional musical notation—notes, rests, sharps, flats, etc.—must be understood and incorporated, in order to take full advantage of the program's offerings. These programs, though more advanced than their brothers described below, from an educational viewpoint, don't offer the music novice a very transparent interface. Not everyone has a technical interest in music; some people just want to sit down and, with a minimum of effort, have their computers serenading them with their favorite tunes.

The second variety of music program strips music down, both intellectually and graphically, to its simplest form, allowing those who can't play even a radio to take their shot at being the next Mozart (or Phil Collins, depending on where your tastes lie).

**Music Painter** falls into this second category. Instead of a screen strewn with stemmed dots waving varying numbers of flags, your masterpiece (it *will* be a masterpiece, right?) consists of colored lines which have been "painted" on the staff with a "paintbrush." The duration of each note painted is based on the length of the line drawn. (The principle involved is sus-

piciously similar to that incorporated in the manufacture of those paper rolls used by player pianos.) Though this method doesn't teach much about musical notation, it does graphically portray the theory behind the notation, giving the organization of the musical piece a visual meaning.

Don't get the idea that all music theory has been dumped by the wayside, though. The **Music Painter** screen display incorporates that traditional five-line, four-space creation we all had to memorize back in elementary school (Every Good Boy Does Fine). Also, as you move your brush (really a small cursor) throughout the staff, the note (i.e., G<sup>#</sup>, B, C) to be painted at that position appears at the top of the display.

If you're the fussy type, you can still divide your melodious works of genius into measures. Measures, as interpreted by **Music Painter**, are fluid creatures, indeed. They can be set to any length. The longer the measure, the more notes you can fit into it. Actually, the use of measures is provided only as a convenient means of marking a piece off into sections. You do not have to stick to any beat-count rules. **Music Painter** doesn't care. It won't make any nasty noises if you mess up. It'll play anything.

Because of **Music Painter's** lack of adherence to traditional notation, the limitations frequently found in this type of program are avoided. For instance, many music programs have difficulty with trip-

lets (a triplet is three notes of equal length, played in such a way that the three combined are the length of two; for instance, three eighth notes that take up only one beat in 4/4 time). **Music Painter** plays triplets as effortlessly as Leonard Bernstein (albeit a bit more mechanically).

Once you've got your composition on its way, **Music Painter's** editing functions let you to breeze through that inevitable fine tuning. You can insert or delete notes and spaces, as well as copy blocks of music from one portion of the piece to another.

All of **Music Painter's** functions are accessed from a graphic menu at the top of the screen. You can load and save data; set the number of notes per measure; set the current instrument (drums, piano, horn or violin); choose which of the three voices to paint with; choose the program's main function (paint, play forward, play backward, insert space, delete space and copy block); move forward or backward through a piece a measure at a time, or jump quickly to the beginning or end; turn any of the three voices on and off; and increase or decrease the tempo.

If you're feeling lazy and just want to listen, rather than compose, the **Music Painter** disk comes with a dozen or so ready-to-play tunes. Just load 'em up and go. Loading is accomplished, as are all disk operations, from a special disk menu screen. There's no typing; everything is joystick controlled.

One thing I especially like about **Mu-**



sic Painter is that, after the program is loaded, there's still plenty of memory left to work with. I entered the entire first movement of Beethoven's "Moonlight Sonata" (total playing time: 5½ minutes) and still didn't run out of space.

Nothing is perfect, of course. The ability to individually adjust the volume of each voice is, sadly, not included amongst Music Painter's abilities. This can be im-

portant when you want a melody line to stand out above the background harmonies. There are times in my arrangement of the Beethoven piece when the melody is barely discernible.

To sum it up, Music Painter is a fine program for living-room musicians, who want to get those melodies tickling the inside of their skulls out into the world where they belong. Its manual is simple,

complete and straightforward, allowing you to get down to business almost immediately. Its "paintbrush" method of entering music is fun and easy to use, and offers few limitations to those who wish to do more advanced composing. The program's features summed with its low price equal a value you can't ignore. . . A nice piece of work from Atari. **A**

## Four-Star Software *continued from page 53*

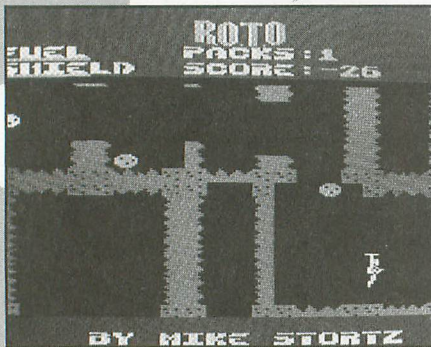
### LANGUAGES

**Action!** (OSS) — An incredibly fast, high-level language, developed solely for the Atari 8-bit. Some of the swiftest software has been written in Action!

"[The Action! runtime library] lets you run your Action! programs without the cartridge. A real boon to software developers." —CB

"If you want to move up to a more powerful, structured, high-level language, Action! is superb. It's also a great introduction to either C or Pascal, in case you ever get an ST." —IC

"I hardly know how to use Action!, but the software written with it that has passed through my hands has been most impressive." —LHP



R.O.T.O. — an Action! game.

**Atari BASIC** (Atari) — The infamous 8K cartridge has been called everything from "great" to a "3-inch devil on Earth."

"What can I say. . . so I haven't developed my programming skills over the years." —MD

"It's not perfect, but it taught me my earliest Atari lessons. First loves die hard." —CW

**BASIC A+** (OSS) — A super advanced version of Atari's BASIC cartridge, disk based, with many new additions.

"A forerunner to other OSS BASICs, this product was the first advanced language for the 8-bit; and even with its bugs, I enjoyed using it." —LHP

**BASIC XL/XE** (OSS) — The most recent versions of OSS Atari BASIC.

"If you want to program in BASIC, then these cartridges contain the very best versions of the language." —IC

"A classic; this is the BASIC that should have been built into the XLs and XEs." —CFJ

**MAC/65** (OSS) — The most popular 6502 (Atari) assembler.

"A macro-assembler and editor for machine language programmers. Combines ease of use with a lot of power." —IC

"Its macros are more powerful than any other assembler I've ever used, and quite simple to learn and use." —MR

"The Rolls Royce of assemblers. About 90 percent of assembly programs are written with this masterpiece." —CW

**Microsoft BASIC** (Atari) — A two-disk set (later released on cartridge) of the BASIC made famous on micros.

"The most versatile, most applicable, most rule-bendable interpreter I've ever used." —DFS

### TELECOMMUNICATIONS

**Amodem 7.2** (public domain) — One of the most popular programs available.

"This program, written in Atari BASIC, has everything I look for in terminal software, especially price—it's free for the cost of a download from most BBSs and telecommunication systems." —CFJ

**Express!** (public domain) — The comments below say it all.

"This program receives a lot of ongoing support and enhancements from both authors and users." —IC

"It has every feature I could ask for, and then some." —MR

"I've never understood why this public domain terminal program wasn't sold commercially. Makes all the high-priced programs blush in embarrassment." —CW

**HomePak** (Electronic Arts/Batteries Included) — Word processing, editing, telecommunications and more. . . all in one. **HomeTerm** is the terminal portion.

"The best terminal program for the Atari 8-bit computer." —AL



HomePak.

"**HomeTerm** works quite well for communicating with non-Atari telecommunication systems like Delphi or CompuServe." —CFJ

"Russ Wetmore's entry into the telecommunications arena remains one of the standards." —CW

### WORD PROCESSORS

**Action!** (OSS) — See Languages.

"True, it's not a word processor—but it has one of the best built-in text editors around." —CB

**AtariWriter Plus** (Atari) — Mega-popular word processor. This expanded version gives 130XE owners more use of memory. Includes a proofreader and mail-merge.

"So easy to use, even a lazy person like me can handle it." —LHP

"I can go back to **AtariWriter** after months of working on a different machine, and remember how to use it almost instantly." —MR

"As applicable as an electronic piece of paper." —DFS

"I used to think the old **AtariWriter** was great. This new revision is nothing short of marvelous." —CW

**Letter Perfect** (LJK) — This small St. Louis company did an outstanding job on their word-processing program, released back in 1981. Many 400/800 users will remember this product took the Atari community by storm—deservedly so.

"It has served me well over the last seven years. It was my first and only word processor for the Atari 8-bit. I never found a reason to try anything else." —MD

"The first (8-bit) word processor; only recently have I started using **AtariWriter Plus**. . . at gunpoint before the rest of the staff." —LHP

**PaperClip** (Electronic Arts/Batteries Included) — A modern-day word processor, touted as easy-to-use and feature-packed. BI is gone now, but this product lives on in many a (computer's) memory.

"Powerful and complex, this is my word processor of choice on the XE. Comes with spelling checker for the XE's extra RAM." —IC

"A very close runner-up to **Writer's Tool**." —CFJ

"Definitely the best—accept no substitutes." —AL

**The Writer's Tool** (OSS) — The leader in 8-bit languages released this product several years ago, and it still remains the favorite of many a user.

"Still my favorite 8-bit word processor, **Writer's Tool** puts many of the ST's programs to shame." —CFJ

## IN ADDITION

**Atari Planetarium** (Atari) — Atari called this product "your window to the universe." Over 1200 stars, 88 constellations, 300-plus deep-sky objects and Halley's Comet are all here. For enthusiasts and casual observers alike.

"A true quality product and excellent in all regards." —LHP

**DiskWiz** (Allen Macroware) — A disk editing repair and duplication package for Atari and Percom disk drives. Other features include hardcopy to any printer, file link trace and block move. **DiskWiz** was followed up by **DiskWiz II**.

"An excellent disk sector editor/copier. I've recovered more than one accidentally deleted file with this program." —CFJ

**Mastertype** (Lightning) — Not simply a game, but one of the most popular educational programs ever.

"The best typing program around and it's a skill that's important for everyone to learn—even more important in the future." —AL

**MidiTrack III** (Hybrid Arts) — A MIDI sequencer with 16 tracks and tape recorder-like operation. Utilizes the 130XE's extra memory to add more note storage capability and other features, as well.

"Somewhat difficult to use and quirky at times, this MIDI sequencer is nonetheless quite powerful. (It also happens to be the only full-featured sequencer for the 8-bit Atari computers, to my knowledge.)" —CFJ

**The Next Step** (Sierra On-Line) — The first major character set designer. It even allows users to modify and create four-color characters.

"We used this extensively to create character sets for our games." —CB

**SpartaDOS 2.3** (ICD) — Very powerful Disk Operating System just under \$40.00; tons of features and easy to use.

"This DOS supports every other DOS format for the 8-bit, is extremely fast and power packed with many helpful utilities." —MR

## HARDWARE

**Axlon 128k Rampower** (Axlon) — This long-gone company turned the Atari 8-bit world on its ear with this (at the time) mind-blowing expansion board.

"Although I own a 130XE with its extra 64K RAM, I still get more use from my original Atari 800 with Axlon RAMdisk installed." —CFJ

**Commodore Video Monitor 1702** (Commodore Business Machines) — What can we say? The competition made great monitors.

"Separate chroma and luminescence inputs make this one of the best monitors you can hook up to an 8-bit Atari." —CB

**Corvus 10-Meg Hard Disk Drive** (Corvus Systems) — A bulky (by today's standards) hard disk, which was the number one hard disk for the lucky few 8-biters having one.

"They stopped making them four years ago; the DOS was a pain to use, and it only worked with old 400s and 800s—but for software development back then, there was nothing to compare." —CB

**Full View 80** (Bit-3) — This board gave any 800 excellent 80-column readability on a monochrome monitor; the board fit into the computer and a wire out the back

plugged into the monitor output on the side. . . all for only \$349.00.

"**Letter Perfect** and the Bit-3 80-column board make my Atari the perfect word processing computer" —MD

**Indus Disk Drive** (Indus Systems) — The company said of their disk drive: "Looks like a Ferrari, drives like a Rolls, and parks like a Beetle." This \$449.00 drive was "hot stuff," although the word processor that came with it wasn't.

"A sleek and mean machine. Unfortunately, the manufacturers are no longer with us." —CW

**MIO Board** (ICD) — This product does it all: up to 1 meg of on-line RAM; printer interface with buffer; RS232 port; hard disk connection; and 80-column capability is on the way.

"The product of the century for the 8-bit Atari is none other than the MIO board from ICD." —MR

"The machine that makes a present-day computer out of the 8-bit Atari." —DFS

**Proburner** (Thompson Electronics) — "This is an EPROM burner cartridge with built-in software. . . great for creating your own cartridges or modifying the OS!" —IC

**RamRod XL/Omnimon/Omniview XL/XE** (Newell Industries) — **RamRod XL** included **OSNXL**, **Fastchip XL** and **Omnimon XL**—three very powerful additions to the 800XL, which were comprised of a revised OS, enhanced floating-point math chip and 80-column upgrade.

"A mother board with a switch to toggle between the old and new OS—no more need for a translator disk! Also provides the **Omnimon** monitor/debugging tool." —IC

"A resident M/L debugger that's even capable of interrupting running programs, **Omnimon** has proven to be an indispensable tool." —CFJ

There you have it—the varied views from the critical commentators. We hope this gives you some insight into the software you'll want to own and use. ☐



## Disk Library

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by **George G. Stepanenko**

There's probably no computer user who hasn't—at one time or another—appreciated the irony in flipping through a pile of disks, mumbling, "Now where did I put that so-and-so file!?" We use computers to manipulate and organize every sort of information, then find that the environment itself is in need of organization. We're constantly losing track of that important resumé, article, letter, program or datafile—whatever is irreplaceable or can only be recreated at a great cost of time or effort. For those who aren't too quick with labels, or who lack a good mental indexing system, a tool like **Disk Library** could be the solution.

The principle behind a disk (file) indexing program is fairly simple: take the filenames from the directory of each disk and put them into one big file—a list. Allow users subsequently sort the list, modify it with additions and deletions, display it or print it, and the program's complete. With good cross-indexing features, speed and ease of use, such a program can turn a chore into a pleasure.

**Disk Library** is good to excellent on all these points. A double-click or keystroke displays a directory of the disk currently in the specified drive (A or B); another determines whether that information will be added to the file, or ignored. It's as simple as that. When a directory is filed, the program automatically sorts it, according to the user's choice. Sorting and resorting criteria are determined by clicking on a standard GEM menu: by name, size, type or date. And another pull-down menu determines whether the screen will display disknames only, folders, files or all. No matter which display is chosen, all information is stored and sorted, so a single point-and-click will change the screen output.

For those who may have wondered what point there was—during the formatting process—in giving the disk a name:

**Disk Library** uses that information for indexing. If a disk has not been named, the program requests a temporary name to identify it. You're warned if that name is not unique, so files won't be over-written. An "option" menu allows you to physically name or rename the disk.

Disk names are displayed in bold, folders in italic, and filenames in normal text. The standard information—name, extender, size, date and time—is shown on the left of the screen. Clicking next to any of the entries brings up a box which displays cross-references and allows for text entry up to forty characters. This text is then display on the right side of the screen, as "comments" that can be toggled on and off. The printed output is also determined by your choice of screen display, so it's easy to generate different lists.

On a 520ST, **Disk Library** allows for approximately 2120 entries and 2150 comments. Each file, disk or folder name takes up one entry. Because this is a memory-based (rather than disk-based) filing system, the maximum will vary, depending on whether any disk accessories have been installed. With a memory-based program, size limitations are inevitable, but you get the benefits of relatively fast and flexible filing and sorting routines. Actually, 2000 entries would generate over thirty pages of printed listings. The manual recommends that you create a number of smaller directories—according to personal methods, and preferences for collecting and storing files and disks—which can be "merged" into one large file.

The recommended procedure is a good idea on two scores: any very large list of similar entries becomes awkward and less useful for quick reference as it grows, and the program gets slower as the number of disks on file increases. Speed is a relative concept: there are no delays in **Disk Library** long enough to send you scurrying off for a cup of coffee, but after the tenth or fifteenth disk, there is evidence of large reorganizations in the ST's memory. The

indexing is certainly much faster than in any disk-based filing program, and the resorting and search features take very little time.

**Disk Library's** manual is one of those which make sense *after* the program has been used a while. As mentioned, the program is very easy to use, and it's surprising that the manual could have so much information, yet so little instruction. All of the features and functions are thoroughly and correctly described, but there is a feeling of distance, as if the programmer explained everything by telephone to the person who wrote the booklet. It's not a drastic problem, just one of those things which leave a vague discomfort in the user's mind.

Is **Disk Library** worth the price? Since it offers the features required for the task at hand—organizing and indexing a disk collection—and implements them fully, quickly, easily and without obvious bugs, one's first reaction is yes. But since it belongs to a class of utilities that might be termed "single-purpose," and won't be used that often, there might be some resistance to it, based on cost. We've already seen utilities like RAMdisks, print spoolers, and spelling checkers fail commercially under the onslaught of public domain programs which do the same things—often, better. The single-purpose programs which do survive in the marketplace are those which do what they promise to do, without unnecessary bells and whistles, and sport a sensible price tag. *ST* owners seem to expect—not unreasonably—software to be in line with the cost of the computer *and* with its "use-full-ness." ☐

*George G. Stepanenko has been an Atari enthusiast since 1981. Having sold computers in a department store, he's been with an Atari-only store for over two years now. He's an original member of Calgary Atari ST user's group and a contributor to their newsletter.*



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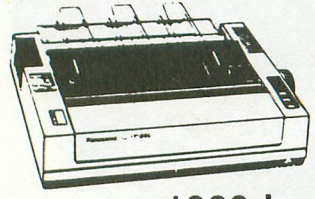
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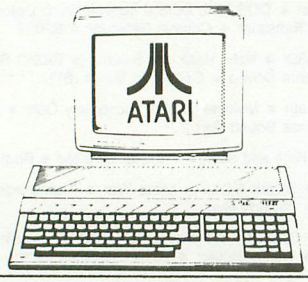
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# TRADE SECRETS

## Part 2 of our survival guide for the novice programmer.

by Clayton Walnum

In Part 1, we covered a lot of general tips that will help you avoid certain nervous disorders common to programmers who've developed bad habits. We also mentioned The Institute for the Incredibly Nervous, a place where programmers who develop these bad habits usually end up. This time around, we'll get into some more detailed debugging techniques. With any luck, once you incorporate these ideas into your programming habits, you'll be able to fire that shrink once and for all. After all, he doesn't need your help to pay for his Rolls Royce; he's got all those Commodore owners banging on his doors.

### More about structure.

Before we get into the debugging techniques, there are a few more things you should keep in mind when writing your code. The first is a hard and fast rule that should never be broken: don't reference REM lines in your code. More specifically, don't point GOTOs and GOSUBs to REM lines. If you do, and later on decide you'd like to delete some of the REMs to increase available memory, you're going to have a horrendous mess on your hands.

Another tip, one that will help you increase the speed of your program, is to keep long FOR...NEXT loops at the top of your code. The further down in your program you place your loops, the longer it'll take for them to run. Try it and see. Load up any long BASIC program you have handy and add these lines:

```
0 GOTO 32600
1 FOR X=1 TO 256: SOUND 0,X,10,10:NEXT
X:END
32600 FOR X=1 TO 256: SOUND 0,X,10,10:N
EXT X:END
```

Run the program. You'll be able to hear the sound register change as the loop goes through all its iterations. Now change Line 0 to the following and rerun the program.

```
0 GOTO 1
```

Hear the difference? The sound loop placed at Line 32600 was located down near the end of your program, so it took much longer to perform its trick than did the one placed at Line 1, right at the top. You can also speed program execution up by keeping the complete loop on one line, as we did in the example.

Keeping loops on one line (when it's possible) is an example of programming style. Good style will help you in every aspect of programming, making your code easy to read and follow. Don't just fill up each line as you go, paying no attention to what you're doing. If you fill each line to its maximum length, you'll have difficulty if you have to add something to the line later on. Use some common sense when you're programming, grouping related items on the same line, not just anything that fits. Look at this example:

```
100 PRINT "HERE ARE SOME NUMBERS":FOR
X=1 TO 10
110 PRINT X:NEXT X:PRINT "HERE ARE MOR
E NUMBERS":FOR X=1 TO 10:PRINT X+10
120 NEXT X
```

What a jumbled mess! There's no logic at all to the way the statements are grouped, plus it ignores the rule about keeping loops together on a single line to increase speed. This is better:

```
100 PRINT "HERE ARE SOME NUMBERS"
110 FOR X=1 TO 10:PRINT X:NEXT X
120 PRINT "HERE ARE MORE NUMBERS"
130 FOR X=1 TO 10:PRINT X+10:NEXT X
```

Hey, that's much nicer, huh? The program's operation is clearer, and, since the program's actions are broken up in a logical way, there's little chance that you'll have to rewrite one of the lines to accommodate a later change. For instance, if we wanted, later on in the program, to perform just the loop in Line 130, we could just GOTO 130. But in the first example? Ouch!

Simply put, you should think of each line of BASIC as a subroutine. Don't let unrelated things clutter it up. Of course, this doesn't mean you should include a long section of single-statement lines just because the statements aren't related. That takes up a lot of extra memory for line numbers. In that situation, it's okay to group the statements on one line. We're using common sense, remember?

### **Birds of a feather.**

And, since we've mentioned subroutines, here's another piece of wisdom: it's a good idea to group your program's subroutines, to place them all together in the same area of your code. Some programmers like to put them at the beginning of the program, using a GOTO to jump over them when the program is run. Others like to put them at the end of the program, out of the way of all the action.

There are advantages and disadvantages to both methods. Putting all the subroutines at the beginning of the program means that they'll run faster. This is because, whenever Atari BASIC encounters a GOSUB instruction, it starts at the first line of your code and reads through until it finds the subroutine. If your subroutines are buried at the end of the program, it'll take BASIC longer to find them when they're called. The disadvantage to putting them at the top of your program is that, even as it speeds up the execution of the subroutines, it slows down the rest of the program. How much it slows down depends on how many lines of subroutines you have.

### **Mini-programs.**

Many times, you'll find yourself having to develop a subroutine that accomplishes something in the background, something the user is unaware of. Maybe it's the solution of a complicated mathematical formula, or maybe you're designing an artificial intelligence routine for a game that requires a computer player. This type of thing, especially if it requires a large amount of code, can be more easily developed if it's written as a mini-program, a freestanding piece of code that can be merged with the main program once it's been completed and debugged. This saves you from having to run the main program and wait for the section you want to test to come into play.

But if you want to use this technique, there are some rules which must be followed. First, the code must not reference any lines that are external to itself; it must be a complete, self-contained unit. Second, the routine should be a subroutine in the BASIC sense, a program section that's called with the GOSUB statement. That way, you don't have to worry about saving space for it somewhere in the middle of the main program. You can just place it wherever you've grouped the rest of your subroutines. The best thing about this technique is that it forces you to think structured programming.

Of course, to stand on its own, your mini-program may require some extra code, program lines that won't appear in the final subroutine. For instance, strings will need to be DIMed, and any data elements the routine expects will have to be initialized. Just add these odds and ends to the beginning of your mini-program and delete them when you're ready to merge it with the main program.

### **Efficient use of time.**

Once you get the first version of your new program typed in, you're going to find out that—no matter how careful you were, no matter how many hours you labored over your program's logic—the computer just doesn't think the way you do.

Let's all say it together and get it out in the open: computers are stupid machines!

There, didn't that feel good? (If not, you haven't done any real programming yet.) They can't do *anything* without help. Like small children, they take everything you say literally, with no common sense applied. This phenomenon gives rise to the ever-popular programmer's scream of frustration: "Do what I want, not what I say!"

The point? Your program—unless it's extremely short—will never run properly the first time around. But you've already figured that out, right? I'm just stating the obvious. What I'm really trying to get at is that, the first time you run your program, there'll be dozens of little problems—problems that don't necessarily affect the program in a fatal way—that you'll want to fix up the instant you see them. Gee, wouldn't that prompt look better if it was centered? Uh-oh . . . look at that misspelling. And that green on red just doesn't cut it.

Don't bother with it yet! Just jot down a quick note and continue on your way. Don't stop the program to fix any bugs until you're forced to. Then go back and fix everything on your list. Your debugging time will be cut in half if you avoid the temptation to jump on those minor corrections right away. And you'll have the satisfaction of knowing that you're making the rules, not the computer. You have to keep those silicon and plastic monstrosities humble, you know. Let them think that they've got you wrapped around their microchips, and you'll never get any peace. (Paranoid? Who, me?)

### **Some debugging techniques.**

Some program bugs are easy to find and fix. Maybe you just have to reposition a line a little, or correct a misspelling. To isolate others will require some cleverness on your part, as well as the ability to recognize certain symptoms of program misbehavior.

In order to locate bugs (program bugs, not those icky things that jump out of corners and make you scream), the first thing you have to do is find out exactly what your program is up to. You need to know what sections of the code are being performed and when they're being performed. In other words, you have to know the program *flow*. Unfortunately, Atari BASIC doesn't supply a trace function; you have to do it the hard way.

The easiest method of tracing program flow is to add print statements to each section you're interested in. Things like this will tell you exactly where your program is at any given time:

```
100 ? "Entering LOAD routine"
110 OPEN #1,4,0,"D:DATAFILE.DAT"
.
.
.
290 CLOSE #1
300 ? "Leaving LOAD routine"
```

Of course, this method won't work well if your program relies on a graphic display, one that won't let you print to the screen without creating intolerable disorder. In that case, you'll either have to live with the messed up screen or step through the program using END statements to stop it at certain intervals. This means reading through a program and placing a STOP or an END statement at the end of the first (in order of execution) section. If the program gets that far without whining, remove the first STOP and place a new one at the beginning of the next section. If the program doesn't end where you've placed the STOP statement, then you know that the flow is incorrect. Little by little, you'll be able to track down your problem.

### Testing variables.

Many times, a bug in your program will boil down to a misbehaving variable. This type of error can be responsible for anything from displaying the wrong score in a game to locking your computer up as tight as Alcatraz. *Anything* can happen if a variable contains an invalid value.

You can check the values of variables in much the same way we checked program flow. We had two methods, remember? The message printing method and the stop-and-go method. The first requires the strategic use of PRINT statements. Wherever you want to check the value of a variable, just print it out:

```
100 ? "Entering LOAD routine"
105 ? "FILE$ = ";FILE$
110 OPEN #1,4,0,FILE$
```

In the above example, we're checking to make sure that FILE\$ contains a valid filename. If we get something that looks like a two-year-old's first typing attempt, we'll know why the file's not opening properly.

We can also use the STOP statement to check the value of a variable. This is especially helpful when we want to find out exactly where a variable is going sour on us. Use the STOP statement to stop the program after each step. When the program stops, examine the contents of the variable by printing its contents in the immediate mode. Then move the STOP statement to the next step and rerun the program.

Analyzing the variables (especially if there are several that may be causing you problems) is a long and meticulous process, but it's the only way you can find out where the problem is.

By the way, you can use your computer's BREAK key to simulate the placing of STOP statements. However, with this method, it's impossible to be sure where you are in the program, unless the computer is staying within a small section of the code. For this reason, using BREAK to analyze variables works best when the program is waiting at a prompt or performing many iterations of a loop.

With either the STOP or BREAK key method, you may be able to jump right back into the program with a GOTO or CONT, and so avoid wading through all the program sections you've already verified.

### The TRAP demon.

Atari BASIC supplies us with a handy instruction that will allow a program to continue running when an error is encountered. I'm talking, of course, about the TRAP statement.

If you should put the line TRAP 400 at the beginning of your program, for example, the next time the program encounters an error (not a logic error necessarily, but the type of error that stops the program dead and prints an error message to the screen), program execution will jump to Line 400. Great, huh?

But what you may not know is that this little bugger sports a double-edged sword. Examine the following code. What do you think will happen?

```
10 TRAP 100
20 N=-1
30 N$(N,N)="A"
```

Give up? You'll get the delightful error message ERROR 12 AT LINE 30.

Now we look up ERROR 12 in our trusty BASIC manual and find out it's a "line not found" error. Huh?! Line 30 doesn't have a GOTO or GOSUB, so how could we possibly come up with an ERROR 12?

The TRAP statement in Line 10 calls for program execution to jump to Line 100 in the event of an error. At Line 30, we try to index a string with a negative number (a major no-no), generating the error. The program then tries to find the nonexistent Line 100. Since BASIC last executed Line 30, it generates the error at that line. Perfectly logical when you think about it, but if you forget this little peculiarity of the TRAP statement, you're going to experience new depths of frustration when it's time to start debugging.

Another problem with TRAP statements is that you don't get a chance to see what error occurred. This is all right when the error is one you were expecting, but, in our above example, the ERROR 12 was really the *second* error. What we need to know (besides the fact that Line 100 is missing) is that our string index value is bad, which should give us an ERROR 3 AT LINE 30.

So, if you're going to take advantage of TRAP statements in your programs, you're going to need a way to check the error code returned. If it's the one you want, you just jump to the line that handles it. If it's not, you need to print out what the error was and stop program execution to correct the problem.

A good way to handle this is to jump to an intermediate error handling routine. Look at this code:

```
10 TRAP 40
20 OPEN #1,4,0,"D:DATAFILE.DAT"
30 INPUT #1,A:GOTO 30
40 CLOSE #1:END
```

This demonstrates one way to use a TRAP statement, as well as the type of problem you might run into if you do. In Line 30, we want to continue reading the file DATAFILE.DAT until we reach the end, but, since we don't really know how big the file might be, we can't use something like a FOR . . . NEXT loop. Instead, we use a TRAP statement so that, when we get to the end of the file, the resultant error 136 (end-of-file error) will cause program execution to continue at Line 40, where the file is closed and the program ends.

But what happens if we accidentally put some string data in the file, buried in with all the numerical input? We'll get an ERROR 8, *not* the error we expected. Unfortunately, the TRAP couldn't care less. All it knows is that an error was encountered. It jumps to Line 40, closes the file and ends

# Trade Secrets *continued*

the program—leaving us completely unaware that, not only was the entire file not read, but we have bad data in the file, as well. The following is a way to get around this problem:

```
10 TRAP 100
20 OPEN #1,4,0,"D:DATAFILE.DAT"
30 GET #1,A:GOTO 30
40 CLOSE #1:END
100 IF PEEK(195)=136 THEN 40
110 ? "ERROR ";PEEK(195);" AT LINE ";P
EEK(186)+256*PEEK(187)
120 END
```

Here, when an error occurs, program execution jumps to Line 100 where we check location 195 (the address where BASIC stores the last error number) to see if we did indeed get to the end of the file (ERROR 136). If the error's correct, then we let Line 40 do its thing. If the error wasn't 136, the error that occurred and the line number (found by the formula  $PEEK(186)+256*PEEK(187)$ ) at which it occurred are printed to the screen, and the program ends.

Once you get your program running properly, you can delete this extra error trapping if you wish (just remember to change all the TRAP statements to point to the right lines). I suggest you leave it in unless you're running out of memory and need the space. You never know.

## Down with the Institute!

Now that you're armed with a slew of new programming techniques—all designed to make your work more enjoyable and frustration free—you need no longer worry about being committed to the Institute for the Incredibly Nervous. The guys in the white coats aren't going to be too happy, but, hey, they've got enough to keep them busy. Every day they're out in programmer land picking up new residents for the Institute, always on the lookout for someone sitting in front of a bludgeoned monitor with a hammer in his hand, mumbling things like, "What's a backup?"

Next time you see those white-coated gentlemen just wave and smile. And say "hi" for me. **A**

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# ST notes

by D.F. Scott

## Newsworthy happenings in the ST world.

### The Return of the Brothers Carlston.

After a wait of two years, to see if the ST was going to be a success, Broderbund—the software company built by Gary and Douglas Carlston, whose roots are linked to the former Adventure International and Synapse companies—is finally waving the ST banner. That banner is printed, one might imagine, with the aid of **The Print Shop**; and authors David Balsam and Martin Kahn are writing the ST version of that program from byte 1, for a GEM-based program with a new “look-and-feel.”

As Broderbund marches cheerfully into the ST's parade of developers, the spectators are shouting, “What took you so long?” We voiced that question to Broderbund's Western Regional Ambassador, Carri J. O'Loughlin, who states she feels ST product development caused the delay: “Every time we go to a show, everyone says, ‘What are you doing for the ST?’ That was the most common question; and our salespeople were all saying, ‘Uh...uh...’ We couldn't talk about things because they were in development. We're not supposed to talk about things until two months before they're released.”

With three of the four new ST products in Broderbund's line having been produced *outside* the company, we might assume there's more in the lab we don't know about yet. The **Art/Film Director** package was developed by Andromeda Software (at one point, apparently, they were to be Mirrorsoft products, but somehow that

changed), and **Karateka** is being ported over by Jordan Mechner, also an author for Andromeda. Andromeda is the company that produced the ST version of **Crystal Castles** for Atari.

“The reason we don't talk about developments in advance,” divulges O'Loughlin, “is because sometimes things happen and the product isn't released. We had one for the IBM, and we ended up never doing the product. It's embarrassing when that happens.” O'Loughlin said projects could be cancelled because sales projections do not exceed production costs.

The beta-test version of the ST **Print Shop** suggests Broderbund won't get into any conflicts with other companies over visual copyrights. Utilizing GEM, specific border or clip-art items can be selected *pictorially*, not by name, from a “toolbox” window, then placed into the GEM clipboard. From there, one may use visual layout techniques to create the page piece by piece, rather than give the program directions and have it conjure up the result internally.

**Art Director** resembles **Neo-Chrome**—more accurately, it *mimics*. **Neo**, even in the use of the half-page functions box and magnifier window. The differences lie in the special effects department, where **Art Director** may execute repetitive “pastes” of a “cut” object when the user holds the mouse down and drags it. The program also allows warping of the image, by producing imitation “bulges” in or out of the art. Another unique feature draws in the background a 3D perspective grid, with vanishing points to aid in the

drawing of realistic objects. **Film Director** utilizes backdrops and cels created with **Art Director**, and perhaps music, for cartoon-type cel animation.

Jordan Mechner's **Karateka** for the ST, although yet *another* karate program, appears very fluidly executed. Game play and premise are identical to its 8-bit predecessors, but the animation of the martial arts characters—including the female “victim” fans have nicknamed “Loni Anderson”—are proportionate figures, appearing more like humans than bean bags or jumping beetles.

But are Broderbund's initial offerings just uniform drops in an already-full bucket of the same substance? Or is the word/data-processing market too saturated itself to re-enter with a modified **Bank Street** product line? Says O'Loughlin, “Our philosophy is: if we can do something better than what's out there, we do it. We just put out a typing program [Typei] for—right now—Apple, IBM and Commodore. There are ten million typing programs out there, but we feel ours is significantly better, and we did it.”

This reporter informed O'Loughlin that what the world needs now is a *real* space game, with explorative strategies and tactical maneuvering. Will future development be put on hold until higher ST sales figures manifest themselves? Says O'Loughlin, “We'll probably put them out and see how they do, but we have pretty high hopes for that machine. We feel it could be the next Commodore. It's so powerful and inexpensive that the average user is going to want it.” //

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## // ST notes *continued*

### Now: "HabaView II" . . . without Haba!

The news that Regent Software is producing another database management system may be met with about as much enthusiasm as Elizabeth Taylor's getting married. While Regent's Frank Cohen is working on his new relational **Regent Base v2.0**, **HabaView** author Richard Skraly is upgrading that item—or, shall we say, *overhauling* it—to create a new heirarchical storage/retrieval database system. To be called **The Informer**, Cohen describes it as "light-years ahead of the old **HabaView**. Not only does it show you the typical **HabaView** stuff, but it also uses graphics on the screen, and it prints out to more major printers.

"**HabaView** has a file-size limit; this doesn't. **HabaView** isn't multi-table, where **The Informer** is—you can have four tables at once in memory; you can link (not relationally) points from one table to another."

Specific tabular items can be given minimum/maximum values; the math extension feature can compute these tables as spreadsheet columns.

Cohen says **The Informer** will also generate sublists: "If you want to generate a smaller database from a bigger one, you can say, 'Show me all the people who live in California,' and it'll show you that list. Once you create a sublist, you can edit that sublist." Sublists can also be generated by extracting all data which meet a

particular condition, or relate to each other in a way that can be represented mathematically, using a floating-point math routine. It is an introduction of relational elements into a heirarchical database; still, Cohen would contend, that doesn't make **The Informer** a true relational database.

Data is plotted to the screen in a spreadsheet fashion, so records may be referred to in rows and columns. The program may be, however, one of the first to utilize data that may be drawn in. Graphics from **DEGAS** or **Neo-Chrome** may be imported into **The Informer**, for use as artistic decoration of the "form" the records are plotted into, or as raster blocks to be treated as records. Straight data may also be imported from **HabaView**, **Regent Base**, or Versasoft's **dBMan**.

**The Informer** will also include a custom reports generator, plus the capability to generate mail merge files for **Regent Word II**. Projected list price is \$99.95, though **HabaView** disks should get a \$20 credit toward a mail-order purchase of **The Informer** through Regent. Demo disks will be available for \$20, also redeemable through Regent for a \$20 credit. //

### Batteries Updated.

Every month, we learn a bit more of the absorption of the Batteries Included brand by Electronic Arts. It seems EA has been wondering whether they should keep the name under their

banner, or market BI's products under the EA logo. EA initiated a nationwide telephone survey of registered BI product owners. Apparently, the results were that the name should be kept.

EA's President Trip Hawkins, in a national conference over CompuServe, conducted by Richard Rea of its Amiga Forum, has admitted that several products announced originally for release by BI were barely started, or "were never even in development."

Hawkins pledged continued support for BI mainliners like **PaperClip**, but, in response to a question from Atari Marketing Communications Director Neil Harris about whether EA will augment support of the Atari 8-bit product line, Hawkins answered, "We are working with some companies now, like DataSoft, that are supporting 8-bit Atari. . . but as for EA, I'm afraid I can't be very encouraging. We came out with a fair number of 8-bit programs last year, and the sales were awful."

On the gaming end, Hawkins mentions the fact that **Marble Madness** is still in the development stage, as well as a possible port-over of Bill Budge's **Pinball Construction Set** to the ST, and a two-player-via-modem version of **Arcticfox**. EA may have announced by press time new products, to be released under the BI banner, at the Chicago Consumer Electronics Show.

Those are the **notes** for this month. I'll see you on Delphi. //



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