NO. 47
OCTOBER 1986

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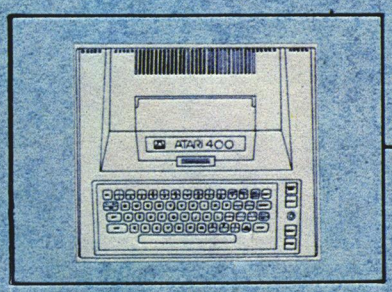
THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

ANALOG COMPUTING



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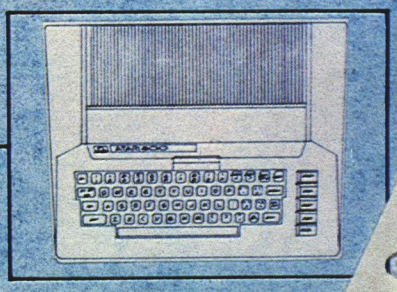

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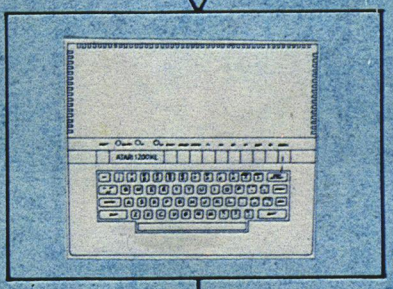
A tutorial on DLIs
Deathzone



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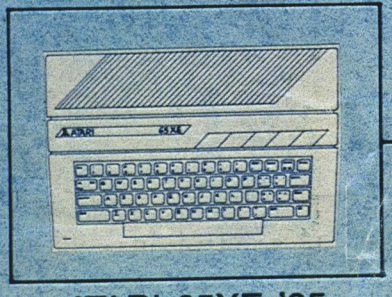

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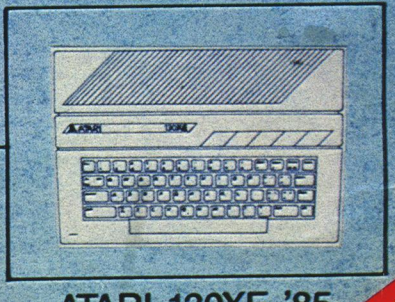

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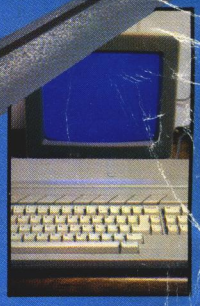

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THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

ANALOG COMPUTING

P.O. BOX 23, WORCESTER, MA 01603

NO. 47 OCTOBER 1986

THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

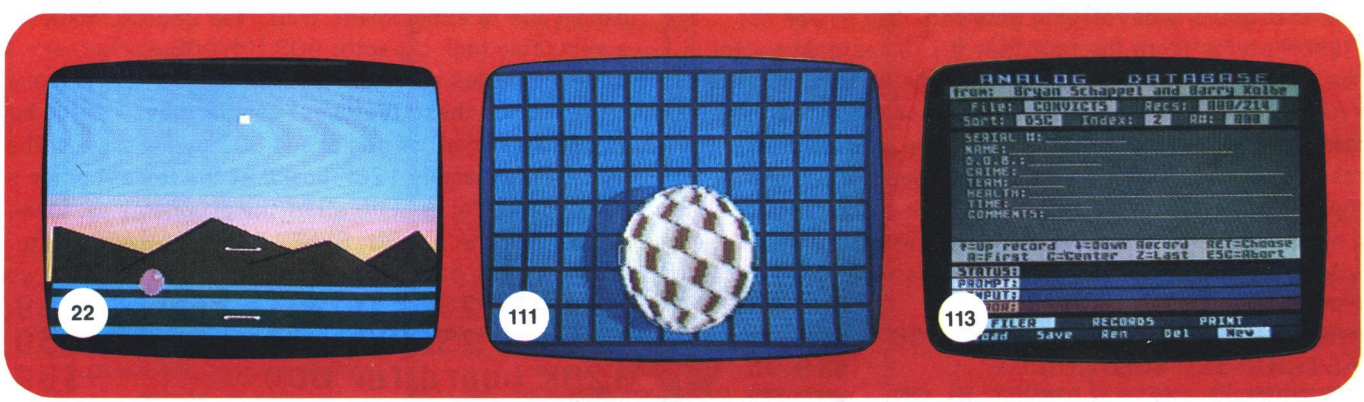
ANALOG COMPUTING™

FEATURES

FEATURES *continued*

REVIEWS

COLUMNS



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```
PC NV-BDIZC AC X  Y  SP
EAF3  FE    01 FE 31 1F3
```

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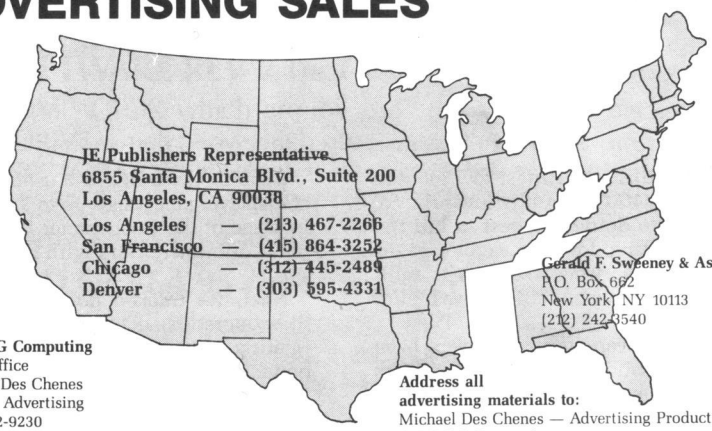

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Editorial

We've heard it all the past few months —how **ANALOG Computing** loves the ST so much we're doing our best to kill the 8-bit line, cutting down on regular pages and running **Paperweight** in issue 41, with a "self-destruct vector" (that was pure fiction).

One reader even says our covers have suggested (to him) Atari 8-bit computers being hacked apart, dissolving, or shrinking into oblivion. Our intent was to present graphically interesting covers; that's *all*. We've addressed the 8-bit page count and **Paperweight** before, so I won't waste time on them now. What I'm leading up to is this month's theme. Here's a hint. It's *not* the ST.

This "special" issue contains, I think, some of the best articles and programs we've run. Ever. It begins with Jonathan David Farley's **DLI's: A minute to learn**, probably the best piece on display list interrupts you'll ever run across. If your thoughts on DLIs are negative, here's a chance to overcome them.

Our feature game is **Deathzone**, and it's a killer. There are similar games on the market, but not at this price.

Midwest Editor Matthew Ratcliff took some time during the hectic Summer CES to nab XE Product Manager John Skruch from the busy Atari display. It was an informative session.

There's also an interview with Doug Neubauer. Who's he? You certainly know his achievements. He's the designer of the POKEY chip and the author of **Star Raiders**. Doug went back in memory to recall for us the Atari computer division's genesis —back in its heyday.

DiskFile gives DOS 2.5 users the option of displaying messages up to 32 bytes long, in place of the 11-character filename normally allowed . . . and with no loss of disk space!

Next, we tracked down the author of those incredible demos you may have seen floating around these past months: the bouncing ball, flying swan and spinning Atari logo. He shares his wit and talent with all of us.

If you rarely type in a program from these pages, make this one of those occasions. We thank Bryan Schappel and Barry Kolbe (also authors of **Clash of the Kings**, issue 40) for sharing **The ANALOG Database** with our readers. It's one of the finest we've seen, even among the offerings on the open market.

Finally, **Bits & Pieces** and **Boot Camp** fans shouldn't fret; they'll be back next month, when we'll have a look at peripherals—and a few surprises.

Our ST Programming Contest is underway. . .We're giving away a $5,000.00 first prize, for the best program received by year's end, as judged by our editors.

A second prize of $2,500.00 will be awarded, along with $1,000.00 for third place, and three honorable mentions of $500.00 each. Judging will take place through the first quarter of 1987.

How can you increase your chances of winning? There are two major criteria for judging—originality and, equally important, quality of execution. You can enter more than one submission; however, one outstanding project (rather than several of lesser standards) is the key.

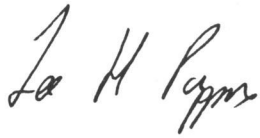
All categories are welcome, and programs (in any language) may or may not utilize the GEM environment. Check the rules (page 48) for more information.

Several readers are upset with our policy of putting in an occasional article with listing(s) available only to disk subscribers. Why do we do this?

ANALOG Computing gets an incredible number of submissions every week. Sometimes we get an excellent program that's just too long to print. If it goes back to the author, there's a chance no one will ever see it. So we make it available to the Atari community, by printing the text and putting the listings on disk.

Some accuse us of using this tactic as a ploy to force them to subcribe on disk. That's *not* the idea; in fact, these "bonus" programs are made available on services such as Delphi for downloading, and, later, to user groups and BBSs.

We're trying to disseminate as much information as possible. Quality articles, tutorials, reviews and programs have always been an **ANALOG Computing** hallmark, and we're not about to change things.



Lee H. Pappas
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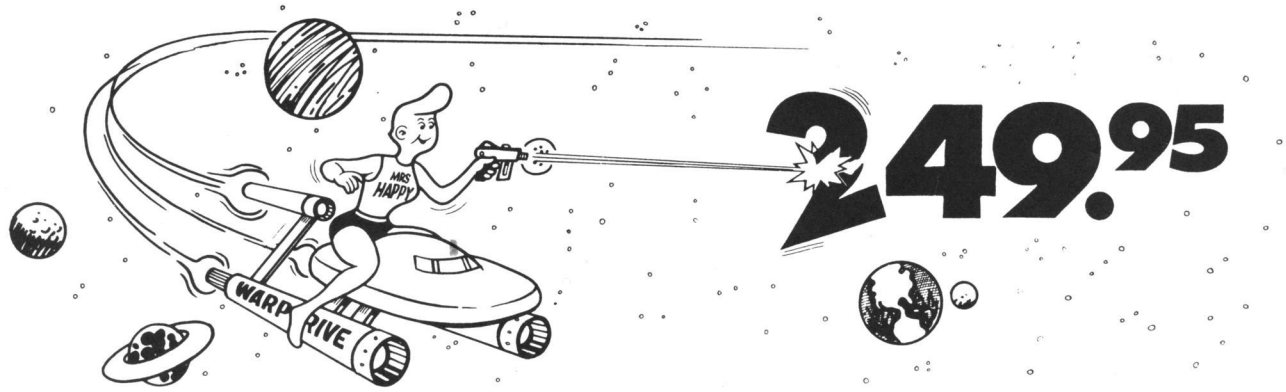

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Reader comment

Photo mixup.

In issue 46, photos of the games **Computer Baseball** (SSI) and **MicroLeague Baseball** (Micro League Sports Association) appeared on the page 94-95 spread, in their separate reviews. If you looked closely, you may have noticed that the pictures were swapped.

The SSI photo appeared on page 95 with our **MicroLeague** review, while the **MicroLeague** picture was printed on page 94's portion of **Panak strikes!**. Oops—we apologize.

Refinements of Barboz.

Kudos to Chris Smith on his fine adventure game **Treasures of Barboz** from issue 41. I had many hours of—often frustrating—fun with his puzzle. Unfortunately, in the course of playing, I discovered three major errors which make it possible to either cheat or be cheated by the game.

If you drop the amulet in the treasure room, leave, then magically call back the amulet, your score is unchanged. Doing this repeatedly, you could accumulate undeserved treasure. Change Line 325 to:

```
325 CL$=M$(Q,Q+C17):X=USR(
LOOK,CL8,ADR("c"),C10):CL$
(X+C8,X+C8)="?":GOSUB 27:I
F Q=109 THEN TREASURE=TREA
SURE-1
```

Now, if you drop the amulet in the treasure room with the command *SAY BARBOZ*, your score is unchanged. The command *GET AMULET* will then cause you to lose one treasure. Having this happen even once makes it impossible to win. To fix this problem, enter:

```
304 ? "Something you're ho
lding gets hot!":ST$(Y,Y)=
"?":CL$(X+C8,X+C8)=N$:A$=C
L$(C1,C1):IF A$<>"G" THEN
28
305 TREASURE=TREASURE+1:GO
TO 28
```

The third problem requires a more complicated solution. The command *CHOP BOULDERS*, when given at the right time, will reveal a huge diamond. Unfortunately, nothing in the program prevents the player from doing this repeatedly and collecting large numbers of huge diamonds. The following lines correct the problem:

```
142 ? #C1;A$:? #C1;BOOK:?
#C1;COIN:? #C1;NUGGET:? #C
1;PAN:? #C1;TREASURE:? #C1
;WEAR:? #C1;DIAMOND
266 X=USR(LOOK,CL8,ADR("?"
),C10):IF X=C0 OR DIAMOND
THEN 265
267 CL$(X+C8,X+C8)="g":? "
A boulder split wide open!
":DIAMOND=1:POP :GOTO 117
392 RESTORE 419:READ FLAG,
BOOK,COIN,NUGGET,PAN,TREAS
URE,WEAR,DIAMOND
406 INPUT #C1,COIN:INPUT #
C1,NUGGET:INPUT #C1,PAN:IN
PUT #C1,TREASURE:INPUT #C1
,WEAR:INPUT #C1,DIAMOND:CL
OSE #C1
419 DATA 0,0,0,0,0,0,0,0
```

This final solution does *create* one problem. Games previously saved cannot be recalled with this improved version.

Sincerely,
Clinton Branch
Merritt Island, FL

Home Shopper fix.

After playing around with the program **Home Shopper** (issue 43), I found a small bug in the SHOPEDIT listing. To fix the bug, you need to change Line 320 to:

```
320 IF DATLIN>=A+20 THEN C
=I:? :GOTO 370
```

This minor change should take care of the problem of the missing data line. Without this, one data line is written over another—and you can lose information.

Sincerely,
Kathy Arnold
Cannon, AFB, NM

Search MicroCheck.

While reading issue 44 of **ANALOG Computing**, I was excited to see a "memo search" routine for **MicroCheck** (issues 27 and 28). The memo search really improves the **MicroCheck** program.

I did find one problem with the memo search. The memo entry will not clear from memo block when you respond with *N* after the prompt *Are the entries correct?* Just changing Line 990 and adding Line 991 will correct the problem.

```
990 POSITION 9,13:? B$(31)
:POSITION 9,14:? B$(31):PO
SITION 20,13:? B$(23):POSI
TION K0,19:? B$(19)
991 POSITION 20,14:? B$(23
):GOTO 940
```

I want to thank you for providing readers with useful home management programs. I also want to thank all the readers for making improvements on programs provided by **ANALOG Computing**.

Dave Myers
Washington, DC

More Print from JACS.

After reading issue 43's **End User**, I am compelled to add to the "Print Shop De-

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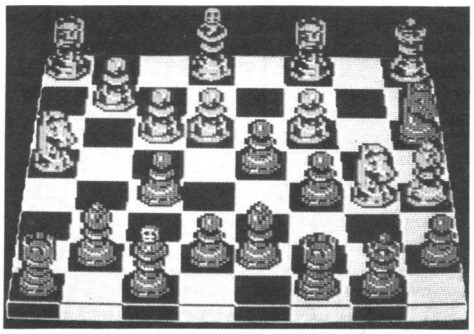
8-bit news!

WORLD CLASS CHESS

The **Chessmaster 2000** is touted as "the most powerful chess program in the world today—and the friendliest!" It draws from an opening library of over 71,000 moves and, in mid-game, is said to display amazing combinations of classical and modern strategy.



Twelve different levels of play are offered, along with "easy" and "teach" modes. Hints are available suggesting possible moves, and you can also take moves back. **Chessmaster 2000** even allows two people to play while the computer referees the game.

Priced at $39.95, available from Software Country, 9713 Santa Monica Boulevard, Suite 204, Beverly Hills, CA 90210 — (213) 278-8450.

CIRCLE #128 ON READER SERVICE CARD

THE BUSINESS MANAGER

This software package allows you to track customers, sales, taxes, inventory and earnings; print invoices, statements and mailing labels—all from an easy-to-use, icon-based program.

The main menu lets you select from your company's information, including tax numbers, invoice messages, company mailing labels, a company report generator, and product data, including cost and inventory. Other selections you may find convenient consist of: a utility file, allowing you to create your own customer and product disks; and a customer record-keeping file, as well as a function for invoice printing.

The Business Manager is designed to operate with one or two drives, up to 128K and **The Rat** version of a mouse.

The program comes with full documentation for $49.95. Reeve Software, 29W150 Old Farm Lane, Warrenville, IL 60555 — (312) 393-2317.

CIRCLE #175 ON READER SERVICE CARD

8-BIT DATABASE

Micromod 3.0 is a powerful new database which supports one or more drives, a hard disk and a printer. Some of its features are: a directory filer for mailing labels, customer information, address sorting and more; point-of-sale invoicing with a time-billing option, stock update option, and billing and continuous statement options; a date/records manager with functions for general ledgers, accounts receivable, accounts payable, spreadsheet/calendar graphs, statements and scheduling.

A text processor and directory filer are included, too. Customizing for individual needs is also available from the publisher at additional cost.

Micromod 3.0 retails for $179.95, and is supported by a 408-page manual, upgrade policy and technical assistance by phone. For additional information, contact MicroMiser Software, 1635-A Holden Avenue, Orlando, FL 32809 — (305) 857-6014.

CIRCLE #106 ON READER SERVICE CARD

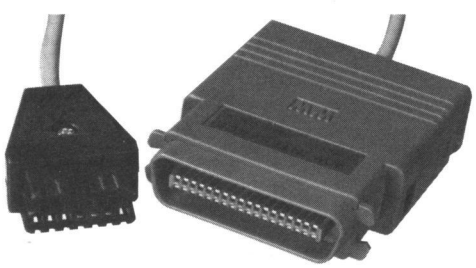
NEW COMPACT PARALLEL PRINTER INTERFACE

The **Interface 72000** permits easy connection of a Centronics-type printer to your computer. You simply plug it into the serial port.

There's no additional power supply needed; the complete interface, which includes 5 feet of cable, is ready to use.

Retailing for $59.00. Contact Wolfgang Guertzgen, 6925 Rosemead Blvd., #24, San Gabriel, CA 91775 — (818) 285-3121.

CIRCLE #109 ON READER SERVICE CARD



OTHER NEWS

Osborne/McGraw-Hill has released Lance A. Leventhal's ***6502 Assembly Language Programming, Second Edition***. This revised version covers the 6502C chip, along with the 6502, and details each of their instructions.

Numerous examples, flow charts, source and object codes, and explanations illustrate a range of techniques, from simple memory loops to complete design projects.

The 650-page book sells for $19.95. From Osborne/McGraw-Hill, 2600 Tenth Street, Berkeley, CA 94710 — (415) 548-2805.

CIRCLE #168 ON READER SERVICE CARD

■ ■ ■

XLent Software recently announced the release of **Miniature Golf Plus**, a game offering a nine-hole golf course—and the option to design your own custom screens.

Stationary and moving objects hinder your progress, as you and up to seven other players compete. The game realistically simulates gravity, friction and the physics of the real thing. As many as sixty different holes can be saved on one disk. This arcade-style game was written by David Plotkin, whose articles are frequently seen in our pages.

For $29.95. XLent Software, P.O. Box 5228, Springfield, VA 22150 — (703) 644-8881.

CIRCLE #172 ON READER SERVICE CARD

■ ■ ■

A new program gives you the ability to handicap professional football games, with information from the paper's sports section.

In five minutes, enter the data for a statistical analysis to predict winner, point spread and total points in a game. Its maker claims 65- to 70-percent accuracy for $39.95 (plus $2.00 shipping and handling). Software Exchange, P.O. Box 5382, West Bloomfield, MI 48033 — (313) 626-7208.

CIRCLE #165 ON READER SERVICE CARD

■ ■ ■

Not into football? How about throughbred and harness racing? **Enhanced Horseracing Handicapping** is a three-program set of forecasts and a Wager Return Analysis.

Available on disk or cassette, the program performs analysis, outputs ratings, and sorts and orders the favorites. Win, place and show finishes, as well as percentage gains, are indicated, and can be displayed on a printer.

Cost is $49.95 (plus $2.00 shipping and handling). The Softtech Group, P.O. Box 582, Keego Harbor, MI 48033 — (313) 851-5925.

CIRCLE #185 ON READER SERVICE CARD

light" paragraphs. Since he did mention Tom Pazel's utility programs (which are *great*), I think it only be fair to let your readers know of our **Print Shop** graphics disks, volumes I, II and III.

These disks have been compiled by the Jersey Atari Computer Society, and consist of graphics that we and other user groups nationwide have contributed to.

This idea was conceived by Irv Feinberg and myself, and has been very successful for us. We send a finished disk and icon page to any user group, for $10.00 each. They then copy the disk and sell it to their members. This keeps the clubs alive financially.

I feel it important that your readers know these icon disks exist and are available from us, the Jersey Atari Computer Society, for only $10.00.

The address is: **Print Shop Graphics Disks**, c/o Jersey Atari Computer Society, P.O. Box 710, Clementon, NJ 08021. Please include $10.00 for each volume, and make checks payable to JACS.

Thanks for the ear.

Bob Whipple
President, JACS

Learning our ABCs.

In reading the review of the Advan BASIC Compiler in your August 1986 issue (45), I was greatly dismayed to find it referred to as the *ABC*. As you and some of your readers probably know, ABC BASIC Compiler is a product and trademark of Monarch Data Systems, Inc. I can only assume the author was unaware of our product and used *ABC* unintentionally.

Our ABC Compiler compiles existing Atari BASIC SAVE files into compact, efficient p-code and runs on all Atari home computers of at least 40K memory. While ABC does not support floating point operations, it *does* support 3-byte integers, resulting in a value range both large enough for most applications and fast enough for professional results. The string handling in our later versions is identical to Atari BASIC, so embedding player/missiles in strings works without change. Our compiler has been sold for almost four years now, was reviewed in your issue 11, and is still in production as revision 1.04.

We would be glad to offer information about the ABC BASIC Compiler to any of your readers by having them send a self-addressed, stamped envelope to our address. Thank you in advance for understanding our concern.

Sincerely yours,
H. Jeff Goldberg, President
Monarch Data Systems, Inc.
Sullivan Terrace
Framingham, MA 01701

It was, we're afraid, a case of editor's (not author's) memory lapse. Our sincere apologies. —*Ed.*

1st Word without form feeds.

In issue 42, Arthur Leyenberger complained of the "page eject" feature in **1st Word** word processor (see **Word Processing on the Atari 520ST**). The first form feed makes it difficult to use letterhead stationary and impossible to address envelopes and cannot be suppressed with the printer driver supplied.

Driven by frustration, I found a simple solution. (1) Copy **1st Word** to a new disk —the whole thing. (2) Use a disk editor (I used **Hippo Disk Utilities**) to find 1st Print.Dot. (3) In the first sector, byte 43 is *0C*—aka *12* decimal, aka *CTL-L*, aka *form feed*. Change this to *00* and save the change.

Now we have a printer driver that will do *no* form feeds whatsoever, but is very good for single-page letters and will address envelopes if the "paper out" switch on the printer is blocked with a 3x5 card.

Perhaps other readers can find more elegant solutions to this problem.

Sincerely,
Deil Bland
Stone Mountain, GA

No double precision?

I purchased a 520ST last September, with ST BASIC and LOGO. I have one complaint against the ST BASIC: it won't produce double-precision numbers as it says it will in the ST BASIC Sourcebook supplied with the computer by Atari.

I have tried the DEFDBL statement, in combination with other statements, a multitude of ways, but ST BASIC will only produce single-precision numbers. In double-precision arithmetic, DEFDBL is supposed to produce floating-point numbers out to $\pm 10^{38}$, but it will only produce single-precision floating-point numbers out to $\pm 10^{17}$. However, when DEFDBL is selected and floating-point numbers are produced, a *D* appears in the printout and there are three digits in the exponent, the first being a zero. Is the ST BASIC disk that I have defective, or is there a special program procedure in order to access double-precision numbers? There is none outlined in the ST BASIC Sourcebook.

Also, is it possible to use a machine code language routine, or a function routine, in order to produce higher digital accuracy in mathematical computations—i.e., up to 32-digit accuracy out to $\pm 10^{308}$?

One last question: is there a compiler for ST BASIC in the planning and production stages? I appreciate any help you can offer in answer to my questions.

Thank you,
Roger C. Gibson, Major, USAFR, Ret.
Seattle, WA

No, your copy of ST BASIC isn't defective. Double-precision floating-point numbers aren't implemented in this version of the language. For some reason, the reference to them in the BASIC manual wasn't removed.

If you know 68000 assembly language, there's no reason you couldn't put together your own math routines, using the CALL command to access them, but you may find it more trouble than it's worth. TOS, unlike the OS for 8-bit machines, doesn't supply a floating-point package. You'll have to do all the work yourself. If you're interested in this sort of thing, check out Volume 2 of The Art of Programming, Seminumerical Algorithms, *by Donald Knuth.*

And, yes, there are several BASIC compilers for the ST. There's ***Fast/BASIC-M*** *from Philon, Inc., 641 Ave. of the Americas, New York, NY 10011 (see this month's review in* ***ST-Log****),* ***LDW BASIC Compiler*** *by Logical Design Works, Inc., 780 Trimble Rd., Ste. 205, San Jose, CA 95131 and* ***Softworks BASIC*** *by Softworks Limited, 2944 N. Broadway, Chicago, IL 60657.* —*Ed.*

VIP Professional with TOS in ROM.

In response to Matthew Ratcliff's article, **The West Coast Computer Faire**, in issue 45 of **ANALOG Computing**—there *is* a solution to running the **VIP Professional** on an ST system with TOS in ROM.

Do not boot the system with the VIP program disk. Instead, use a disk such as the one you store your VIP templates on. After booting to the desktop, remove this disk and insert your VIP program disk, open the AUTO folder and run the PROFESS. PRG. The program will now run properly and, with TOS in ROM, give you over 80K for spreadsheets rather than 20K.

It's not the mouse version as promised by VIP Technologies, but it'll do for now.

Mike Lange,
Wise Products Co.
Princeton, IL

A full report on *Consumer Reports*.

About the issue 42 **End User** column . . . I have been a subscriber to the Consumers Union magazine *Consumer Reports* since January 1972. Like Arthur Leyenberger, I too was angered over their recent treatment of the 520ST (which, along with the Commodore Amiga, was lumped under the heading "Looking for a high-tech doorstop?" in the February 1986 issue).

By their own admission, "on shopping trips just before Christmas we found a number of games and word-processing programs for the Atari, so we have begun looking at this machine in earnest. We have yet to find anything to do with the Commodore Amiga." Does that statement make the 520ST deserving of the title "doorstop"? Full reports on both the 520ST and the Commodore Amiga are slated for an upcoming issue.

Concerning the 8-bit Ataris, however, please give credit where credit is due. In

March and September of 1985, *Consumer Reports* published reader surveys which gave high marks to the **AtariWriter** word processing cartridge. (I'm assuming these are the issues Arthur Leyenberger was referring to in **End User**—"in 1985, they pronounced **AtariWriter** the best word processor for home use.") Prior issues did not, however, preach "the Commodore dogma with nary a mention of the Atari 8-bit computer." In September 1983, the Atari 800 was judged by CU to be a good "learning computer," its chief drawback being the limitations of Atari BASIC. In that same issue, the Commodore 64 was lumped into the "Also-Rans" category, because of poor software support. The following month, after testing the recently introduced **AtariWriter** cartridge, the Atari 800 was judged to be a good low-cost computer for word processing.

In February 1984, the humble Atari 600XL, 1010 cassette recorder, 1027 printer and **AtariWriter** combo was CU's first choice for word processing, over the TRS-80 Color Computer 2, Coleco Adam and Commodore 64 (poor software support again being the downfall of the C-64).

In an October 1984 update, the 800XL was tested and (naturally) preferred for word processing, *if* a tape drive was used for storage. The 1050 drive added so much to system cost at the time, it was recommended you consider models such as the IBM PCjr or the Apple IIc, if you wanted a system with a disk drive. By this time, PaperClip and Speedscript were out for the C-64, and the usefulness of both programs was mentioned in that report.

The Atari 800XL system was still preferred, however, on the strength of the typewriter-quality print produced by the 1027, and the Atari's superior screen display. In that issue, by the way, word processing was referred to as "the single most important application of computers in the home."

In November 1984, the Atari 800XL system was one of CU's "Best Buy" holiday gifts, "our first choice for an all-around home computer system." Curiously, the accompanying photograph showed an Atari 800XL, a 1027 printer and the 1050 disk drive, as opposed to the recommended 1010 cassette recorder.

In short, *Consumer Reports* isn't perfect. I was particularly angered to see no mention of the 130XE as an alternative to the Commodore C128 in their February issue. The author of that article should be inserted into a disk drive and formatted, preferably in double density. But neither has *Consumer Reports* ignored the obvious advantages of an Atari home computer in past issues.

Sincerely,
Bill Hicks
Newport News, VA

Send your letters to:

Reader comment

P.O. Box 23
Worcester, MA 01603

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 **ANALOG 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 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*, on page 31.

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:CHKS
   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$(A)="S" THEN 120
FD 90 TRAP 430:OPEN #2,4,0,F1$:TRAP 110
HQ 100 FOR X=1 TO 16:GET #2,A:NEXT X:LINE
   =LINE+10:GOTO 100
WM 110 CLOSE #2:OPEN #2,9,0,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)="N" 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:? "NOW ON
   LINE: ";LINE:CHKSUM=0
GH 180 L1=3:FOR X=1 TO 16:POSITION 13*(X<
   10)+12*(X>9),X+2:POKE 752,0:? "BYTE #"
   ;X;": ";:GOSUB 310
KH 190 IF EDIT AND L=0 THEN BYTE=BF(X):GO
   TO 210
FY 200 BYTE=VAL(N$)
OZ 201 MOD$=N$
BU 210 POSITION 22,X+2:? BYTE;"  "
YZ 220 BF(X)=BYTE:CHKSUM=CHKSUM+BYTE*X:IF
    CHKSUM>9999 THEN CHKSUM=CHKSUM-10000
MS 230 NEXT X:CHKSUM=CHKSUM+LINE:IF CHKSU
   M>9999 THEN CHKSUM=CHKSUM-10000
IG 240 POSITION 12,X+2:POKE 752,0:? "CHEC
   KSUM: ";:L1=4:GOSUB 310
EW 250 IF EDIT AND L=0 THEN 270
AM 260 C=VAL(N$)
SY 270 POSITION 22,X+2:? C;"   "
IL 280 IF C=CHKSUM THEN 300
DI 290 GOSUB 440:EDIT=1:CHKSUM=0:GOTO 180
LW 300 FOR X=1 TO 16:PUT #2,BF(X):NEXT X:
   LINE=LINE+10:EDIT=0:GOTO 170
FV 310 L=0
LG 320 GOSUB 500:IF A=ASC("Q") AND X=1 AN
   D  NOT EDIT THEN 420
PO 330 IF A<>RETRN AND A<>BACKSP AND (A<4
   8 OR A>57)  THEN 320
DX 331 IF A=RETRN AND N$="" 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
DW 350 IF A=RETRN THEN POKE 752,1:? " ":R
   ETURN
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>L1 THEN A=RETRN:GOTO 35
   0
WX 410 N$(L)=CHR$(A):? CHR$(A);:GOTO 320
KN 420 GRAPHICS 0:END
YT 430 GOSUB 440:POSITION 10,10:? "NO SUC
   H FILE!":FOR X=1 TO 1000:NEXT X:CLOSE
   #2:GOTO 30
FD 440 POKE 710,48: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
   ,112:POKE 559,0:POKE 710,4
XR 460 DL=PEEK(560)+256*PEEK(561)+4:POKE
   DL-1,70:POKE DL+2,6
HW 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
ZW 480 POKE DL+41,65:POKE DL+42,PEEK(560)
   :POKE DL+43,PEEK(561):POKE 87,0
AC 490 POSITION 2,0:? "analog #1 editor":
   POKE 559,34:RETURN
WZ 500 OPEN #1,4,0,"K:":GET #1,A:CLOSE #1
   :RETURN
```

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DLIs

A minute to learn

by Jonathan David Farley

A wise author of a technical article (mainly, myself) once cautioned, "Highly technical jargon will always drive even your boldest readers straight up the trunks of any nearby trees." *Id est*, novices run from big words in books and magazines faster than disks from lodestones. Display list interrupts, or DLIs, however, shouldn't frighten an experienced programmer like yourself away from this month's **ANALOG Computing**.

Yes, I admit that whoever coined the term *display list interrupts* just might've made it a little more self-explanatory (or perhaps a tad shorter), so as to eliminate the need for articles such as this, but, alas, the party involved did not. That's what I'm here for, anyway—to show, tell and explain to you all there is (that I know) about these elusive, conducive, cybernetic creatures controlled via computer (and keyboard), using little or no alliteration.

Now that the introduction to this piece is done, you may ask with impunity, "What's a DLI?" I'm glad you did; a DLI is an interruption in the display list. You may ask, "What's a display list?" (Go on, ask.) Luckily for you, I have the answer; unfortunately, it's rather involved.

Watching TV.

The display list has, of course, something to do with the display produced by your TV set or monitor. Hence, to understand DLIs, you must understand your TV (or monitor). If you've ever examined the screen in a wild paroxysm of curiosity, you may have noticed it's composed of a myriad of diminutive dots. (If you've never, ever scrutinized the display, I'll wait while you do.) Each of these screen specks emits a specific color, and, from a distance, all of them form the image you see. (This operates along the same lines as the art form pointillism: a few paces from a painting, the human eye cannot differentiate two contiguous spots, so the whole picture is mentally interpreted as one image, not as multichromatic speckles.)

A special beam produced by your set gives the motes of the display their colors, sweeping over every one of them sixty times in a single second, starting from the top left corner. The beam's intensity can be controlled, to create a bright or dim glow. From the starting position, it brushes over to the right, then turns itself off, so it doesn't fill in anything on its return to the left. The special ray automatically lowers itself slightly, and goes back to the left side. Here, it restarts to color yet another line of dots, turns off on the right, drops and rushes to the left again. One horizontal line of filled specks on the screen is termed a "horizontal scan line." When the TV completes 192 of these (or thereabouts), the display is finished, and the beam resets itself to the top left of the glass.

The times when the ray is off have special names. When it's on the right and going back to the left to turn back on, it's the "horizontal blank." Since screen dots are the elements which collectively form a picture, they're called "picture elements," or "pixels."

I hope it seems obvious that the Atari computer needs some way to tell the TV what to show on the screen. Here's how it does so.

In BASIC, the screen can only have one graphics mode at a time. The screen's either graphics 2 or graphics 6 (or any of the other BASIC graphics modes), but never more than one mode at a time (most of the time). By manipula-

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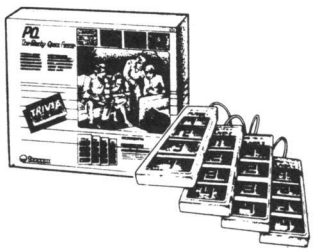

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tion of the display list, the display can be up to fourteen different modes on one screen!

Perhaps you think of BASIC graphics mode 0 as just that—BASIC graphics mode 0. Your Atari thinks of it as ANTIC mode 2.

ANTIC is a video microprocessor; it controls the TV display, including the display list you've heard so much about. To understand the display list, think of BASIC graphics modes not as screens, (as in mode 0) of text, but as piles of lines, or "mode lines" (i.e., mode 0 is really a pile of twenty-four mode lines on top of each other). If you think of it that way, you can see how one mode line could be replaced by a different mode line. That's how the computer gets so many graphics modes on one screen.

Inseparable screen?

The display list is a series of bytes located in your computer's RAM. Its exact address can be found by multiplying the contents of location 561 (by PEEKing into it) by *256* and adding the product to the contents of 560. When you switch graphics modes, your computer creates a new display list. Type in this program:

```
10 GRAPHICS 0
20 DL=PEEK(561)*256+PEEK(560)
30 FOR A=0 TO 31
40 PRINT PEEK(DL+A);" ";
50 NEXT A
60 GOTO 60
70 REM PRESS break TO STOP ME!
80 END
```

This program PRINTs the 32 bytes of the BASIC graphics mode 0 display list onto the screen. It should start out with three *112*s, a *66*, followed by two other numbers, several *2*s, and a *65*, followed by two other numbers. Just about every number correlates to one line on your screen. For instance, I told you that BASIC mode 0 is ANTIC mode 2. Those *2*s in the display list indicate mode 0 lines.

DL shift.

Since in BASIC mode 0 there are forty characters per line, when you type the graphics 0 command, the computer takes 40 bytes and puts them on one line. However, if you switch mode lines, it still thinks every mode line is ANTIC 2. The result: wait, I'll show you!

Take a BASIC mode 3 line interposed right in the middle of a graphics 0 display. Well, in a graphics 3 display, you know that you can plot up to 40 pixels across the screen. Since it only takes 1 byte to produce 4 pixels, then every line in BASIC mode 3 must take 10 bytes, as opposed to the 40 in a mode 0 display. When the computer still thinks it's in mode 0 for every line, it will take an extra 30 bytes' worth of characters after the mode 3 line of 10 bytes. It believes the line is a normal 40 bytes.

Since the 10 bytes of the mode 3 line take up one physical line (see the Atari BASIC Reference Manual for the definition), the next 30 bytes must be displayed on the next physical line. That means everything will be shifted over 30 bytes, or pixel positions. You can try it and see for yourself; just POKE the ANTIC mode value equivalent for BASIC mode 3 (*8*) in DL+16.

Table 1 tells you the number of pixels that can be plotted per mode line, as well as the number of bytes per line.

Table 1.

ANTIC mode	BASIC mode	Pixels (Char. per line	Bytes per line
2	0	40	40
3	none	40	40
4	none	40	40
5	none	40	40
6	1	20	20
7	2	20	20
8	3	40	10
9	4	80	10
10	5	80	20
11	6	160	20
12	none	160	20
13	7	160	40
14	none	160	40
15	8	320	40

ANTIC/BASIC Graphics Modes Equivalents

The best way to avoid the "DL shift" is to combine mode lines, so the total number of bytes/line for all the changed mode lines equals the number of bytes/line for one or more lines of the graphics mode which the computer believes it's in. That way, all of the lines you added will be treated as one or more normal lines by the machine (though you'll know the difference), and the DL shift will not occur.

Let's see how the DL shift can be eliminated, by substituting some ANTIC mode 2 lines (BASIC 0) with some mode 6 (BASIC 1) lines. The table says ANTIC mode 6 lines take 20 bytes for one line's worth of characters. Just one mode 6 line, then, will DL shift every line below it 40 – 20 = 20 bytes. If we add two lines, though, the DL shift will be 40 – (20+20) = 0 bytes—no DL shift at all. Try this:

```
10 GRAPHICS 0
20 POKE 82,0
30 DL=PEEK(561)*256+PEEK(560)
40 POKE DL+16,6
50 POKE DL+17,6
60 END
```

Line 20 just makes the left margin the left side of the display.

If you experiment with the mode 6 band, you'll find the computer thinks that both mode 6 lines are one mode 2 line, because together there are 40 bytes' worth of characters, the number on one ANTIC 2 line. Take out statement 40 and run the program; notice the DL shift? An easy way to find out which row the computer thinks it's in is to count out forty byte groups, until you get to where you want. This method also works in modes other than 2, but you must use different byte groupings.

More codes of modes.

If you substitute, say, *10* for the POKE values in Lines 40 and 50, you'll see plotted pixels in the band, instead of characters. ANTIC 10, or BASIC graphics mode 5, is not a text mode.

The same byte means different things in different modes. It's just translated another way, much like a byte in BASIC 0 could be a character, but is four pixels in BASIC 3. The codes for the characters and symbols in ANTIC are given in the Atari BASIC Reference Manual, and the pixels' colors for nontext modes can be determined

by using the base 10 value you find and converting it to base 2. Every pair of bytes is the color for a pixel.

Going off on a tangent once more, enter the following BASIC program:

```
10 GRAPHICS 8
20 REM BASIC GRAPHICS MODE 8=ANTIC 15
30 COLOR 1
40 PLOT 0,80
50 DRAWTO 319,80
60 END
```

The line that results from running this program is exactly one horizontal scan line. Now that you know what a horizontal scan line looks like, count how many of these there are in one ANTIC mode 2 character. If you counted eight, you're correct; every ANTIC 2 (or normal text) mode line is composed of eight horizontal scan lines. If there are twenty-four mode 2 lines in a regular graphics 0 display, the screen then has 192 scan lines. As I said before, there are only 192 effective scan lines in your screen; a graphics 0 display uses the whole screen.

Now, other modes' pixels use varying numbers of horizontal scan lines. For instance, ANTIC mode 15 pixels, as you've seen, only take up a single scan line in vertical distance, while mode 7 lines take up sixteen scan lines. Let me show you why the number of scan lines in a mode line is important—type in the previous program again.

Out of space.

In a graphics 0 display, there are twenty-four lines per screen of 40 bytes per line, or 960 per screen. After you run the program, you see twenty-two mode lines of 40 bytes each and two mode 6 lines of 20 each, for a total of 920 bytes. Where did the missing bytes go?

Actually, they didn't go anywhere. Just as the computer expects 40 bytes for every mode line, no matter what, in a graphics 0 display, it expects 960 for the whole screen. The two mode 6 lines, while taking up as many bytes as a single mode 2 line, take up twice the vertical space in horizontal scan lines.

Thus, all 192 scan lines are used up, but there's still one more line of characters left, the missing 40 bytes. Those 40 bytes are not displayed, because there's not enough space, but the computer treats them as if they were still on the display. In fact, when you move your cursor off the screen, you can't see it; it's in the "missing" line.

Empty space.

We've looked at the "mode codes" of the display list. Now let's see what the remaining bytes in it are. Starting at the top of your screen is the border.

Take a look at it and estimate its size. Doesn't it look like three (completely blank) mode 2 lines stacked on each other? That's because both mode 2 lines and these lines have eight horizontal scan lines in them. You can create lines anywhere from one blank scan line to eight.

Let's say that *N* is the number of blank scan lines you want. Just POKE the value *16*N-16* into the appropriate byte of the display list. The computer will go about its business as if that line (or those lines) weren't even there.

Some TV sets have "overscan"—parts of the display are lost behind the case of your TV. In a computer, no part of the screen which might hold any vital information should be off the visible portion of the screen, for unseen information is useless. The three "blank 8" lines, as they're called, push the display down enough to ensure that overscan doesn't occur.

RAM space and inanimate communication.

The next 3 bytes of the display list go together, the *66* and the two following numbers. The first byte is an operator and the next two, operands; they could be almost any values, really. Remember how locations 560 and 561 manipulated in a special way revealed the first byte of the display list? Well, the fourth and fifth bytes of an unchanged display list for graphics 0 tell us the location of the first byte in the screen RAM. In case you forgot, in the screen RAM each byte (for mode 2 lines) is a character.

In a text mode, the character symbol displayed depends on the particular byte being used. There are 960 bytes in the screen RAM for graphics 0, to correspond to the same number of characters which may be put on the display in that full-screen mode.

To simplify, let's turn the inner workings of your Atari into some dialogue. For instance, the *66* in the display list spoken of earlier essentially says to your computer's processing unit, "Hey, you, start putting those characters' bytes you got over there in the screen RAM—hmm, it's at . . . forty-thousand on the dot, that's where the screen RAM memory starts—translate 'em to characters and put those on me, starting on this line. Oh, yeah, I almost forgot, I'm an ANTIC mode 2 line."

The *66* is actually a composite of two commands of the Atari. It's broken up into a *2* and a *64* by the computer. The *2* means, "I'm a mode 2 line," and the *64* says, "Into this line and others below me (unless otherwise specified), put the data in memory locations starting with the following." The following memory location address, (the two numbers following the *66*) is the beginning of the screen RAM. The decimal address is calculated by multiplying the second number by 256, then adding the first.

The *64+2=66* command may be placed more than once in the display list. You could have one for each mode line, for instance. In that case, the characters would come from different portions in memory for every mode line. You might even combine the *64* command with a mode 8 line, for a *64+8=72* command line, or use it with almost any other mode. The screen of your Atari can be made as diverse and complex, or as simple and basic as you desire—if you know how to do it.

The operands of the commands may also be changed. Hence, your screen RAM for a mode line may be anywhere in the computer's available memory.

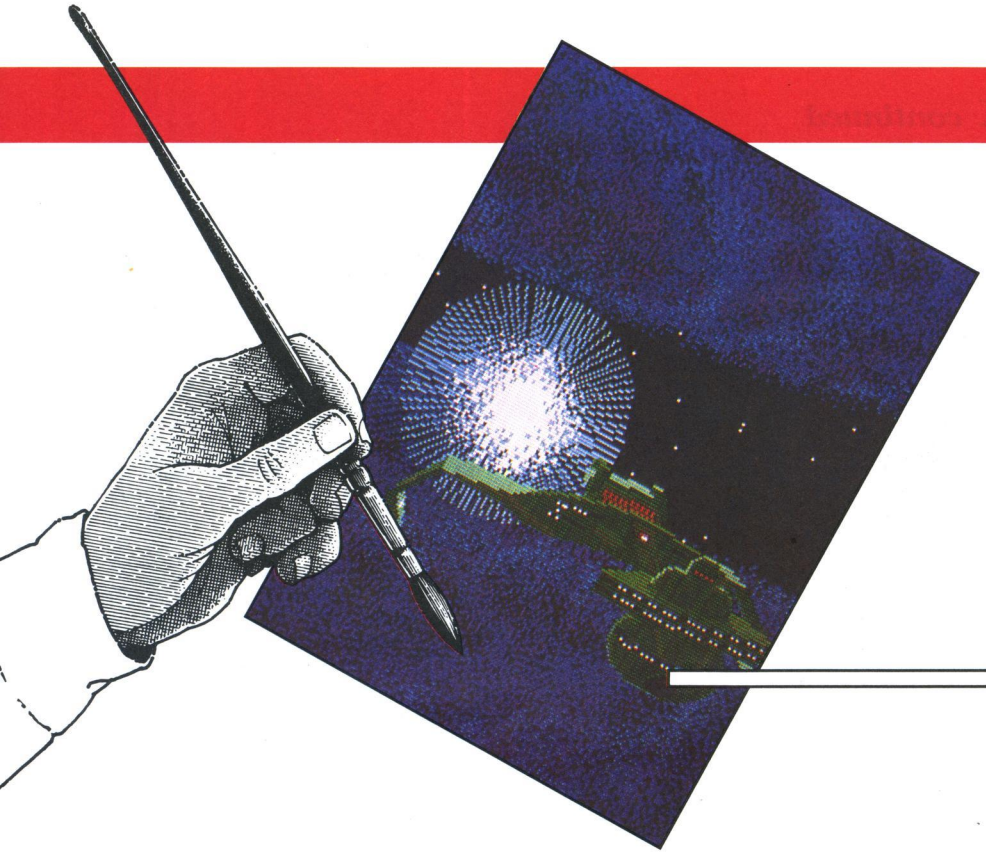
Rerun.

As you may have surmised by now, the *65* toward the end of the display list is an operator, or command that operates on the next two values following it, which are the location of the first byte in the display list. The display list is really a program for the ANTIC microprocessor; it needs some way to constantly run the list. The computer examines the list like a BASIC program that's run; the *65* is like a GOTO statement, and the next two numbers are the address where it must go to start the program over again.

Unit test.

I think I've given you enough information to understand the basics of display lists. You now have the power to warp the display list any way you choose, but experimentation is the only way to measure the full capability of your Atari. So go ahead, you can do it! Next month we'll tackle the display list interrupts themselves.

Jonathan David Farley has been working with computers since taking a college computer course at age nine, and is now interested in reviewing and writing software.



Pixel Perfect

by Maurice Molyneaux

Arguments abound as to whether or not images created on computers are "Art." Many "compuphobics" regard computer art as artificial, machine made. . . interesting, but synthetic. . . not Art.

But, really, the computer is nothing more than the latest innovation on the paintbrush, not a dehumanizing "graphics processor" as some think. It's a *tool*, nothing more. However, the potential impact of this tool on the visual arts may be staggering. It could be as great a revolution in image creation as word processing has been to many writers. It frees the artist to experiment, to try things not otherwise attempted. You can manipulate work on a computer so easily that it invites experimentation and innovation.

In this article, we'll discuss effectively using graphics/painting software for your Atari. Even if you use your computer to draw purely for fun, you may find the following descriptions of techniques (and pitfalls) helpful.

Concept.

Plan ahead. It's best not to plunge in and realize—after hours of work—that you should have approached things differently. Decide exactly what you're going to draw: take into consideration your system's capabilities. Will a particular effect for one portion of the image deplete your resources to the point where the rest of the picture suffers? Is the object of your concern something that would look better against a blank backdrop, or would something behind it heighten the overall impact of the image? If you're going to tackle a close reproduction of *The Last Supper* on your 800XL, think again. Resolution and color are the major limitations of personal computers, and you must learn to deal with them.

A case in point: an Atari 8-bit with a **Micro-Illustrator**-compatible graphics program is restricted to so-so resolution, with four colors. You can't rival Rembrandt within such limits, but what you *can* do is try to capture the essence of a Rembrandt. Forget the subtleties. You may be caricaturing a masterpiece, but you'll at least be recreating something of it. If your work has the "feel" of the original, you can call it Art.

You color ST owners should wipe those smug expressions off your faces, because I've seen you *waste* whole color registers for a few dots! To effectively utilize your resources, try limiting yourself to a few colors. Once you learn to make art within those restrictions, you're ready to tackle *real* complexity. . . and make it work.

Keep it simple. Cluttered and confusing is fine—if that's the effect your picture requires. But it rarely beats the elegance of clean simplicity. "Nothing exceeds like excess," as the saying goes.

Drawing.

I find the freehand DRAW mode of most programs to be clumsy and sloppy. Tablets, joysticks, light pens and mice are not well suited for outlining or sketching anything other than straight lines. Trying to draw rounded shapes where an ellipse won't work can be a real pain.

One of the best ways to get controlled contours is to use line drawing modes. Draw a series of short, connected lines, altering the angle a bit each time to create your curves. The effect won't be perfect, but it's usually much cleaner than with DRAW, and you can always use MAGNIFY to tidy up bits that stick out.

Lines have their pitfalls, too. In drawing and painting, artists begin by defining the forms of objects and shadows with lines—usually with pencil. Fine, on paper or canvas; all wrong on a computer. Unless you're using lines to achieve a certain effect (like the obvious ink lines in cartoon characters), they tend to make the picture look strange.

Let's say you're drawing an airliner. Since the plane is mostly white, that's the color you start with. You draw the entire plane in this manner, making a line drawing which you then fill in. Now, the white sections of the plane look just peachy, but the dark gray underside looks. . .well, *bad*. There shouldn't be white lines around it. So, you say, "No sweat," and aim a FILL with dark gray into an offending line. Great, unless that line's connected to the other white areas of the plane (it probably is). WHOOSH!—a big, dark gray blob where your plane was.

The solution: tackle each section of an object as a separate entity. As you define its shape (yes, with lines), use the same color as the fill you'll want. When you move to a part that's to be a different color or tone, change colors and outline with the hue *that* section will be.

Geometric Drawing Functions.

Most drawing programs have functions to draw filled or unfilled frames and circles. These can be used to make properly shaped moons, balloons, bricks, or boards.

But, remember, a wheel drawn with CIRCLE (unless it allows ellipses) can't be used in a graphic of a car at an angle, and FRAME can't be used to draw a house.

Color.

Honestly, a great deal of computer art is overpainted. It looks like a gaudy technicolor nightmare. If you want to make something look real, it's generally best to keep the colors muted. Cousin Henry's barn may be red and white, but using your reddest red and whitest white will not a barn make. *Subtlety* is important. The exceptions to this are subjects that demand brightness, glaring colors and the eye-jarring contrasts that exist between chartreuse and purple. Pop art, surreal images and abstractions can all benefit from the computer's potentially tacky neon palette.

Also, in some cases, "luminance" or "tone" can be more important than color. If you have two colors whose junction is harsh, don't be afraid to try putting a 1-pixel-wide division of another color between the offending colors, even if it's not in the same color range. Color-wise, it may be all wrong, but if its brightness is right, it may smooth things out visually.

One of the most powerful features of computer graphics packages, is their ability to alter screen colors on the fly. Not only does this allow you to correct color mistakes, with skillful use it can help you change the entire mood of the picture.

Figure 1.

An example: the ST graphic of the fortress on Rigel 7 (Figure 1) (from the "Star Trek" episode "The Menagerie") is set in daytime, and it has a particular feel. After five minutes changing all the color registers and doing a few small spots of careful recoloring, it was a night scene (Figure 2), and the mood was all different. Light, shadow, tone and color are the artist's primary tools. Do *not* underestimate their value. Color choice can determine whether a picture is pleasant or spooky, happy or depressing. And here lies one of the greatest things about computer art. In no other medium are you so free to experiment, to try so many variations without beginning from scratch each time.

Some programs permit color animation effects. **Micro-Illustrator**'s RAINBOW cycles a series of multi-colored bars through

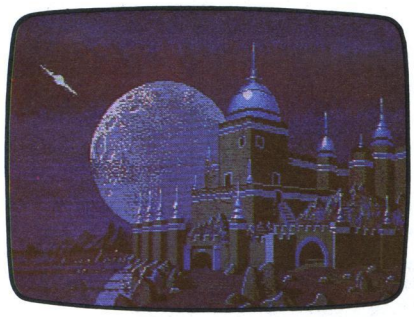


Figure 2.

a user-selected color. It's generally too overpowering for most pictures, but, if limited to hues used for small details, it can add an interesting effect. An example would be to draw the running lights on an airplane in one color, and have RAINBOW run in that color, creating a pseudoflashing effect. **NEO-Chrome** on the ST has a routine to cycle a range of user-defined colors, which can be used to stunning effect (you've all seen the waterfall, right?) I used this effect in Figure 3 to make the rays of the energy bolt spin at very high speed, lending an effect of power.

Patterns.

Pattern fills can help stretch a limited palette and create the illusion of more colors. Fills can be used between colors, making sort of a medium tone, or to add texture to objects and detail to blank backdrops.

Light and shadow.

These are of immeasurable importance. A well-placed highlight can give fullness to a shape, or life to a portrait. Shadow is likewise invaluable in adding depth and weight to an object, and often serves to "join" an object to the background.

Computers are marvelously suited to producing high-contrast images, with strong colors and extreme contrasts. Subtle shading is more difficult. If you're very limited in colors, you'd be better off to stick to high contrast for your effects.

Magnify and zoom.

Even the best of us can't get a pixel-perfect screen without a little fine tuning. Most good drawing programs feature a zoom or magnify mode, which allows you to see pixels in detail. The best zooms let you scroll all around the picture. A limited "set location" zoom isn't as effective, but it's better than none at all.

Never doubt the effect a pixel here or there can have on your picture. Resolution *is* a factor, and a badly placed pixel can make things look sloppy. Sometimes, eliminating an offending dot, you create another problem. Be patient; readjust pixels all around the affected area. Sooner or later, you'll hit the right combination.

Whoops!

Erasing mistakes can be simple—or complex. Depending on your software, you can handle errors in a variety of ways: use the UNDO function; use the eraser mode; FILL the mistake with the background color; DRAW over it; cover it with a BOX or DISK; alter it a pixel at a time with ZOOM; CUT the offending area out and CLEAR the PASTE buffer; COPY another part of the picture and cover the mistake with it; or LOAD the last saved version of the picture.

And, if all else fails, ERASE the current picture and start again.

Mirror, mirror.

Have to draw a symmetrical object? Well, if the angle's right, you can draw half, or even a quarter of it, and MIRROR will make a reverse-image copy, finishing the drawing for you. The trouble is that it usually limits you to certain points of view, like head-on or overhead. Three-quarter angles are out, and, unless you have a MOVE or a CUT & PASTE option, you'll be forced to place your object squarely at screen center.

Graffiti.

Spray and airbrush modes lay down a pattern of dots at (often) a selectable speed, and are most useful for blurring the border between two colors. You can create surprisingly soft effects with this mode. Careful use of it in shading (Figure 4) may add depth and realism to your work.

Scissors and glue.

If your drawing program has CUT & PASTE, you have the ability to fix (by moving chunks of pictures) awkward positionings. Maybe the face you've drawn really ought to be an inch to the right. Solution? Drag it over.

Some programs allow you to make single or multiple copies of a specified chunk of the screen. This can simplify some things (like duplicating hand-drawn text), but don't overdo it. A forest made by "rubber stamping" trees always looks artificial.

If your program has a PASTE BUFFER, you've got an added bonus. You can put part of one picture in the buffer, load another picture, then slap that chunk of the first on the second. If the second picture uses different colors than the first, your paste object may look a little odd, but careful preplanning can eliminate this.

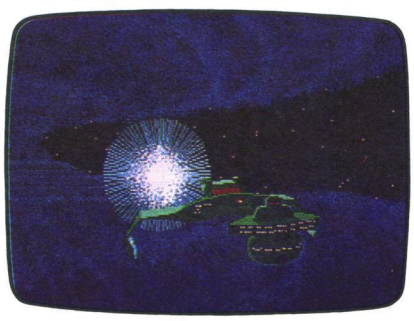


Figure 3.

The buffer allows you to try out different backgrounds. It also allows you to draw complex backgrounds without having to worry about damaging foreground objects. In Figure 3, the cloud was created using a "spray paint" can. The energy bolt was pasted on top of it, then the ship (both taken from a separate screen).

Work from back to front.

If you're working on pictures of relative complexity, it's best to start with the background. If you draw the foreground elements first, you're liable to get bored with the picture and hurry the background. As a result, it may look sloppy. Save the best for last. Take your time, craft your background, then work your way forward. The results will likely be superior.

Files.

Save your picture *often*. It only takes a few seconds, and it'll avoid a lot of grief if you accidentally fill half the picture with the background color, or your system decides to bomb and send your masterwork to "electron heaven."

Make sure you have a disk with plenty of room. Name your files descriptively—and differently. This way, if you realize you've made a horrible goof after one or two saves, a much earlier pre-goof edition still exists on your disk. Not only that, if you later decide you'd like to try a different effect in addition to the first, you can go back to earlier versions and carry on from there.

Make backup disks! Once I lost two nights' work due to a single disk error, and I didn't have a backup.

It's all black and white.

As I write this, the only widely available ST high resolution painting program is **DEGAS**. If you have **DEGAS** and a monochrome system, you're in luck. Most of what I've covered still applies, even in black and white. The trick in high resolution is to use clusters of pixels to create shades of gray.

ST monochrome, with its fantastic resolution, allows for close approximation of the pen and ink technique of "stippling" (the ball in Figure 4). You've seen those drawings where all the tones are defined by the density of tiny, hand-applied dots? That's stippling, and using **DEGAS** in its airbrush mode effectively simulates it.

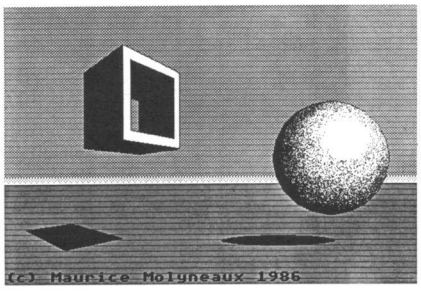


Figure 4.

Clean your brushes.

I hope this crash course in graphics techniques has been of benefit to some of you. Before I go, I want to make one last important point: my comments about what works and what doesn't work are *not* carved in stone. The very technique I advise you to avoid may, in certain circumstances, be the perfect method for a picture. But, then again, breaking rules is one of the things that makes art Art.

Highly allergic to all things Commodore, Maurice Molyneaux purchased an 800XL for animation work. Now wielding an ST, he writes regularly for a local Atari users group, is finishing revisions on a science fiction novel and occasionally sells original paintings on commission, in addition to being employed as a computer operator by a mining company in Nevada.

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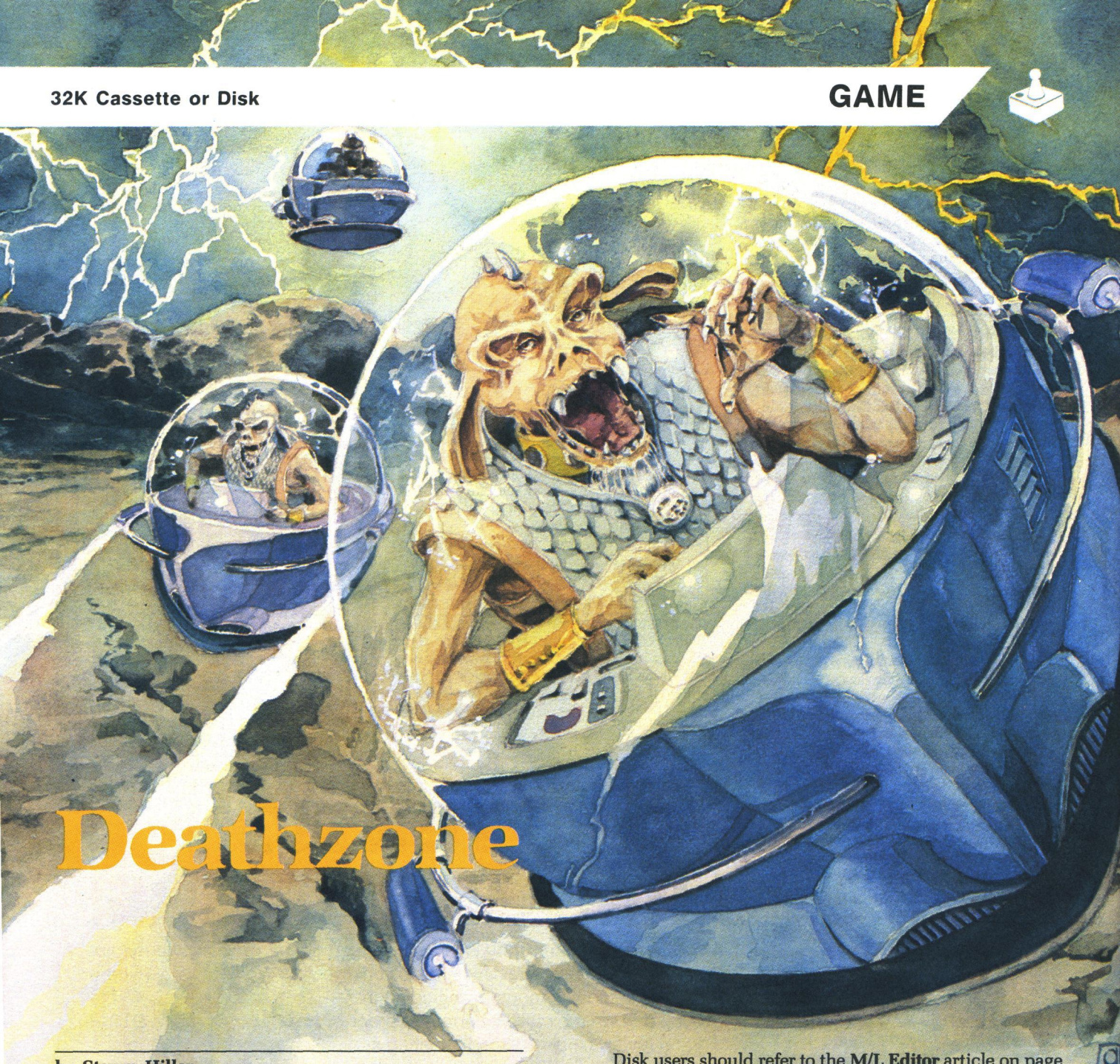

Deathzone

by Steven Hiller

Suddenly, your scanner detects the presence of an alien. Moments later it screams into view, charging headlong at you. In desperation, you back off, firing salvos of raw energy bolts at your attacker. One strikes home, and the alien pod disintegrates into scintillating dust. You were lucky that time, but how much longer will you be able to survive in the **Deathzone**?

Deathzone is a fast-moving, 3-dimensional arcade game that will work on all 8-bit Atari micros.

Typing it in.

Listing 1 is the BASIC data used to create both cassette and disk versions of **Deathzone**. Those readers who are interested in how the game works may obtain the assembly listing on either the magazine disk version or the **ANALOG Computing** Atari Users' Group on Delphi.

Disk users should refer to the **M/L Editor** article on page 11 for typing instructions.

If you have a cassette system, type in Listing 1, then add the lines shown in Listing 2. Type *RUN* and press RETURN. The program will begin checking the data statements, printing the line numbers as it goes. It will alert you to any problems. Fix any incorrect lines and rerun the program until all errors are eliminated.

When all your data lines are correct, the computer will beep twice and prompt you to *READY CASSETTE AND PRESS RETURN*. Now, insert a blank cassette in your recorder, press the RECORD and PLAY buttons simultaneously, and hit RETURN. The message *WRITING FILE* will appear, and the program will create a machine language boot tape version of **Deathzone**, printing each data line number as it goes. When the *READY* prompt appears, the game is recorded and ready to play. CSAVE the BASIC program onto a separate tape before continuing.

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Deathzone *continued*

To play the game, rewind the tape created with the BASIC program to the beginning. Turn your computer off and remove all cartridges. Press the PLAY button on your recorder and turn on your computer, while holding down the START key. If you have an XL or XE series computer, you must hold the START and OPTION keys when you turn on the power. The computer will beep once. Hit the RETURN key, and **Deathzone** will load and run automatically.

Playing Deathzone.

If you've followed the instructions correctly, you will now be looking at the title page for **Deathzone**. Both the lowest (L) and highest (H) scores are shown. You can start the game either by pressing the trigger of joystick 1, or be pressing the START key. If you should wish to abort a game before completion, either the SELECT or OPTION keys will bring you back to the title page.

When you begin the game, you'll notice that the screen is divided into sections. At the very top is a horizontal line whose length indicates how close the alien is. Two sets of directional arrows at either end of the line indicate whether the alien is to your front, left, right, or rear. The next line is the status line, showing your score from left to right, lives remaining and current level of play. Further down, there's a standard radar scanner superimposed on the sky. The white central dot represents your own position, of course.

By using the joystick, you can move in and out of the screen, or swivel on the spot. You must do your best to avoid both the aliens themselves and the energy bolts they fire. Each time you're hit, you'll lose a life. You'll need to dodge, reverse away and fire rapidly, in order to destroy the aliens before they reach you. Incidentally, you can pause the game with the SPACE BAR and continue it by moving the joystick.

Every so often, an alien pod with rather different characteristics will attack you. If you should succeed in destroying it, you'll receive an extra life and move up to the next level of play. If not, you'll have to restart that level. There are a total of six levels, each progressively more difficult than the last. Should you complete the last level, well . . .wait and see!

Last, a word of thanks to my brother for writing a "black-box" 16-bit math package, around which the game was based.

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*, page 31.

The code is simply a double check for Listing 1; it's of more use with Listing 2.

Listing 1.

```
YR 1000 DATA 255,255,0,31,128,59,112,112,
   112,112,112,240,71,0,27,7,2243
VD 1010 DATA 112,2,112,112,6,112,112,2,11
   2,112,65,0,31,0,151,79,187
VT 1020 DATA 80,76,77,78,0,203,79,80,76,7
   7,78,0,152,65,66,67,1466
ZS 1030 DATA 68,69,70,71,72,0,137,79,80,1
   33,76,77,78,0,143,79,1914
ZB 1040 DATA 80,83,0,136,73,74,75,69,70,7
   1,72,0,134,79,80,76,1112
VS 1050 DATA 77,78,0,137,65,66,67,68,69,7
   0,71,72,0,137,79,80,914
PR 1060 DATA 133,76,77,78,0,143,79,80,65,
   66,67,68,136,69,70,71,1657
GP 1070 DATA 72,0,131,79,80,138,76,77,78,
   65,66,67,68,81,82,0,357
PX 1080 DATA 132,79,80,131,83,0,132,73,74
   ,75,135,69,70,71,72,79,2034
DP 1090 DATA 80,133,76,77,78,0,130,65,66,
   67,68,136,69,70,71,72,1530
XU 1100 DATA 0,131,79,80,138,76,77,78,65,
   66,67,68,81,82,0,132,1339
IW 1110 DATA 79,80,130,14,143,69,84,80,13
   9,1,2,3,4,134,81,82,9926
NA 1120 DATA 79,80,134,83,73,74,75,142,5,
   6,7,8,134,76,85,14,9146
PX 1130 DATA 143,69,84,80,139,1,2,3,4,134
   ,81,82,79,80,133,12,307
VH 1140 DATA 13,14,139,15,28,140,4,140,29
   ,30,132,9,10,11,158,12,8753
KB 1150 DATA 13,14,139,15,28,140,4,140,29
   ,30,176,29,207,29,131,0,1703
VW 1160 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
   85,85,3795
EC 1170 DATA 85,85,85,85,90,165,85,85,85,
   85,90,165,85,85,85,85,4250
IG 1180 DATA 90,165,85,85,85,90,165,85
   ,85,85,85,85,165,90,4860
QF 1190 DATA 85,85,85,85,85,85,85,165,
   90,85,85,85,85,85,85,3520
VV 1200 DATA 85,85,165,90,85,85,85,85,85,
   85,85,165,90,85,85,4130
TH 1210 DATA 85,85,85,86,105,149,85,85,85
   ,86,105,149,85,85,86,105,4591
PF 1220 DATA 149,85,85,85,85,85,149,105,8
   6,85,85,85,85,85,85,85,3461
RS 1230 DATA 85,149,105,86,85,85,85,85,85
   ,85,85,149,105,86,85,85,4024
JD 1240 DATA 85,85,86,89,101,149,0,60,102
   ,110,118,102,60,0,0,24,9692
WA 1250 DATA 56,24,24,24,126,0,0,60,102,1
   2,24,48,126,0,0,126,8164
CO 1260 DATA 12,24,12,102,60,0,0,12,28,60
   ,108,126,12,0,0,126,7884
OE 1270 DATA 96,124,6,102,60,0,0,60,96,12
   4,102,102,60,0,0,126,66
GE 1280 DATA 6,12,24,48,48,0,0,60,102,60,
   102,102,60,0,0,60,7898
TV 1290 DATA 102,62,6,12,56,0,0,0,0,240,2
   40,0,0,0,0,0,6902
BX 1300 DATA 0,15,15,0,0,0,86,89,101,149,
   85,85,85,85,149,101,3189
SF 1310 DATA 89,86,85,85,85,85,85,85,85,8
   5,149,101,89,86,0,0,1203
TP 1320 DATA 0,255,255,0,0,0,0,0,63,63,60
   ,60,60,60,0,0,6792
WB 1330 DATA 192,224,240,120,60,28,60,60,
   60,60,63,63,0,0,28,60,8507
IN 1340 DATA 120,240,224,192,0,0,0,0,63,6
   3,60,60,63,63,0,0,7658
ZY 1350 DATA 252,252,0,0,240,240,60,60,60
   ,60,63,63,0,0,0,0,8235
HJ 1360 DATA 0,0,252,252,0,0,0,1,3,7,15,3
   0,60,60,0,128,7422
CQ 1370 DATA 192,224,240,120,60,60,60,60,
   63,63,60,60,0,0,60,60,9207
NZ 1380 DATA 252,252,60,60,0,0,0,0,63,63,
   3,3,3,3,0,0,3903
JZ 1390 DATA 252,252,192,192,192,192,3,3,
   3,3,3,3,0,0,192,192,1725
PX 1400 DATA 192,192,192,192,0,0,0,0,60,6
   0,60,60,63,63,0,0,7541
DA 1410 DATA 60,60,60,60,252,252,60,60,60
```

```
   ,60,60,60,0,0,60,60,62
GQ 1420 DATA 60,60,60,60,0,0,0,0,63,63,0,
   0,1,3,0,0,3272
BX 1430 DATA 252,252,120,240,224,192,7,15
   ,30,60,63,63,0,0,128,0,186
KH 1440 DATA 0,0,252,252,0,0,0,0,15,31,60
   ,60,60,60,0,0,6649
OD 1450 DATA 240,248,60,60,60,60,60,60,60,60
   ,60,31,15,0,0,60,60,7687
PX 1460 DATA 60,60,248,240,0,0,0,0,60,62,
   63,63,63,63,0,0,7654
PI 1470 DATA 60,60,60,188,252,252,63,61,6
   0,60,60,60,0,0,252,252,6615
QB 1480 DATA 252,124,60,60,0,0,85,85,85,8
   5,85,85,85,85,0,0,9540
SF 1490 DATA 0,0,0,0,10,165,0,0,0,0,10,16
   5,85,85,0,0,6915
MW 1500 DATA 10,165,85,85,85,85,10,165,85
   ,85,85,85,85,85,160,90,4465
CK 1510 DATA 85,85,85,85,85,85,0,0,160,90
   ,85,85,85,85,0,0,9885
AJ 1520 DATA 0,0,160,90,85,85,0,0,0,0,0,0
   ,160,90,0,0,6635
KN 1530 DATA 0,0,0,2,41,149,0,0,0,2,41,14
   9,85,85,2,41,7877
YY 1540 DATA 149,85,85,85,85,85,128,104,8
   6,85,85,85,85,85,0,0,991
DG 1550 DATA 0,128,104,86,85,85,0,0,0,0,0
   ,128,104,86,0,0,7489
WY 1560 DATA 0,0,2,9,37,149,2,9,37,149,85
   ,85,85,85,128,96,2296
MW 1570 DATA 88,86,85,85,85,85,0,0,0,0,12
   8,96,88,86,128,128,2236
RW 1580 DATA 96,96,88,88,86,86,0,0,160,90
   ,86,89,101,149,10,165,3973
MI 1590 DATA 149,101,89,86,85,85,170,255,
   255,170,255,255,255,255,255,255,1367
AS 1600 DATA 170,255,255,255,255,255,255,
   255,255,255,255,255,255,255,255,170,48
   35
FB 1610 DATA 255,255,255,255,255,255,255,
   255,255,255,255,255,255,255,255,255,62
   90
TD 1620 DATA 255,255,126,24,30,0,0,24,60,
   126,24,24,24,0,0,24,6249
IJ 1630 DATA 24,24,126,60,24,0,0,24,48,12
   6,48,24,0,0,0,24,5524
WM 1640 DATA 12,126,12,24,0,0,8,24,56,120
   ,56,24,8,0,0,96,6532
XW 1650 DATA 96,96,96,96,126,0,0,60,96,60
   ,6,6,60,0,16,24,6726
TH 1660 DATA 28,30,28,24,16,0,112,112,194
   ,160,27,130,112,96,112,112,5163
FK 1670 DATA 112,112,112,112,112,240,240,
   240,212,0,28,212,128,28,212,0,8386
EZ 1680 DATA 29,84,128,29,84,0,30,212,128
   ,30,68,0,18,4,132,4,9237
PB 1690 DATA 4,65,32,35,104,24,105,1,141,
   0,2,104,105,0,141,1,9502
YW 1700 DATA 2,104,64,72,169,6,141,10,212
   ,141,23,208,169,152,133,202,9957
CL 1710 DATA 32,78,35,72,169,0,141,23,208
   ,141,10,212,173,194,2,141,7494
JH 1720 DATA 25,208,165,202,56,233,16,141
   ,26,208,133,202,201,56,240,2,9612
ZO 1730 DATA 104,64,32,78,35,72,141,30,20
   8,165,203,141,10,212,141,8,6992
XO 1740 DATA 208,165,200,141,0,208,165,20
   1,141,18,208,32,78,35,72,169,6862
UW 1750 DATA 182,141,10,212,141,23,208,16
   9,178,141,24,208,169,0,141,26,7243
QV 1760 DATA 208,32,78,35,72,169,15,141,1
   8,208,169,120,141,10,212,141,7963
JJ 1770 DATA 0,208,169,1,141,8,208,173,8,
   208,13,11,208,41,1,13,2218
GE 1780 DATA 12,208,41,13,133,172,104,64,
   216,169,64,141,14,212,169,6,7131
FD 1790 DATA 162,228,160,95,32,92,228,169
   ,32,141,244,2,169,34,141,47,6874
VY 1800 DATA 2,169,0,141,29,208,162,4,157
   ,13,208,202,16,250,32,36,6282
HM 1810 DATA 38,169,18,133,129,169,0,133,
   128,160,0,162,13,152,145,128,6711
DO 1820 DATA 200,208,251,230,129,202,240,
   8,224,3,208,242,169,64,208,238,4969
HN 1830 DATA 162,255,232,188,100,38,192,2
   55,240,15,232,189,100,38,201,155,2519
VP 1840 DATA 240,240,153,0,27,200,232,208
   ,242,169,0,141,198,2,141,200,1119
NI 1850 DATA 2,133,130,141,4,212,133,187,
   169,17,141,251,27,32,13,39,4663
GV 1860 DATA 169,15,141,197,2,169,54,141,
   196,2,169,62,141,47,2,169,5412
NO 1870 DATA 31,141,49,2,169,0,141,48,2,3
   2,12,38,169,38,141,1,340
FW 1880 DATA 2,169,52,141,0,2,169,192,141
   ,14,212,169,128,133,213,169,865
EB 1890 DATA 3,133,196,9,16,141,226,27,24
   8,162,2,181,190,213,193,144,2204
BD 1900 DATA 16,208,5,202,16,245,48,9,162
   ,2,181,190,149,193,202,16,8787
AV 1910 DATA 249,216,160,0,162,2,181,193,
   32,19,38,153,93,27,165,163,6106
HS 1920 DATA 153,94,27,200,200,202,16,238
   ,169,0,162,2,149,190,202,16,8580
AX 1930 DATA 251,169,8,141,31,208,173,31,
   208,201,6,240,15,173,16,208,8982
DP 1940 DATA 208,244,32,12,38,173,16,208,
   240,251,208,15,32,12,38,169,6780
AH 1950 DATA 8,141,31,208,173,31,208,201,
   6,240,249,169,28,133,129,169,1366
BU 1960 DATA 0,133,128,162,0,160,0,189,23
   ,31,48,26,208,20,232,189,6575
YT 1970 DATA 23,31,41,127,168,169,0,145,1
   28,136,16,251,189,23,31,200,7844
PQ 1980 DATA 240,4,145,128,169,1,41,127,2
   4,101,128,133,128,144,2,230,6949
FL 1990 DATA 129,232,224,225,144,209,160,
   47,169,86,24,153,0,18,105,1,3949
KU 2000 DATA 153,48,18,105,1,153,96,18,10
   5,1,153,144,18,105,1,153,2995
UF 2010 DATA 192,18,136,16,227,132,197,16
   9,30,133,164,169,0,133,132,169,9346
DZ 2020 DATA 1,133,198,32,208,45,198,164,
   208,245,169,17,133,174,141,111,1458
BN 2030 DATA 2,169,15,141,192,2,169,255,1
   33,138,141,158,20,141,208,20,8872
FM 2040 DATA 169,129,141,157,20,141,209,2
   0,169,1,133,139,141,8,208,169,8518
HP 2050 DATA 120,141,0,208,162,4,169,24,1
   57,62,20,202,16,250,169,0,6413
VU 2060 DATA 141,47,2,141,243,2,169,16,16
   0,6,153,215,27,153,157,38,6622
VT 2070 DATA 136,16,247,162,98,142,213,27
   ,202,142,224,27,142,249,27,32,8951
GD 2080 DATA 226,55,169,3,141,29,208,169,
   16,141,7,212,169,32,141,244,9461
PC 2090 DATA 2,169,18,141,196,2,169,12,14
   1,197,2,162,38,160,218,169,9232
PR 2100 DATA 6,32,92,228,169,35,141,1,2,1
   69,93,141,0,2,169,192,5466
MU 2110 DATA 141,14,212,169,35,141,49,2,1
   69,32,141,48,2,169,63,141,4532
UY 2120 DATA 47,2,169,112,141,19,31,169,2
   55,141,252,2,32,174,54,76,6893
WE 2130 DATA 1,53,165,20,197,20,240,252,9
   6,72,41,15,9,16,133,163,4772
JB 2140 DATA 104,74,74,74,74,41,15,9,16,9
   6,169,3,141,15,210,169,4599
BF 2150 DATA 0,162,8,157,0,210,202,16,250
   ,96,72,138,72,152,72,164,8354
JX 2160 DATA 176,166,177,169,31,133,175,1
   41,10,212,140,24,208,142,25,208,9614
HA 2170 DATA 200,232,198,175,16,241,230,1
   76,198,177,169,0,141,24,208,169,2076
TH 2180 DATA 224,141,9,212,104,168,104,17
   0,104,64,1,224,225,164,165,232,2860
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EV 2190 DATA 233,172,173,240,241,180,181,
   248,249,188,189,228,229,155,21,226,779
   6
CV 2200 DATA 227,166,167,234,235,174,175,
   242,243,182,183,250,251,190,191,230,10
   64
OK 2210 DATA 231,155,53,34,121,0,51,14,0,
   40,105,108,108,101,110,155,3919
LT 2220 DATA 80,44,0,16,16,16,16,16,16,16
   ,0,0,40,0,16,16,4188
BN 2230 DATA 16,16,16,16,16,155,102,0,0,0
   ,8,35,9,0,0,17,5011
QF 2240 DATA 25,24,22,0,0,0,33,110,97,108
   ,111,103,0,35,111,109,1799
AI 2250 DATA 112,117,116,105,110,103,0,0,
   0,155,148,225,227,229,155,255,2972
SA 2260 DATA 169,35,141,1,2,169,93,141,0,
   2,165,130,141,4,212,165,6833
FI 2270 DATA 240,32,238,44,165,186,48,2,1
   98,186,230,169,165,169,201,16,1739
TA 2280 DATA 144,14,173,243,2,73,2,141,24
   3,2,169,0,133,169,133,77,6921
PK 2290 DATA 76,95,228,169,95,133,157,133
   ,225,133,156,133,224,96,32,49,9539
FB 2300 DATA 40,162,16,6,140,38,141,38,14
   2,38,143,6,148,38,149,144,5253
UH 2310 DATA 17,165,150,24,101,140,133,14
   0,165,151,101,141,133,141,144,2,8292
TS 2320 DATA 230,142,202,208,222,76,107,4
   0,32,49,40,165,148,5,149,208,7662
AT 2330 DATA 3,76,23,40,165,150,5,151,208
   ,3,76,32,40,162,0,134,3736
TH 2340 DATA 144,134,145,134,146,134,147,
   165,150,56,229,148,133,155,165,151,260
   1
MR 2350 DATA 229,149,176,8,232,6,150,38,1
   51,76,97,39,5,155,208,3,5044
WC 2360 DATA 76,12,40,224,0,240,35,70,151
   ,102,150,165,148,56,229,150,273
SN 2370 DATA 72,165,149,229,151,72,176,4,
   104,104,144,7,104,133,149,104,7343
GP 2380 DATA 133,148,56,38,142,38,143,202
   ,208,221,162,16,70,151,102,150,9694
OI 2390 DATA 102,147,102,146,165,148,56,2
   29,150,133,155,72,165,149,229,151,2944
ZX 2400 DATA 72,144,66,5,155,208,28,165,1
   44,56,229,146,72,165,145,229,1729
GN 2410 DATA 147,72,144,47,104,133,145,10
   4,133,144,104,133,149,104,133,148,9619
XL 2420 DATA 56,176,37,104,133,149,104,13
   3,148,165,144,56,229,146,133,144,1264
BT 2430 DATA 165,145,229,147,133,145,176,
   8,165,148,208,2,198,149,198,148,2266
NZ 2440 DATA 56,176,5,104,104,104,104,24,
   38,140,38,141,202,208,157,76,8304
CC 2450 DATA 107,40,232,56,38,142,38,143,
   202,208,249,240,242,165,150,5,3312
LQ 2460 DATA 151,208,2,230,142,96,162,128
   ,160,0,165,149,69,151,48,2,6203
YN 2470 DATA 202,136,134,143,132,142,96,1
   65,149,69,151,133,154,165,149,16,9513
YO 2480 DATA 9,166,148,32,92,40,134,148,1
   33,149,165,151,16,9,166,150,7753
TF 2490 DATA 32,92,40,134,150,133,151,169
   ,0,133,140,133,141,133,142,133,9738
YF 2500 DATA 143,96,133,153,134,152,169,0
   ,56,229,152,170,169,0,229,153,1197
QD 2510 DATA 96,165,140,16,10,230,141,208
   ,6,230,142,208,2,230,143,165,1944
DM 2520 DATA 154,16,16,160,0,56,169,0,249
   ,140,0,153,140,0,200,192,8282
WR 2530 DATA 4,208,243,96,56,233,0,133,14
   8,165,149,56,233,64,133,149,402
FB 2540 DATA 169,0,133,154,165,149,16,9,1
   66,148,32,92,40,134,148,133,6801
VC 2550 DATA 149,165,149,41,192,240,17,16
   9,0,56,229,148,133,148,169,128,750
DR 2560 DATA 229,149,133,149,169,255,133,
   154,6,148,38,149,38,148,38,149,7880
VW 2570 DATA 176,40,38,148,144,4,230,149,
   240,32,166,149,189,70,41,24,7608
MH 2580 DATA 105,1,133,142,169,0,105,0,13
   3,143,165,154,16,11,165,143,6649
FO 2590 DATA 166,142,32,92,40,134,142,133
   ,143,96,169,0,133,142,133,143,8672
DR 2600 DATA 96,169,0,133,154,166,148,165
   ,149,16,5,133,154,32,92,40,5310
IG 2610 DATA 189,70,42,72,189,70,43,170,1
   04,164,154,16,3,32,92,40,3348
PS 2620 DATA 133,143,134,142,96,166,143,2
   32,224,2,176,15,202,138,69,142,359
VU 2630 DATA 48,9,165,142,133,143,165,141
   ,133,142,96,162,127,160,255,165,3538
ZE 2640 DATA 143,48,5,134,143,132,142,96,
   232,200,240,247,255,255,255,255,1181
JI 2650 DATA 255,255,255,255,255,255,255,
   254,254,254,254,254,254,254,253,253,71
   91
MR 2660 DATA 253,253,253,252,252,252,252,
   251,251,251,251,250,250,250,249,249,67
   29
CV 2670 DATA 249,248,248,248,247,247,247,
   246,246,245,245,244,244,244,243,243,59
   73
AF 2680 DATA 242,242,241,241,240,240,239,
   238,238,237,237,236,236,235,234,234,48
   73
JY 2690 DATA 233,232,232,231,230,230,229,
   228,228,227,226,226,225,224,223,223,34
   58
VE 2700 DATA 222,221,220,219,219,218,217,
   216,215,214,214,213,212,211,210,209,17
   39
BN 2710 DATA 208,207,206,206,205,204,203,
   202,201,200,199,198,197,196,195,194,97
   68
DC 2720 DATA 193,192,191,190,189,188,187,
   185,184,183,182,181,180,179,178,177,75
   00
XE 2730 DATA 176,174,173,172,171,170,169,
   167,166,165,164,163,161,160,159,158,50
   05
ZQ 2740 DATA 156,155,154,153,151,150,149,
   148,146,145,144,143,141,140,139,137,22
   96
ZW 2750 DATA 136,135,133,132,131,129,128,
   127,125,124,122,121,120,118,117,116,94
   06
FK 2760 DATA 114,113,111,110,108,107,106,
   104,103,101,100,98,97,96,94,93,6345
JN 2770 DATA 91,90,88,87,85,84,82,81,79,7
   8,76,75,73,72,70,69,3142
BH 2780 DATA 67,66,64,63,61,60,58,57,55,5
   4,52,50,49,47,46,44,9846
KC 2790 DATA 43,41,40,38,37,35,33,32,30,2
   9,27,26,24,23,21,19,6491
EJ 2800 DATA 18,16,15,13,12,10,8,7,5,4,2,
   1,0,0,0,0,3298
UT 2810 DATA 0,0,0,1,1,1,1,1,1,2,2,2,2,2,
   2,3,3047
YT 2820 DATA 3,3,3,3,3,3,4,4,4,4,4,4,5,5,
   5,5,3401
YT 2830 DATA 5,5,6,6,6,6,6,6,6,7,7,7,7,7,
   7,8,3750
NP 2840 DATA 8,8,8,8,8,8,9,9,9,9,9,9,9,10
   ,10,10,4088
ZH 2850 DATA 10,10,10,11,11,11,11,11,11,1
   1,12,12,12,12,12,12,4421
MP 2860 DATA 12,13,13,13,13,13,13,13,13,14,1
   4,14,14,14,14,14,15,4743
HK 2870 DATA 15,15,15,15,15,15,15,16,16,1
   6,16,16,16,16,17,17,5049
TR 2880 DATA 17,17,17,17,17,17,18,18,18,1
   8,18,18,18,19,19,19,5352
OK 2890 DATA 19,19,19,19,19,20,20,20,20,2
   0,20,20,20,20,21,21,5626
QN 2900 DATA 21,21,21,21,21,21,22,22,22,2
   2,22,22,22,22,22,23,5887
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FG 2910 DATA 23,23,23,23,23,23,23,23,24,2
   4,24,24,24,24,24,24,6138
ZH 2920 DATA 24,25,25,25,25,25,25,25,25,2
   5,26,26,26,26,26,26,6400
CG 2930 DATA 26,26,26,26,27,27,27,27,27,2
   7,27,27,27,27,27,28,6608
YX 2940 DATA 28,28,28,28,28,28,28,28,28,2
   9,29,29,29,29,29,29,6839
QI 2950 DATA 29,29,29,29,29,30,30,30,30,3
   0,30,30,30,30,30,30,7015
HC 2960 DATA 31,31,31,31,31,31,31,31,31,3
   1,31,31,0,41,81,122,9119
UZ 2970 DATA 163,204,244,29,70,111,151,19
   2,233,17,58,98,139,180,220,5,9786
MJ 2980 DATA 45,86,126,167,207,247,32,72,
   112,153,193,233,17,57,97,137,9683
AR 2990 DATA 177,217,1,41,81,120,160,200,
   239,23,62,102,141,181,220,3,9615
NX 3000 DATA 42,81,120,159,198,237,20,59,
   97,136,174,213,251,34,72,110,506
IE 3010 DATA 148,186,224,6,44,81,119,157,
   194,231,13,50,87,124,161,198,270
KH 3020 DATA 235,16,52,89,125,162,198,234
   ,15,51,86,122,158,194,229,9,58
HY 3030 DATA 44,80,115,150,185,220,255,33
   ,68,103,137,171,206,240,18,52,814
IV 3040 DATA 86,119,153,187,220,253,31,64
   ,97,130,163,195,228,5,37,69,8917
VR 3050 DATA 102,134,166,198,230,5,37,68,
   100,131,162,193,224,255,30,61,909
MF 3060 DATA 91,122,152,183,213,243,17,47
   ,76,106,136,165,194,224,253,26,2690
NC 3070 DATA 55,84,112,141,170,198,226,25
   4,27,55,83,110,138,166,193,221,3420
RU 3080 DATA 248,19,46,73,100,127,154,180
   ,207,233,4,30,56,82,108,134,7813
JY 3090 DATA 159,185,211,236,5,31,56,81,1
   06,131,156,180,205,229,254,22,2620
BR 3100 DATA 46,70,94,118,142,166,190,213
   ,237,4,27,51,74,97,120,142,8254
ZR 3110 DATA 165,188,211,233,255,22,44,66
   ,88,110,132,154,176,197,219,240,4822
AR 3120 DATA 6,27,48,69,90,111,132,153,17
   4,195,215,236,169,1,133,226,3399
MA 3130 DATA 173,0,211,201,255,208,4,169,
   0,240,54,41,8,208,3,32,5702
TG 3140 DATA 175,44,173,0,211,41,4,208,3,
   32,143,44,173,0,211,41,5433
LD 3150 DATA 2,208,8,32,15,45,198,226,32,
   168,45,173,0,211,41,1,5383
PX 3160 DATA 208,8,32,3,45,230,226,32,168
   ,45,169,80,141,2,210,169,9431
SZ 3170 DATA 34,141,3,210,96,166,130,224,
   3,208,12,162,255,172,51,35,9744
BZ 3180 DATA 208,2,160,80,136,132,240,232
   ,134,130,230,200,230,200,169,0,4961
QK 3190 DATA 162,128,76,207,44,166,130,20
   8,14,162,4,172,51,35,192,79,7605
RF 3200 DATA 208,2,160,255,200,132,240,20
   2,134,130,198,200,198,200,169,0,4993
RQ 3210 DATA 162,128,32,92,40,133,163,36,
   186,16,24,138,24,101,158,133,6497
XS 3220 DATA 158,165,159,101,163,133,159,
   138,24,101,222,133,222,165,223,101,384
   0
K5 3230 DATA 163,133,223,96,141,51,35,141
   ,57,35,141,63,35,73,128,141,5919
TC 3240 DATA 54,35,141,60,35,141,66,35,96
   ,169,1,32,208,45,32,143,4841
XH 3250 DATA 45,169,0,240,10,169,255,32,2
   08,45,32,143,45,169,128,133,9087
TV 3260 DATA 160,36,186,16,227,165,220,13
   3,148,165,221,133,149,32,154,40,1187
NT 3270 DATA 32,185,45,165,143,166,142,36
   ,160,48,3,32,92,40,133,163,6156
TO 3280 DATA 138,24,101,218,133,218,165,1
   63,101,219,133,219,165,220,133,148,585
   1
LQ 3290 DATA 165,221,133,149,32,147,40,32
   ,185,45,165,218,133,150,165,219,2824
NK 3300 DATA 133,151,165,142,133,148,165,
   143,133,149,32,66,39,32,31,41,4557
BL 3310 DATA 165,142,133,148,165,143,133,
   149,32,251,40,166,142,165,143,36,663
EH 3320 DATA 160,16,3,32,92,40,133,163,13
   8,24,101,220,133,220,165,221,2637
WG 3330 DATA 101,163,133,221,96,169,0,133
   ,182,169,1,133,183,165,156,133,1690
DZ 3340 DATA 218,165,157,133,219,165,158,
   133,220,165,159,133,221,96,165,220,633
   3
TJ 3350 DATA 133,158,165,221,133,159,165,
   218,133,156,165,219,133,157,96,165,490
   3
JD 3360 DATA 142,133,148,165,143,133,149,
   165,182,133,150,165,183,133,151,32,236
   4
GG 3370 DATA 24,39,32,31,41,96,133,131,19
   7,198,240,12,133,198,165,197,3117
WF 3380 DATA 73,85,133,197,169,0,133,131,
   165,132,24,101,131,48,14,201,7716
NC 3390 DATA 20,144,18,165,197,73,85,133,
   197,169,0,240,8,165,197,73,374
FA 3400 DATA 85,133,197,169,19,133,132,17
   0,165,197,157,202,34,73,85,168,1228
IX 3410 DATA 138,74,170,152,157,192,34,13
   8,74,170,152,157,180,34,162,0,9261
TO 3420 DATA 165,132,201,3,144,5,233,3,23
   2,208,247,165,197,157,185,34,3812
ZL 3430 DATA 162,0,165,132,201,5,144,5,23
   3,5,232,208,247,165,197,157,4881
JJ 3440 DATA 176,34,96,198,139,208,16,169
   ,2,133,139,165,138,16,25,173,8189
SN 3450 DATA 16,208,240,4,32,170,46,96,16
   9,15,133,138,169,3,133,203,9160
WX 3460 DATA 169,112,133,200,169,16,133,1
   37,32,170,46,165,138,170,74,24,8162
GD 3470 DATA 169,15,133,201,224,14,208,11
   ,169,1,133,203,165,200,24,105,35
FU 3480 DATA 8,133,200,224,12,208,11,169,
   0,133,203,165,200,24,105,4,8105
ZX 3490 DATA 133,200,169,2,141,6,210,164,
   137,240,2,136,136,132,137,140,1259
WM 3500 DATA 7,210,169,20,133,129,169,0,1
   33,128,32,183,46,198,138,96,9137
NA 3510 DATA 169,0,160,159,153,0,20,200,1
   92,208,144,248,96,169,1,133,1425
IO 3520 DATA 134,224,12,144,23,240,19,138
   ,56,233,13,170,188,248,46,189,2153
UH 3530 DATA 251,46,133,134,189,254,46,17
   0,208,10,162,15,138,74,73,255,898
HB 3540 DATA 24,105,184,168,134,164,189,2
   2,50,170,165,134,133,136,189,142,2464
LN 3550 DATA 49,145,128,200,198,136,208,2
   49,232,198,164,16,237,96,172,168,6084
TR 3560 DATA 159,2,2,4,11,15,11,165,157,4
   8,33,201,96,144,12,165,6039
HX 3570 DATA 159,73,128,133,159,169,95,13
   3,157,133,156,165,157,201,2,144,1957
KL 3580 DATA 11,165,225,48,16,201,2,144,1
   2,76,180,47,169,2,133,156,7368
GY 3590 DATA 133,157,32,180,47,169,0,133,
   229,32,135,52,133,137,141,7,7530
KY 3600 DATA 210,32,246,52,169,255,133,13
   8,32,170,46,32,36,38,162,38,6146
VM 3610 DATA 165,20,133,163,160,4,173,10,
   210,153,22,208,192,4,208,1,8827
OW 3620 DATA 136,136,16,242,173,10,210,14
   1,18,208,173,10,210,141,25,208,1239
CF 3630 DATA 141,20,208,141,21,208,173,10
   ,210,141,19,208,9,16,141,1,6120
JU 3640 DATA 210,165,20,197,163,240,205,2
   02,16,198,32,13,39,198,196,208,2513
MK 3650 DATA 5,104,104,76,226,35,206,226,
   27,32,36,38,32,163,47,165,6527
YP 3660 DATA 238,208,3,32,226,55,76,174,5
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   4,169,0,162,223,202,157,0,37
EZ 3670 DATA 21,157,0,22,157,0,23,208,244
   ,96,32,163,47,166,157,224,1041
NG 3680 DATA 2,144,13,165,156,16,1,232,22
   4,64,144,5,169,0,133,217,9372
PN 3690 DATA 96,189,62,49,133,217,170,224
   ,16,176,46,165,165,56,253,126,2625
DA 3700 DATA 49,141,2,208,169,0,141,10,20
   8,134,164,138,74,133,163,169,1426
WK 3710 DATA 183,56,229,163,56,229,208,16
   8,189,22,50,170,189,142,49,153,1937
QH 3720 DATA 0,22,200,232,198,164,16,244,
   96,224,22,176,99,138,56,233,2575
LN 3730 DATA 16,170,134,168,165,165,56,25
   3,38,50,141,2,208,24,105,8,6551
HD 3740 DATA 141,3,208,169,0,141,10,208,1
   41,11,208,189,50,50,56,229,9556
XI 3750 DATA 208,168,189,44,50,133,166,18
   9,201,50,170,189,56,50,240,28,682
TI 3760 DATA 153,0,23,134,163,162,0,134,1
   67,166,166,74,38,167,202,16,9372
HM 3770 DATA 250,166,163,165,167,153,0,22
   ,200,232,208,223,166,168,165,165,6139
AX 3780 DATA 56,253,186,51,72,188,180,51,
   189,192,51,170,104,76,18,49,7952
TQ 3790 DATA 138,56,233,22,170,134,168,18
   9,207,50,141,11,208,189,215,50,2590
TF 3800 DATA 141,12,208,189,211,50,141,10
   ,208,165,165,56,253,223,50,141,3193
JU 3810 DATA 7,208,24,125,219,50,141,6,20
   8,125,219,50,141,5,208,125,389
GO 3820 DATA 219,50,141,4,208,125,227,50,
   141,2,208,125,231,50,141,3,9300
XU 3830 DATA 208,188,164,51,189,235,50,56
   ,229,208,170,185,239,50,240,31,4397
XI 3840 DATA 133,164,185,240,50,157,0,19,
   185,241,50,157,0,22,185,242,624
ON 3850 DATA 50,157,0,23,232,198,164,208,
   233,200,200,200,200,208,220,136,9151
PI 3860 DATA 136,136,136,185,239,50,240,3
   1,133,164,185,240,50,157,0,19,9743
MQ 3870 DATA 185,241,50,157,0,22,185,242,
   50,157,0,23,232,224,223,240,4311
XJ 3880 DATA 6,198,164,208,229,240,216,16
   6,168,188,168,51,165,165,24,125,3698
DG 3890 DATA 172,51,72,189,176,51,170,104
   ,141,1,208,173,194,2,24,105,8577
YH 3900 DATA 2,141,19,208,141,193,2,134,1
   64,152,56,229,208,168,169,0,1973
IO 3910 DATA 141,9,208,189,22,50,170,189,
   142,49,153,0,21,200,232,198,1733
VI 3920 DATA 164,16,244,96,0,0,25,24,23,2
   2,21,20,19,18,17,16,7507
PD 3930 DATA 15,14,13,12,11,10,10,9,9,8,8
   ,7,7,6,6,5025
RN 3940 DATA 6,6,5,5,5,5,5,4,4,4,4,4,3,3,
   3,3,4457
GU 3950 DATA 3,2,2,2,2,2,2,1,1,1,1,1,1,0,
   0,0,4070
BV 3960 DATA 0,0,0,0,5,5,4,4,5,5,4,4,5,5,
   4,4,4521
ND 3970 DATA 5,5,4,4,8,8,8,24,24,24,24,24
   ,24,24,8,28,6573
OI 3980 DATA 28,28,8,8,28,28,28,28,8,24,2
   4,60,60,60,24,24,8508
GQ 3990 DATA 24,24,60,60,60,60,24,24,8,28
   ,28,62,62,62,28,28,9448
IE 4000 DATA 8,8,28,28,62,62,62,62,28,28,
   8,24,60,60,126,126,2266
KI 4010 DATA 126,126,126,60,60,24,24,60,6
   0,126,126,126,126,126,60,7048
XU 4020 DATA 60,24,28,62,62,127,127,127,1
   27,127,127,127,62,62,28,28,5313
OV 4030 DATA 62,62,127,127,127,127,127,12
   7,127,127,62,62,28,24,60,126,5862
YM 4040 DATA 126,255,255,255,255,255,255,
   255,126,126,60,24,24,60,126,126,1491
BC 4050 DATA 126,255,255,255,255,255,255,
   126,126,126,60,24,0,1,3,6,5566
WW 4060 DATA 10,15,21,28,36,45,55,66,78,9
   1,105,120,9,8,9,8,337
MB 4070 DATA 8,8,6,7,6,7,7,7,175,174,173,
   171,170,167,192,224,2599
DB 4080 DATA 224,240,240,240,248,248,248,
   248,248,240,240,240,224,224,192,0,1992
IB 4090 DATA 192,224,224,240,240,240,248,
   248,248,248,248,248,248,240,240,240,71
   62
NR 4100 DATA 224,224,192,0,128,224,240,24
   0,248,248,248,252,252,252,252,252,6012
LG 4110 DATA 252,252,248,248,248,240,240,
   224,128,0,128,224,224,240,240,248,1842
SF 4120 DATA 248,248,252,252,252,252,252,
   252,252,252,248,248,248,240,240,224,74
   40
HJ 4130 DATA 224,128,0,128,224,240,248,24
   8,252,252,252,254,254,254,254,254,6742
JN 4140 DATA 254,254,254,254,254,254,252,
   252,252,248,248,240,224,128,0,128,362
BS 4150 DATA 240,248,248,252,252,254,254,
   254,254,255,255,255,255,255,255,255,87
   23
DD 4160 DATA 255,255,255,255,255,254,254,
   254,254,252,252,248,248,240,128,0,2377
FH 4170 DATA 18,38,60,85,113,0,0,0,1,0,0,
   1,1,0,0,0,5383
DU 4180 DATA 85,2,2,2,4,13,12,16,24,2,2,2
   ,4,8,8,16,5415
SA 4190 DATA 16,165,160,152,136,0,0,0,0,1
   ,0,62,0,1,0,127,9104
IM 4200 DATA 0,1,0,255,128,1,1,255,192,2,
   3,255,224,3,7,255,9895
CV 4210 DATA 240,4,15,255,248,6,31,255,25
   2,0,0,0,0,1,0,126,3354
JX 4220 DATA 0,1,0,255,0,1,1,255,128,1,3,
   255,192,1,7,255,8245
VY 4230 DATA 224,2,15,255,240,2,31,255,24
   8,3,63,255,252,5,127,255,4338
VP 4240 DATA 254,7,255,255,255,0,0,0,0,1,
   0,24,0,1,0,60,8840
ST 4250 DATA 0,2,0,126,0,1,0,255,0,1,1,25
   5,128,2,3,255,5702
TA 4260 DATA 192,2,7,255,224,3,15,255,240
   ,3,31,255,248,3,63,255,2662
RJ 4270 DATA 252,6,127,255,254,7,255,255,
   255,0,0,0,0,1,0,60,4341
LV 4280 DATA 0,1,0,126,0,2,0,255,0,2,1,25
   5,128,2,3,255,5746
UP 4290 DATA 192,3,7,255,224,3,15,255,240
   ,4,31,255,248,5,63,255,2732
XV 4300 DATA 252,10,127,255,254,15,255,25
   5,255,0,4,40,84,136,171,167,2210
JF 4310 DATA 160,151,255,0,1,2,9,11,13,15
   ,179,178,177,176,175,173,235
SX 4320 DATA 3,3,3,3,2,1,2,3,4,5,6,7,169,
   97,56,229,2699
AV 4330 DATA 157,133,163,41,7,170,165,163
   ,74,74,74,168,189,217,52,141,1687
IZ 4340 DATA 219,32,141,220,32,189,226,52
   ,141,211,32,141,212,32,132,171,2561
AB 4350 DATA 162,23,169,31,153,184,27,157
   ,160,27,202,136,16,246,164,171,2915
EK 4360 DATA 169,27,157,161,27,169,26,153
   ,184,27,169,0,153,185,27,157,9534
JZ 4370 DATA 160,27,202,200,192,15,144,24
   4,165,159,24,105,32,42,42,42,6905
DX 4380 DATA 41,3,170,208,19,165,159,24,1
   05,32,201,54,144,4,162,1,6657
BT 4390 DATA 208,6,201,12,176,2,162,3,188
   ,235,52,185,243,52,160,3,480
ZC 4400 DATA 153,164,27,136,16,250,188,23
   9,52,185,243,52,160,3,153,200,3546
FF 4410 DATA 27,136,16,250,166,157,165,15
   6,16,1,232,224,6,144,58,162,882
VB 4420 DATA 0,32,152,52,74,102,150,133,1
   51,32,24,39,32,31,41,169,4824
SN 4430 DATA 127,24,101,143,133,241,162,1
   ,32,152,52,133,151,32,24,39,6104
```

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JV 4440 DATA 32,31,41,169,64,56,229,143,1
   33,174,96,169,3,164,174,153,2150
PY 4450 DATA 255,18,153,0,19,153,1,19,96,
   169,0,133,174,96,165,159,9147
QT 4460 DATA 133,149,165,158,133,148,224,
   1,240,6,32,147,40,76,173,52,8494
JQ 4470 DATA 32,154,40,165,142,133,148,16
   5,143,133,149,165,156,133,150,165,4470
OC 4480 DATA 157,74,102,150,74,102,150,96
   ,24,105,32,201,64,176,13,133,8140
SR 4490 DATA 149,165,158,162,6,70,149,106
   ,202,208,250,96,169,0,96,0,9869
ME 4500 DATA 1,3,7,15,31,63,127,255,0,128
   ,192,224,240,248,252,254,8566
SI 4510 DATA 255,1,1,0,0,1,2,2,1,224,0,22
   7,162,47,169,0,5078
LD 4520 DATA 157,160,27,202,16,250,96,32,
   12,38,169,0,162,223,202,157,1511
PD 4530 DATA 0,19,208,250,141,12,208,165,
   186,16,12,165,174,240,8,165,2073
US 4540 DATA 241,141,4,208,32,133,52,32,1
   ,47,32,94,53,32,61,46,2232
ZY 4550 DATA 32,70,44,165,186,16,30,32,15
   7,54,32,102,53,32,198,51,5458
RP 4560 DATA 173,252,2,201,33,208,14,164,
   19,32,36,38,173,0,211,201,8843
TN 4570 DATA 255,240,249,132,19,169,255,1
   41,252,2,173,31,208,201,7,240,4628
AQ 4580 DATA 166,76,226,35,165,159,32,194
   ,52,133,165,96,165,172,240,27,2621
BN 4590 DATA 165,138,73,15,133,163,165,15
   7,74,74,56,229,163,24,105,2,8196
WG 4600 DATA 201,2,144,12,16,5,173,194,2,
   208,2,169,15,133,201,96,8914
XP 4610 DATA 230,237,169,0,32,135,52,32,3
   6,38,32,246,52,133,137,133,8140
DM 4620 DATA 234,169,255,133,138,32,170,4
   6,169,30,133,239,173,194,2,133,2204
JO 4630 DATA 199,32,180,47,32,94,53,169,1
   35,56,229,208,168,185,0,19,9936
AV 4640 DATA 45,10,210,153,0,19,185,0,21,
   45,10,210,153,0,21,185,5889
BF 4650 DATA 0,22,45,10,210,153,0,22,185,
   0,23,45,10,210,153,0,4836
TF 4660 DATA 23,200,192,223,144,215,165,2
   39,74,170,133,163,144,4,169,0,1876
IK 4670 DATA 240,6,165,199,41,240,5,163,1
   60,2,153,193,2,153,19,208,437
WQ 4680 DATA 136,16,247,138,9,128,141,1,2
   10,138,74,9,128,141,5,210,9214
NQ 4690 DATA 169,128,141,0,210,141,4,210,
   32,70,44,165,157,201,2,176,295
OU 4700 DATA 6,169,2,133,157,133,156,198,
   239,240,6,32,12,38,76,171,9406
MK 4710 DATA 53,32,36,38,32,13,39,165,238
   ,208,29,32,226,55,165,187,1018
WM 4720 DATA 201,5,144,10,169,6,141,19,31
   ,104,104,76,226,35,230,187,668
KD 4730 DATA 238,251,27,230,196,238,226,2
   7,248,173,10,210,41,112,240,248,6938
EO 4740 DATA 24,101,190,133,190,165,191,1
   01,187,133,191,165,192,105,0,133,3341
QZ 4750 DATA 192,216,162,2,160,0,181,190,
   32,19,38,153,215,27,153,157,167
WP 4760 DATA 38,200,165,163,153,215,27,15
   3,157,38,200,202,16,232,76,174,3610
FU 4770 DATA 54,173,10,210,41,240,201,176
   ,240,247,9,6,141,194,2,141,2136
SU 4780 DATA 195,2,96,165,238,208,3,76,22
   0,56,201,1,208,3,76,57,8555
WQ 4790 DATA 57,76,21,55,169,45,133,186,1
   65,237,197,236,144,3,76,199,3908
BZ 4800 DATA 55,173,10,210,197,213,176,3,
   76,237,55,165,213,24,105,10,69
KT 4810 DATA 133,213,169,0,133,180,133,18
   1,164,187,173,10,210,41,3,201,1934
JU 4820 DATA 3,240,247,133,188,201,2,240,
   17,169,1,190,169,55,44,10,8577
SU 4830 DATA 210,48,3,32,92,40,133,181,13
   4,180,32,139,54,165,188,208,2538
ZE 4840 DATA 4,192,2,176,8,173,10,210,41,
   31,56,233,15,133,159,32,7811
NZ 4850 DATA 13,39,169,0,133,158,169,2,13
   3,238,96,164,187,165,156,56,2838
JM 4860 DATA 249,163,55,133,156,165,157,2
   33,1,133,157,165,188,240,67,165,5360
QL 4870 DATA 159,16,3,32,157,55,217,175,5
   5,144,31,165,188,201,1,240,2601
OO 4880 DATA 9,190,187,55,185,193,55,76,7
   3,55,190,169,55,169,1,36,8123
YQ 4890 DATA 159,48,3,32,92,40,134,180,13
   3,181,165,188,201,2,208,18,1487
YB 4900 DATA 165,159,16,3,32,157,55,217,1
   81,55,176,6,169,0,133,180,9925
PT 4910 DATA 133,181,165,158,24,101,180,1
   33,158,165,159,101,181,133,159,169,491
   9
RK 4920 DATA 4,141,8,210,169,96,24,101,15
   7,141,0,210,56,233,1,141,71
NY 4930 DATA 4,210,169,96,56,229,157,74,7
   4,74,9,160,141,1,210,141,268
SC 4940 DATA 5,210,96,73,255,24,105,1,96,
   40,56,72,80,104,112,0,5027
YV 4950 DATA 0,32,64,64,64,8,12,16,16,16,
   16,4,6,8,12,15,7180
KR 4960 DATA 15,128,192,216,0,128,0,0,0,1
   ,1,2,2,32,237,55,2393
KC 4970 DATA 185,220,55,133,189,169,255,1
   33,231,133,159,133,235,169,0,133,5403
XC 4980 DATA 238,96,6,5,4,3,3,3,169,12,13
   3,236,169,0,133,237,9451
WH 4990 DATA 133,208,96,32,139,54,164,187
   ,173,10,210,41,15,24,121,178,9271
BD 5000 DATA 56,133,189,169,0,133,19,133,
   156,133,158,169,75,133,157,173,3020
QH 5010 DATA 10,210,133,159,32,39,56,32,7
   4,56,32,127,56,169,1,133,5856
MZ 5020 DATA 238,169,3,133,228,165,213,56
   ,233,10,133,213,96,173,10,210,3602
ND 5030 DATA 41,128,133,210,164,187,173,1
   0,210,57,190,56,217,196,56,176,4242
TR 5040 DATA 245,133,180,169,0,133,181,17
   3,10,210,57,184,56,133,211,96,2532
IQ 5050 DATA 173,10,210,41,128,133,209,16
   4,187,173,10,210,57,214,56,133,2998
TM 5060 DATA 179,173,10,210,57,184,56,133
   ,212,192,4,144,10,165,238,240,4750
HT 5070 DATA 6,169,0,133,179,160,3,173,10
   ,210,57,202,56,217,208,56,2229
QD 5080 DATA 176,245,133,178,96,164,187,1
   73,10,210,57,153,56,24,105,1,8322
RI 5090 DATA 133,230,185,159,56,133,231,3
   2,165,56,169,0,133,229,96,255,4184
JC 5100 DATA 127,255,127,63,31,1,1,0,0,0,
   0,169,0,162,143,157,5491
CR 5110 DATA 0,21,232,224,223,144,248,96,
   15,13,11,9,7,6,255,255,9801
DP 5120 DATA 127,127,127,127,63,127,127,2
   55,255,255,64,96,128,160,192,255,7961
SB 5130 DATA 127,127,255,255,63,63,96,128
   ,192,255,32,64,0,0,0,0,5083
YH 5140 DATA 1,1,165,169,208,9,173,194,2,
   24,105,16,32,150,54,164,7726
IA 5150 DATA 217,185,77,59,133,149,169,0,
   133,148,133,151,230,235,165,235,7413
SL 5160 DATA 201,50,144,4,169,0,133,235,2
   01,25,144,4,169,49,229,235,3334
LZ 5170 DATA 170,189,103,59,141,0,210,56,
   233,4,141,4,210,169,96,141,1414
DZ 5180 DATA 8,210,165,217,74,24,105,2,9,
   32,141,1,210,141,5,210,8339
TF 5190 DATA 189,52,59,133,150,32,24,39,3
   2,31,41,165,143,133,208,164,108
ZB 5200 DATA 187,165,229,208,32,165,19,19
   7,189,144,26,169,255,133,230,165,6817
GG 5210 DATA 156,56,249,163,55,133,156,16
```

```
   5,157,233,1,133,157,165,238,240,7473
BB 5220 DATA 3,32,121,55,96,198,211,208,1
   5,165,238,208,8,165,235,240,7357
SZ 5230 DATA 4,230,211,208,3,32,39,56,165
   ,159,16,3,32,157,55,217,8285
VK 5240 DATA 6,59,144,8,165,159,41,128,73
   ,128,133,210,198,212,208,15,3740
HH 5250 DATA 165,238,208,8,165,235,240,4,
   230,212,208,3,32,74,56,165,1940
MY 5260 DATA 157,197,228,176,4,169,0,240,
   7,217,12,59,144,4,169,128,9737
XG 5270 DATA 133,209,198,230,208,6,165,23
   1,240,9,198,231,169,3,133,228,6496
BV 5280 DATA 76,152,58,230,230,165,229,20
   8,32,169,15,133,228,133,234,197,7388
MW 5290 DATA 157,176,237,165,157,133,225,
   165,156,133,224,165,158,133,222,165,87
   12
BV 5300 DATA 159,133,223,133,232,169,40,1
   33,229,198,229,208,9,32,165,56,3436
HT 5310 DATA 32,127,56,76,152,58,165,234,
   240,4,198,234,9,128,141,5,1493
EE 5320 DATA 210,169,10,141,4,210,166,226
   ,224,1,240,11,165,232,24,105,2943
QI 5330 DATA 64,16,4,138,73,2,170,134,183
   ,169,64,133,182,165,224,133,4430
WM 5340 DATA 218,165,225,133,219,165,222,
   133,220,165,223,133,221,165,232,24,852
   4
BD 5350 DATA 105,64,41,128,32,25,45,165,2
   18,133,224,165,219,133,225,165,6623
AY 5360 DATA 220,133,222,165,221,133,223,
   32,194,52,133,233,165,225,16,4,3016
HL 5370 DATA 169,1,133,225,201,96,144,13,
   32,165,56,169,0,133,229,32,9924
IU 5380 DATA 127,56,76,152,58,201,64,176,
   53,74,74,32,157,55,24,105,7073
EH 5390 DATA 15,170,160,2,217,43,59,176,3
   ,136,16,248,165,233,56,249,4167
DR 5400 DATA 46,59,141,1,208,185,49,59,14
   1,9,208,169,15,141,193,2,9727
QS 5410 DATA 141,19,208,169,21,133,129,16
   9,0,133,128,32,183,46,165,209,2011
JO 5420 DATA 240,16,165,156,56,229,178,13
   3,156,165,157,229,179,133,157,76,6064
ET 5430 DATA 185,58,165,156,24,101,178,13
   3,156,165,157,101,179,133,157,165,5063
XZ 5440 DATA 210,240,16,165,158,56,229,18
   0,133,158,165,159,229,181,133,159,7557
RE 5450 DATA 76,218,58,165,158,24,101,180
   ,133,158,165,159,101,181,133,159,4763
YG 5460 DATA 165,238,240,39,198,216,16,35
   ,166,215,165,217,74,9,96,141,2502
IZ 5470 DATA 1,210,169,64,141,8,210,189,1
   8,59,141,0,210,189,30,59,9462
MH 5480 DATA 133,216,232,224,12,144,2,162
   ,0,134,215,96,24,32,40,48,6856
IC 5490 DATA 64,96,70,75,80,85,90,95,150,
   130,135,150,145,160,130,135,2726
RY 5500 DATA 150,130,140,145,3,2,3,4,3,4,
   5,4,2,3,4,2,7320
ZG 5510 DATA 0,0,13,15,4,8,16,0,1,3,0,56,
   72,89,102,114,2036
JH 5520 DATA 125,135,145,154,162,170,177,
   185,191,198,205,211,217,223,229,235,31
   39
NR 5530 DATA 240,246,251,3,4,8,10,12,14,1
   6,20,26,30,33,36,39,95
CQ 5540 DATA 42,45,48,51,57,60,66,72,78,8
   5,100,120,110,240,232,224,3649
BQ 5550 DATA 216,208,200,192,184,176,168,
   160,152,144,136,128,120,112,108,104,42
   34
GO 5560 DATA 100,96,94,92,92,92,0,224,2,2
   25,2,226,35,0,0,0,4763
```

Listing 2.
BASIC listing.

```
XH 10 REM *** DEATHZONE ***
LI 20 REM CASSETTE MAKER PROGRAM
EI 40 DIM DAT(16):LINE=990:RESTORE 1000:T
   RAP 120:? "CHECKING DATA"
DO 50 LINE=LINE+10:? "LINE:";LINE:FOR X=1
    TO 16:READ DAT:IF DAT<0 OR DAT>255 TH
   EN 220
YY 60 DAT(X)=DAT:NEXT X:DATLIN=PEEK(183)+
   PEEK(184)*256:IF DATLIN<>LINE THEN ? "
   LINE ";LINE;" MISSING!":END
WP 70 TOTAL=LINE:FOR X=1 TO 16
HM 80 IF PASS=2 THEN PUT #1,DAT(X):NEXT X
   :READ CHKSUM:GOTO 50
AJ 90 TOTAL=TOTAL+DAT(X)*X:IF TOTAL>9999
   THEN TOTAL=TOTAL-10000
LR 100 NEXT X:READ CHKSUM:IF TOTAL=CHKSUM
    THEN 50
MO 110 GOTO 220
ZR 120 IF PEEK(195)<>6 THEN 220
ZT 130 IF PASS=0 THEN 200
AD 160 FOR X=1 TO 128:PUT #1,0:NEXT X:CLO
   SE #1:END
SD 200 ? "READY CASSETTE AND PRESS RETURN
   ";:OPEN #1,8,128,"C:":RESTORE 230:FOR
   X=1 TO 40:READ N:PUT #1,N:NEXT X
QS 210 ? :? "WRITING FILE":PASS=2:LINE=99
   0:RESTORE 1000:TRAP 120:GOTO 50
MI 220 ? "BAD DATA: LINE ";LINE:END
UV 230 DATA 0,58,210,30,249,30,169,0,234,
   234,234,169,60,141,2,211,169,0,141,231
   ,2,133,14,169,64,141,232,2
SQ 240 DATA 133,15,169,226,133,10,169,35,
   133,11,24,96
```

BASIC Editor II

A revised edition with all updates included

by Clayton Walnum

BASIC Editor II is a utility to help you enter BASIC program listings published in **ANALOG Computing**. To simplify the identification of errors, each program line is evaluated immediately after it's typed, eliminating the need for cumbersome checksum listings. When you've finished entering a program using **BASIC Editor II**, you can be certain it contains no typos.

An option is provided for those who wish to use standard BASIC abbreviations. Also, the program retains all Atari editing features. Finally, for those who prefer to type programs the conventional way, using the built-in editor, a post-processing mode is available. It allows you to check typing after the entire listing has been entered.

Typing in the Editor.

To create your copy of **BASIC Editor II**, follow the instructions below—exactly.

Disk version.

(1) Type in Listing 1, then verify your work with **Unicheck** (see issue 39).

(2) Save the program to disk with the command *SAVE "D:EDITORL1.BAS"*.

(3) Clear the computer's memory with the command *NEW*.

(4) Type in Listing 2, then verify your work with **Unicheck**.

(5) Run the program (after saving a backup copy) and follow all the on-screen prompts. A data file will be written to your disk.

(6) Load Listing 1 with the command *LOAD "D:EDITORL1.BAS"*.

(7) Merge the file created by Listing 2 with the command *ENTER "D:ML.DAT"*.

(8) Save the resultant program with the command *LIST "D:EDITORII.BAS"*.

Cassette version.

(1) Type in Listing 1 and verify your work with **Unicheck**.

(2) Save the program to cassette with the command *CSAVE*. (Do *not* rewind the cassette.)

(3) Clear the computer's memory with the command *NEW*.

(4) Type in Listing 2 and verify your work with **Unicheck**.

(5) Run the program and follow the on-screen prompts. A data file will be written to your cassette.

(6) Rewind the cassette.

(7) Load Listing 1 with the command *CLOAD*.

(8) Merge the file created by Listing 2 with the command *ENTER "C:"*.

(9) On a new cassette, save the resultant program with the command *LIST "C:"*.

Using the Editor.

Take a look at one of the BASIC program listings in this issue. Notice that each program line is preceded by a two-letter code. This code is the checksum for that line; it's not a part of the program.

To enter a program listing from the magazine, load **BASIC Editor II** with the *ENTER* command, and run it. You'll be asked if you wish to allow abbreviations (see your BASIC manual). If you do, type *Y* and press RETURN. Otherwise, type *N*.

Note: if you set **BASIC Editor II** to allow abbreviations, the program will run slightly slower.

Your screen will now be divided into two "windows." The upper window will display each line after it's processed, as well as the checksum generated for that line. The lower window is where program lines are typed and edited.

When the program's waiting for input, the cursor will appear at the left margin of the typing window. Type a program line and press RETURN. The line will be evaluated and reprinted in the message window, along with the checksum generated.

If the checksum matches the one in the magazine, then go on to the next program line. Otherwise, enter the command *E* (edit) and press RETURN. The line you just typed will appear in the typing window, where you may edit it. When you think the line has been corrected, press RETURN, and it'll be re-evaluated.

Note: you may call up any line previously typed, with the command *E* followed by the number of the line you wish to edit. For example, *E230* will print Line 230 in the typing window. *Do not attempt to edit any program lines numbered 32600 and higher.* These lines fall within the **BASIC Editor II** program.

If you're using BASIC abbreviations, the two versions of the command *E* work slightly differently. The command *E*, without a line number, will call up the line exactly as you typed it. When you append the line number, the line will be printed in its expanded (unabbreviated) form.

Leaving the Editor.

You may leave **BASIC Editor II** at any time, by entering either *B* (BASIC) or *Q* (quit). If you type *B*, the **Editor** will return you to BASIC. Enter *LIST* to review your work, if you wish. Note that Lines 32600 and above are the **Editor** program. Your work will appear before these lines. To return to the **Editor**, type *GOTO 32600*.

Type *Q*, and you'll be asked if you really want to quit. If you type *Y*, the **Editor** program will be erased from memory, and you may then save your work in any manner you like. If you type *N*, the *Q* command will be aborted.

Large listings.

If the program you're entering is partic-

ularly long, you may need to take a break. When you want to stop, type Q and press RETURN, then save your work to disk or cassette. When you're ready to start again, load the program you were working on, then load **BASIC Editor II** with the *ENTER* command. Type *GOTO 32600*, and you're back in business.

The post-processor.

Many people may not want to use **BASIC Editor II** when entering a program listing, preferring, instead, the Atari's built-in editor. For that reason, **BASIC Editor II** will allow you to check and edit your programs after they've been typed.

To take advantage of this option, type any magazine program in the conventional manner, then save a copy to disk or cassette (just in case). With your typed-in program still in memory, load **BASIC Editor II** with the *ENTER* command, then type *GOTO 32600*.

Respond with *N* to the "abbreviations" prompt. When the **Editor** appears on your screen, enter the command *P* (post-process), and the first program line will appear in the typing window. Press RETURN to enter it into the **Editor**.

The line will be processed, and the checksum, along with the program line, will be printed in the upper window. If the checksum matches the one in the magazine, press RETURN twice, and the next line will be processed.

If you find you must edit a line, enter the command *E*, and the line will be moved back to the typing window for editing.

When the entire listing has been checked, you'll be asked if you wish to quit. Type *Y* and press RETURN. The **Editor** program will be removed from memory, and you may then save the edited program in any manner you wish.

Murphy's Law.

Anyone who's been associated with computing knows this is the industry Murphy had in mind. You may find that, after typing a program with **BASIC Editor II**, it still won't run properly. There are two likely causes for this.

First, it may be that you're not following the program's instructions properly. Always read the article accompanying a program *before* attempting to run it. Failure to do so may present you with upsetting results.

Finally, though you can trust **BASIC Editor II** to catch your typos, it can't tell you if you've skipped some lines entirely. If your program won't run, make sure you've typed all of it. Missing program lines are guaranteed trouble.

One last word. Some people find it an unnecessary and nasty chore to type REM lines. I don't condone the omission of these lines, since they may be referenced within the program (a bad practice, but not unheard of). If you want to take chances, **BASIC Editor II** is willing to comply.

Listing 1.
BASIC listing.

```
32600 IF FL THEN 32616
32602 DIM L$(115),SV$(115),C2$(2),B$(1
15),M$(119),S$(98),E$(69),A$(1):FL=1:S
TMTAB=PEEK(136)+PEEK(137)*256
32604 GRAPHICS 0:POKE 710,0:P=0:ABR=0:
? "ALLOW ABBREVIATIONS";:INPUT A$:IF A
$="Y" OR A$="y" THEN ABR=1
32606 B$(1)=" ":B$(115)=" ":B$(2)=B$
32616 OPEN #17,4,0,"E:":L$=" ":GOSUB 3
2662:START=0
32618 POKE 766,1:POKE 83,39:POSITION 1
,3:IF LEN(L$)<39 THEN ? L$:GOTO 32624
32620 IF LEN(L$)<77 THEN ? L$(1,38):?
L$(39,LEN(L$)):GOTO 32624
32622 ? L$(1,38):? L$(39,76):? L$(77,L
EN(L$))
32624 POKE 752,0:POKE 766,0:POKE 559,3
4:POKE 82,1:POKE 83,38:POSITION 0,10:?
" ";:INPUT #17;L$:POKE 766,1
32626 IF (L$="P" OR L$="p") AND START=
0 THEN P=1:L$=""
32628 IF L$="E" OR L$="e" THEN E=1:POS
ITION 1,10:? SV$ GOTO 32624
32630 IF L$="Q" OR L$="q" THEN 32690
32632 IF L$="" AND P=1 THEN 32686
32634 IF L$="" THEN 32624
32636 IF L$="B" OR L$="b" THEN GRAPHIC
S 8:? "TYPE 'GOTO 32600' TO CONTINUE":
END
32638 IF L$(1,1)="E" OR L$(1,1)="e" TH
EN E=1:TRAP 32624:EL=VAL(L$(2)):POSITI
ON 1,9:LIST EL:GOTO 32624
32640 SV$=L$:TRAP 32624:X=VAL(L$)
32642 START=1:IF P AND  NOT E THEN 326
52
32644 GOSUB 32674:IF  NOT ABR OR P THE
N 32652
32646 POKE 766,0:? CHR$(125):POSITION
0,3:L=VAL(L$):LIST L:? :? :? "CONT":L$
=B$
32648 POSITION 0,0:POKE 842,13:STOP
32650 POKE 842,12:A=USR(ADR(S$),ADR(L$
),4):L$=L$(1,A)
32652 CHKSUM=USR(ADR(M$),ADR(L$),LEN(L
$)):CHKSUM=CHKSUM+PEEK(1542)*65536
32654 CHK=CHKSUM-(INT(CHKSUM/676)*676)
:HI=INT(CHK/26):LO=CHK-(HI*26):C2$(1)=
CHR$(HI+65):C2$(2)=CHR$(LO+65)
32656 IF  NOT P OR E THEN E=0:GOSUB 32
662:IF  NOT P THEN 32660
32658 POKE 83,39:POKE 752,1:FOR X=3 TO
 5:POSITION 1,X:? B$(1,38):POSITION 1,
X+7:? B$(1,38):NEXT X:POKE 83,38
32660 POKE 766,1:POKE 83,38:POSITION 6
,7:? C2$:POKE 752,0:GOTO 32618
32662 GOSUB 32702:POKE 766,0:POKE 752,
1:? "S":POKE 82,1:DL=PEEK(560)+256*PEE
K(561)+4
32664 POKE DL-1,70:POKE DL+2,6:POKE DL
+3,112:POKE DL+4,112:POKE DL+5,112:POK
E DL+13,112:POKE DL+14,112
32666 POKE DL+22,112:POKE DL+23,112:PO
KE DL+24,65:POKE DL+25,PEEK(560):POKE
DL+26,PEEK(561):POKE 83,39
32668 POSITION 20,0:? "  basic editor
II ":POSITION 0,7:? "                TYP
ING WINDOW                 ":
32670 POSITION 0,1:? "                MESS
AGE WINDOW                 ":POSITION 1,7
:? "CODE:";
32672 POKE 559,34:RETURN
32674 GRAPHICS 0:POKE 559,0:POKE 766,1
:POKE 82,0:POKE 83,39:POSITION 0,3:? L
$:? :? :? :? "CONT":POSITION 0,0
32676 POKE 842,13:STOP
32678 POKE 842,12:TRAP 32682:A=USR(ADR
(E$),VAL(L$)):IF A=4 THEN POP :GOTO 32
682
32680 RETURN
32682 GOSUB 32662:SOUND 0,75,10,8:FOR
X=1 TO 20:NEXT X:SOUND 0,0,0,0:POSITIO
N 1,3:? "SYNTAX ERROR!":POKE 766,1
32684 POKE 83,38:POSITION 1,10:? SV$:G
OTO 32624
32686 LINE=PEEK(STMTAB)+PEEK(STMTAB+1)
*256:IF LINE>32599 THEN 32690
32688 OFS=PEEK(STMTAB+2):STMTAB=STMTAB
+OFS:POSITION 1,9:LIST LINE:GOTO 32624
32690 POKE 766,0:POSITION 1,10:? "READ
Y TO QUIT";:INPUT A$:IF A$<>"Y" THEN P
OSITION 1,10:? B$(1,38):GOTO 32624
32692 GRAPHICS 0:? :? :? :FOR X=32600
TO 32636 STEP 2:? X:NEXT X:? "CONT":PO
SITION 0,0:POKE 842,13:STOP
32694 POKE 842,12:GRAPHICS 0:? :? :? :
FOR X=32638 TO 32674 STEP 2:? X:NEXT X
:? :? "CONT":POSITION 0,0
32696 POKE 842,13:STOP
32698 POKE 842,12:GRAPHICS 0:? :? :? :
FOR X=32676 TO 32702 STEP 2:? X:NEXT X
:? :? "POKE 842,12":POSITION 0,0
32700 POKE 842,13:STOP
32702 POKE 16,112:POKE 53774,112:RETUR
N
```

CHECKSUM DATA.
*(see issue 39's **Unicheck**)*

```
32600 DATA 6,665,923,757,809,171,225,8
98,532,499,910,267,912,144,735,8453
32638 DATA 97,358,230,693,706,878,317,
127,36,597,238,258,182,430,168,5315
32668 DATA 864,953,472,385,887,724,72,
687,908,736,625,612,672,184,891,9672
32698 DATA 8,856,85,949
```

Listing 2.
BASIC listing.

```
10 DIM L$(120),ML$(119),A$(1)
20 GRAPHICS 0:POKE 710,0:? "DISK OR CA
SSETTE";:INPUT A$:IF A$<>"C" AND A$<>"
D" THEN 20
30 IF A$="C" THEN 50
40 ? "PLACE FORMATTED DISK IN DRIVE";?
 "THEN PRESS RETURN":INPUT L$:OPEN #1,
8,0,"D:ML.DAT":GOTO 60
50 ? :? "READY CASSETTE, PRESS RETURN"
;:INPUT L$:OPEN #1,8,0,"C:"
60 L$="32608 M$(1)=";L$(13)=CHR$(34)
70 N=119:GOSUB 130:L$(14)=ML$(1,58):L$
(LEN(L$)+1)=CHR$(34):? #1;L$
80 L$(1)="32610 M$(59)=":L$(14)=CHR$(3
4):L$(15)=ML$(59):L$(LEN(L$)+1)=CHR$(3
4):? #1;L$
90 L$(1)="32612 S$=":L$(10)=CHR$(34)
100 ML$="":N=98:GOSUB 130:L$(11)=ML$:L
$(LEN(L$)+1)=CHR$(34):? #1;L$
110 L$(1)="32614 E$=":L$(10)=CHR$(34)
120 ML$="":N=69:GOSUB 130:L$(11)=ML$:L
$(LEN(L$)+1)=CHR$(34):? #1;L$:END
130 FOR X=1 TO N:READ A:ML$(X)=CHR$(A)
:NEXT X:RETURN
140 DATA 104,104,133,204,104,133,203,1
04,104,133,205,169,0,141,3,6,141,2,6,1
41,4,6,141,5,6
150 DATA 141,6,6,238,3,6,32,68,218,172
,2,6,177,203,133,212,32,170,217,32,182
,221,32,68,218
160 DATA 173,3,6,133,212,32,170,217,32
,219,218,32,210,217,165,212,141,0,6,16
5,213,141,1,6,24
170 DATA 173,0,6,109,4,6,141,4,6,173,1
,6,109,5,6,141,5,6,144,3,238,6,6,238,2
180 DATA 6,172,2,6,196,205,208,176,173
,4,6,133,212,173,5,6,133,213,96
190 DATA 104,104,133,204,104,133,203,1
04,104,141,255,6,169,0,133,213,216,165
,88,133,205,165,89,133,206
200 DATA 174,255,6,24,165,205,105,40,1
33,205,144,2,230,206,202,208,242,160,0
,177,205,201,64,144,18
210 DATA 201,96,144,19,201,128,144,18,
201,192,144,6,201,224,144,7,176,8,24,1
05,32,144,3,56,233
220 DATA 64,145,203,200,192,114,240,2,
208,215,177,203,201,32,208,3,136,208,2
47,200,132,212,96
230 DATA 104,104,141,254,6,104,141,253
,6,169,0,133,213,216,165,136,133,205,1
65,137,133,206,160,0,177
240 DATA 205,205,253,6,208,8,200,177,2
05,205,254,6,240,15,160,2,177,205,24,1
01,205,133,205,144,228
250 DATA 230,206,176,224,160,4,177,205
,201,55,240,4,160,0,240,0,132,212,96
```

CHECKSUM DATA.
*(see issue 39's **Unicheck**)*

```
10 DATA 203,265,465,844,294,973,652,27
0,978,797,278,275,835,209,301,7639
160 DATA 355,94,254,420,935,840,580,41
9,974,564,5435
```

Database Delphi

News and views from the *ANALOG Computing* Atari Users' Group on Delphi

by Matthew J.W. Ratcliff

This month on our Delphi SIG, we'll talk about: the divergence of ST and 8-bit Atari interests, your favorite software and the latest in the ST world. If you're a member of Delphi, please take the time to answer the polls. Your vote—and opinion—really count when it comes to improving the SIG (and **ANALOG Computing**) for you, the user/reader.

Electromagic wants to know, "Should the ST users break from the SIG Atari board and form their own?"

The vote's been strongly in favor (86 percent) of splitting into two different SIGs. Most 8-bit owners are interested in keeping up with the STs to some extent, but can't afford to sort through ST messages and files in the databases, looking for 8-bit information. Setting your topics helps to a certain extent, but it's still a problem.

The reverse is true for ST owners. The STs are completely different computers. As one respondent pointed out, these two groups have "nothing compatible except emotion."

ANALOG Computing does have an extra, "dummy" SIG available, currently used to test certain features before making them permanent in the SIG. Converting this to an ST SIG would create a particular problem for our vastly overworked SYSOP, Charles Bachand.

He's been putting in long hours to "submit" his 1000-plus ST and 8-bit files to the current SIG. Splitting it would force him to duplicate a large portion of the hundreds of hours he's invested to make the databases what they are. It would also spread **ANALOG Computing**'s resources a bit thin—it's a lot more work to manage two separate SIGs. It *is* possible that we'll split into two SIGs, eventually.

Your feedback here will be appreciated. If you haven't voted on this one yet (only 100 out of 1800 current members have replied as of this writing), please do so. The question will be left up for a bit longer, to allow everyone to comment.

As a follow-up, I've asked who owns 8-bit or 16-bit computers, or both. A whopping 70 percent have 8-bits, of which 32 percent also own STs. About 13 percent own STs only, while over 60 percent own an 8-bit Atari only. Ownership of the old 400/800 systems was lagging slightly behind that of the newer XL/XEs. And 13 percent just owned *bunches* of computers.

In defense of the 8-bit, one user states that it "still runs like a top! Why upgrade?"

Most 8-bitters mention owning many different versions of the Atari computers, and nearly all were planning on getting an ST. Comments by ST owners indicate that the old 8-bit machines still get frequent use. I think most agree: both computers are alive and well.

There's also a poll question on what types of programs you want to see more of in these pages (without any specific mention of computer type).

Over 40 percent want to see more utilities. Another 30 percent is divided evenly between home applications and hardware. The hardware part was a bit of a surprise. Most seemed satisfied with BASIC, C, Action! and others, considering that no other votes were more than 5 percent or so for each. It was interesting that no one wanted to see more BASIC programs! Only 2 percent wanted more games.

Several friends bought 1040STs locally, at the same time. All of them have had some kind of problem with the built-in double-sided, double-density drive. Two of the four systems have had hardware failures, though less than a month old.

I asked if other 1040 users had any drive problems. Of the replies, 61 percent have had drive problems! I'm certain Atari is aware of the problems and is working them out if they're chronic. If you have problems with the internal 1040ST drives (like its wiping out files on disk, even if write protect is set), contact the dealer you bought your system from for a fix.

It seems there are many different modems in use these days. There was no clear winner in my modem poll. The ANCHOR 1200-baud modem had a slight edge over the Avatex and Atari 1030.

I expect the Avatex to be one of the hottest brands going for some time to come, however. It's the first Hayes-compatible modem to come along that's widely available for less than $100.00. Atari plans to release a 1200-baud model later this year (check the John Skruch interview on page 36), with both SIO—for 8-bitters who don't have an 850 or equivalent interface—and RS232 ports. It, too, will sell for under $100.00.

Considering these very attractive prices, plus speed four times that of a 300-baud model, the new modems will quickly pay for themselves in saved access time on Delphi, where there's *no surcharge* for higher baud rates.

Last month, we were asked what programming language was preferred for the STs. Now, DIGITA, an avid Action! user, wants to know what 8-bit Atari programming language is most popular.

Currently, Action! is out in front, with

BASIC XL/XE close behind. We'll leave this up for another month, to get a better sampling of the 8-bit community.

Steve Grimm asks if pirating is your main source of computer software. As I'd expect, 96 percent claim that it isn't, however, most comments indicate that a few pirated titles reside in users' libraries. This one may stay up for a while, to see what interesting comments other SIG members may have.

Packaging of the ST has been discussed at length on Delphi in the past few months. Many are distressed that the keyboard is so mushy, and that it isn't detachable.

Right now there's no alternative, but some interesting suggestions have been made. I think the best was the idea of providing an IBM PC-keyboard-compatible connector at the side of an ST. It would be the perfect solution.

Those who want a better keyboard (or just the convenience of a laptop) would then need only go out and purchase one of the many excellent IBM PC-compatible keyboards on the market. Maybe Atari will give this to us in a future version of the ST. . .

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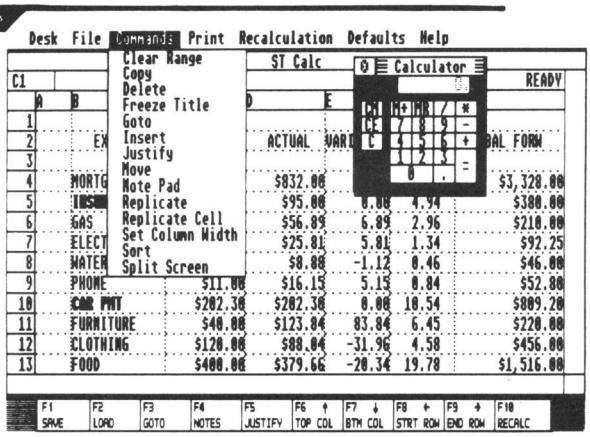

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CIRCLE #117 ON READER SERVICE CARD

"...There are still folks out there doing some high-quality software for the 8-bits."

by Matthew J.W. Ratcliff

John Skruch, Manager of XE Software Products at Atari, took time from his busy schedule at CES to talk with us about the 8-bit Atari product line. He gave us some very interesting details on the current batch of hardware and software coming out for the 8-bits. John also gave answers to a few follow-up questions I had on the West Coast Computer Faire.

MR: *How do you think the 8-bit Atari computers are doing this year?*

JS: Epyx is bringing out a karate game; Electronic Arts is coming out with some new stuff. There is some development. I will say it's not as extreme as ST development, but then, the hype and interest center on the ST. But there are still folks out there doing some high-quality software for the XE.

I think this show is very good, because we've invited a lot of them (8-bit software and hardware developers) into the booth. As an example, the Mindscape folks... When I called them before the show, I asked if they wanted to participate, and they said, "Gee, we don't have the people to cover it," and so on. Then they came up to me a little while ago (after having seen the huge, bustling Atari booth) and said, "Hey, this is fantastic! It's amazing. We really want to be here next time. Sorry we weren't this time. This is great!"

MR: *Do they (Mindscape) have their own booth?*

JS: No, I think they're sharing a booth with Soft Kat, and they have a hotel suite. A lot of people are cutting down. You know, this is very expensive. What we're doing is a "combined buying power" kind of thing. We can offer the area and we're not charging them to be in the booth. That gives them some exposure. On some companies that have been indecisive about doing any more for 8-bits, we told them to talk to some dealers coming through here (the Atari booth). See if it's worthwhile or not. If they're unhappy at the end of the show, then "go away, God bless ya—go find another computer system." I think it's a reasonably safe bet most of them are saying, "Hey, this is really hot."

MR: *I was talking to Bill Stealy of Microprose earlier. He expressed a concern that Atarians were the worst pirates around, saying his Atari sales have plummeted recently. Any comments on the piracy problem?*

JS: Well, let's use **Star Raiders II** as an example. **Star Raiders II** has a suggested retail of $19.95. It has a copy protection that can be broken by the average Atari user in maybe five minutes. It's designed to stop the casual copier, DOS and sector copiers. People should *not* be copying software, period. We're offering a quality game at $19.95 and we're making a profit on it. We feel it's a value. I mean, the manual alone (is important). If you just rip off a copy, it's going to take you a bit of time to figure out what's going on. The game is not going to be what it could be, without the manual.

MR: *That's the approach Microprose took. Their games are so dependent on the documentation that it's not practical to copy the game without it.*

JS: We've been speaking to a lot of user

What's next?

John Skruch of Atari Corp. talks about product support, policies and progress.

groups. Most of them realize that prices are coming down, and, if they fool around and rip the software off, they just hurt themselves. They're not in a good position to be doing that.

MR: *That's right. Our 8-bit users want more support, but they're going to be left out in the cold if they continue to pirate software. I've told our user group about the piracy problem and that it's causing the lack of support in the first place. Because of a write-in campaign about Electronic Arts' not coming out with software for the 8-bit, the company now is coming out with new titles. It's made a difference. I just hope the software sells now.*

JS: Everybody got letters. I think that was fantastic. Something I think is an excellent idea also—and I've been trying to promote this to user groups—is that they should *ask* for the product. Typically, they say, "Well gee, there's no local retailer support, so we're going mail order." And the local retailer tells us, "Nobody's asking for the product; why should I sell it?" I'm saying that, as we develop a relationship with our dealers, the consumer needs to be developing a relationship with the dealer—and *saying* what he wants. If you don't bother to ask for the product, the dealer doesn't know the demand is there. We need to get out of this loggerhead that says, "I can't find it in your store." *Ask* the guy in the store. Show the dealers there's a demand. Let them *see* the product move off the shelf. You support him, and he'll support you, and we'll support him, and everything works right. But this just sort of giving up, continuing a bad situation, is not a good idea.

MR: *One user group wanted to get ICD US Doublers for their 1050 drives. No one in town carried them, so the group asked if they were planning to. They said, "No, we don't carry them and we don't plan to; we're just supporting STs right now." The group went direct to ICD and got a user group discount, an excellent price. Then, when the dealers found out about it, they got peeved at the club's officers. By the next week, they were carrying the product at full list price. Of course, then it was too late.*

JS: I know, it's really crazy. We'll be putting some efforts into the field, to put the right dealers in touch with users.

MR: *Do you know how the deal with Toys 'R' Us is progressing? When are the Ataris actually going to hit their shelves?*

JS: Picture a wave spreading across the country. In our area (Sunnyvale, California), as an example, they're stocked. In this area (Chicago, Illinois) they aren't quite stocked yet, a matter of getting through their warehousing system. They've ordered the entire line, 2600s through 520s. In fact, they've just reordered 1050 drives.

MR: *One thing I was talking about in an article. . .the 850s went out of production, didn't they?*

JS: Yes, we've had no reason to make more at this point in time.

MR: *I just finished doing a review on the* ***P:R: Connection*** *for* ***ANALOG Computing****, and it's fantastic! For the person who wants both the standard interface for a modem and a printer, it's perfect. I've encouraged ICD to talk with marketing people at Toys 'R' Us. The marketing people responded in a manner that said, "Big deal. We don't want to talk to you." Is there any way Atari can encourage Toys 'R' Us to take other third-party products on the shelf? Otherwise, there's no way to get some of them, except by mail order, since the specialty stores have virtually dropped all 8-bit support.*

JS: We have some things in process to do that, not specifically on the **P:R: Connection**, but software in general.

MR: *From what I've seen, the biggest problem with selling through Children's Palace, Toys 'R' Us, and so on, is that sales people don't know what you're talking about when you ask for a particular piece of software. And if they do, they don't know enough to tell you anything about the program—and seldom will they allow you to test run it.*

> *"The magazine review is one of my tools when I buy software."*

JS: That's why packaging is so important. You do get into places where you can't rely on a trained sales person. There's no such thing (for Atari products). And, since they have a three-dollar-an-hour clerk, you can't expect (personnel) to be trained by the store.

If you look at the Atari product (software package), we're trying to put a description,

system requirements—all that good stuff—on the packaging. We recognize the fact that you'll see it on a shelf, and it's going to be taken from there to the register.

> *"Nobody's asking for the product... we need to show the dealers there's a demand."*

Things that help in that situation are user groups, user group newsletters and magazine reviews. That's why we send you people review copies of software. Get product information out to the widest number of people possible. The magazine review is one of my tools when I buy software. Movie reviews, it's the same sort of thing: you find a guy whom you trust or believe in, or what have you. There's one reviewer out here, who, if he hates a movie, I know I'm gonna love it.

I think that's really important—product reviews you can believe in. Another thing that would be nice, and we may get into it one of these days, is some product advertising. I would love to see a full-page spread on **Star Raiders II** or **Planetarium**, because **Planetarium** needs a lot of information behind it. At some point in time, Jack may allow us to do that sort of thing.

MR: *B. Dalton Booksellers has started this "try it before you buy it" concept. They have a whole software section set up with computers, so you can test run programs before you put out the green.*

JS: I think something like that is pretty neat.

MR: *The only problem is, they don't have any Ataris! They sell Atari books and Atari software, but they didn't have an ST or XE set up.*

JS: We give a special price to stores for machines that they put out as demonstrators. So there's no excuse for anyone not to have Atari systems.

MR: *Maybe it's a lack of knowledge on B. Dalton's part, more than anything else.*

JS: It could be.

MR: *B. Dalton is the biggest bookstore chain I know of, and they do carry Atari-specific magazines. The only other one that has Atari-only products is Waldenbooks.*

JS: We're going to be doing some work in the area of software distribution and software-only stores. We have a lot of work to do. It's kind of interesting, too...I think we're seeing people looking at (Atari much more closely). It's very bizarre that they should move the Atari booth—because last year we were upstairs in the little room, and Commodore was downstairs. Now it's reversed. It's very quiet there. We're getting a lot of Commodore dealers coming down and saying, "Whoa, we've gotta talk, seriously!" It's changing, evolving.

People last year were still trying to write us off the books, saying, "Hey, Atari's gone; they're history." It's taken us some time to get them to say, "These guys aren't dead; they're alive, in fact. And they're not only alive, but they're growing; their product line is getting stronger." It's always been an exceptional product line. They're now saying, "This is not a bad deal. They're looking a lot stronger than the other company (Commodore) is." So all these things, plus our reps, plus dealers, word of mouth ...it will continue to happen. Keep in mind there's still a way to go. There's this uncomfortableness with the ST if you're a hard-core 8-bitter.

MR: *Yes, there is a lot of friction in the computer clubs about that.*

JS: I'm really sorry to hear that.

*(At this point in time, we started rambling on about new software and **Leather Goddesses of Phobos**, about the same time a leather-clad woman strolled by from somewhere within the corners of the video section.)*

MR: *I heard an interesting rumor that a console 8-bit, similar to the 1450XLD, may be in the works. It will have 256K, if not 512, at least one integral 3½-inch disk drive, 1200-baud modem and 80-column capability built in. Is it possible that something like that really is in the works?*

JS: Atari is very much like GM or Ford, in that you're constantly trying different designs, different concepts for machines. We have an incredible designer by the name of Ira Velinsky, who has done the styling and design of our equipment. Ira just loves to come up with different ways to do things, to make mockups, and so on. So there are all sorts of things we're looking at in that area. In terms of what makes it and what doesn't, what becomes a national product, it depends on the needs of the market.

MR: *One thing we've seen already: software vendors are supporting 256K 8-bit Ataris, even though Atari Corp. doesn't make such a machine.*

JS: But we set the standard for it, by the 130, and doing it in such a fashion that allows esentially an unlimited amount of memory.

MR: *You run out of select bits after a while.*

JS: Yes, but it's the sort of thing where a 512K machine wouldn't be unheard of. A lot of it is just RAM prices.

MR: *I've seen 1-meg upgrades advertised for the 800 already. I don't know how compatible they are with the XE. I wish Atari would just go to 512K on the XE, to get software vendors to support it heavily. All the hardware hackers are doing it, anyway. It's becoming so popular that some software vendors are supporting it. If Atari would come out with an "official version" it would catch on like wildfire.*

JS: It's fairly trivial to do.

MR: *I know.*

JS: And you never can tell.

MR: *I installed the RAMBO XL 256K upgrade for the 800XL. It's fairly easy to do.*

JS: I was reading the comparison in **ANALOG Computing** between the Newell and RAMBO. It is bizarre. Neither one is perfect, is the unfortunate thing.

MR: *Either is fine, though, as long as the chips are socketed. That's the only problem I've run into.*

JS: In terms of the Newell, it locks in the ANTIC. But the RAMBO is easier. One thing I think we may need to do is make Freddy chips available. In reality, I don't see any reason why Atari wouldn't.

MR: *In the 800XL, can you replace the PIA with a Freddy?*

JS: Well, I'm not the circuit guy, so this is beyond me. But I don't see why you couldn't provide the chips to ICD or Newell, so they could do the upgrade to be fully compatible with the Atari 130XE format. I can't see us staying opposed to selling the Freddy chip.

MR: *From what I've seen, if the chips are socketed, anyone with a little kit-building experience can do the upgrades. If it's not socketed, then you have to use a desoldering iron. More often than not, a user will burn up a chip or damage the etch. I've been doing it for six years, and I managed to bust some etch on my ST.*

JS: Yes, I put in a 1-meg upgrade in a 520ST. It was very successful. I'm a hobbiest solderer, not a pro.

MR: *Haba has a new one out, too, for under $100. As far as piracy is concerned, has Atari looked into any more cartridge software for the 8-bit or ST?*

JS: We're definitely doing cartridge software for the ST.

MR: *Are you working on one that's difficult to copy, with built-in protection, where you couldn't even do a hardware copy (such as duplicating EPROMS)?*

JS: Of the cartridge, no. Unless the world proves us wrong, we still believe that, if you offer it at the right price with complete documentation, the product will sell. If we have to get back on the merry-go-round, where we're always trying to stay one scheme ahead of the hackers, then that will be a sad day. It costs us money. A good protection scheme costs anywhere from thirty- to forty-thousand dollars to develop.

MR: *I was thinking of semicustom silicon, like PLAs (Programmable Logic Arrays).*

JS: Again, how much does that cost? The consumer ends up paying for it.

MR: *Certainly.*

JS: If **Star Raiders II** had a heavy-duty protection scheme on it, it wouldn't be $19.95. We'd have to add the cost of protection onto it. It's really sad. To answer your question on cartridge software on the 8-bit, we'll do disks where practical. The installed base of drives has increased dramatically.

MR: *Very few people use cassettes any more.*

JS: We've got a 32K cartridge design, came up with it a couple of years ago.

MR: *Bank switching?*

JS: Yes, we can do that, but it's more expensive—more expensive to build—and it increases your lead times.

MR: *And it must be more bug free before you put it in ROM.*

JS: Yes, you'd have to change the mask (a ROM template, for mass reproduction), a very expensive proposition. With this (disk-based) software, it can be easily updated. Cartridges are a pain for that. We would have them over in the Orient, so logistics would be a major problem, too.

MR: *I like my application software in cartridges, such as MAC/65. The problem is that it takes so long to develop anything with disk-based compilers, editors, and so on, with the ST.*

JS: I'd say—especially when we had our drive promotion for $69.00—it's hard to imagine a single-drive user, especially in that kind of scenario (ST software development). And that was a pretty good deal; two drives are so handy. But your point is well taken, in terms of cartridge software. In fact, we're trying to provide cartridge boards and plastics to people if they need them. (Atari provided David Small with the cartridge hardware necessary to build the MacCartridge.)

MR: *Will Atari provide cartridge work for other software developers, who don't want to get into the hardware side?*

JS: If the quantities are right, we would certainly consider that.

MR: *For the ST as well?*

JS: I'm speaking of the ST specifically. Sure, we'd do it for the 8-bits, as well. The only problem with the 8-bit right now is that we have *Atari* all over the cartridge cases, and we don't want to do an implied endorsement. That gets a little strange. We don't want people to get confused; that maybe they're buying an Atari product when they really aren't. But we are open to a lot of things that, maybe, Warner wouldn't have thought of.

MR: *Do you envision a luggable, like the Apple IIc, at some point?*

JS: Well what I can see—epecially with the 3½-inch drives—may be a portable or luggable. I don't see a heavy future for that. We did, in fact, show a portable, luggable back at the very first CES we were in. The dealer response was underwhelming.

MR: *I noticed that the Commodore luggable is out of production now.*

JS: Yes. I've got one. I got a 64K luggable back at the ranch, with the 3½-inch drive, cartridge port in the back, and a little 5-inch monochrome screen. But, with the underwhelming response and the tooling investment, we'd have to sell a lot (and it just didn't look like the market was there).

MR: *With IBM getting into the portable market now, it makes me wonder if that won't create a demand.*

JS: There are so many people in the portable market, though. It just doesn't quite make sense.

MR: *What do you think of the new hardware ICD is showing, especially their new MIO board?*

JS: That little box is a trip! I got to talk to them about it, how they'll be doing the 80-column. We'll try to make sure we're compatible, to get support.

MR: *Do you know what the status is on the MS-DOS Box for the ST?*

JS: It's being worked on.

MR: *I heard that it wasn't at COMDEX.*

JS: Yes it was. We didn't have a giant staff. It was actually sitting in a hard-drive case, for want of something to put it in. We were running **Multiplan** on it.

MR: *I got the impression that Atari might do a redesign on it and not provide a 5¼-inch drive with it, but fix it up so that the 3½-inch ST drive would plug into it, since the release of the IBM PC portable with its 3½-inch drives.*

JS: The decision on what kind of drives—whether there'll be drives—I can't really comment on that, because I'm not sure what the status is. But we will do it in a form that provides the most flexibility and best cost. It's really kind of a decision point, of whether there are enough inexpensive 3½-inch IBM drives out there that it would make sense for us not to put it in the box (the 5¼-inch drive).

MR: *One area I think would have a big*

market: a 5¼-inch drive that you can plug into the ST. Now, Leonard Tramiel explained at the West Coast Computer Faire that all you need is a cable. But you've got to hack on your hardware to do that. If Atari provided at least a cable, so you could go out and buy a 5¼-inch drive, then just plug it in, it would be great.

JS: From our standpoint, an after-market cable like that is just something we would not do.

MR: *But those connectors are so hard to come by.*

JS: They're actually starting to crop up People are finding the outlets to get those.

MR: *There's a big demand for them; Atari has created it.*

Coming soon: a new 80-column card, the XEP80 and a new 1200-baud modem.

JS: Yes, you can get spare cables now, from Atari. You, know a cable like that is a great and groovy thing, but advertising it and selling large volumes isn't feasible.

MR: *The main reason I think that the 5¼s would be so popular is that the 5¼-inch floppies are so much cheaper than are the 3½s. The 3½-inch typically cost double or three times as much as 5¼-inch disks.*

JS: That's true, but you'll see the 3½-inch prices coming down.

MR: *It would be nice if Atari could score a good deal on a quantity of them, and market them at a lower rate than most.*

JS: We already do.

MR: *Atari 3½-inch disks?*

JS: Yes. An Atari brand of disks. We announced them at COMDEX.

MR: *What sort of price?*

JS: We don't really have a list price on them. What we're doing is providing them very inexpensively to our dealers, letting them set the margins.

MR: *Will we see those in Toys 'R' Us?*

JS: I'm not sure if they picked up the blank disks or not. We sell five-packs of DS/DD with the Atari logo and all that. We're pricing them so that dealers can use them as demonstration disks, or whatever. So a supply of inexpensive 3½-inch disks is coming from us.

MR: *You have the new disk drive for the 8-bit, **Planetarium** and **Star Raiders II**. Do you have anything else in the works?*

JS: In the near-term, the 80-column card and the modem will be finishing up (XEP-80 and new 1200 baud modem).

MR: *When will the 8-bit 3½-inch drive be ready?*

JS: They aren't ready to be officially announced at this point.

MR: *Do you know how much storage it will have? I've gotten conflicting reports on that.*

JS: Well, until we finalize the DOS formatting, it's not exact. It will be over 300K, let's put it that way. (Bill Wilkinson has since assured me they'll have 320K formatted.)

MR: *Will it be single or double sided? Maybe around 360?*

JS: Single sided, double density. It won't have as much as 360K, maybe between 300 and 350. That's a function of sector layout and sector information (like date stamps and subdirectories, possibly).

MR: *Do you think Atari will ever market a hard drive for the 8-bit?*

JS: We are nearly ready to start shipping the hard drive for the ST. You know, a 3½-inch for the 8-bit sort of logically follows from the fact that we're probably the world's largest purchaser of 3½-inch drives now. You never can tell. You have to understand that we're a very small company—in terms of personnel—doing a lot of things. It's not like everybody's sitting around daydreaming about what to build next. We've all got at least eight different jobs.

Projects are on an as-needed, nonparallel basis. If the guy is working on this, he isn't working on that. Things take a little time. Probably the biggest activity (next) will be to convert our products to work on the-80 column, such as **AtariWriter+**, **XE-Term**, and **Silent Butler**. Dealing with third-party dealers, such as Synapse, Broderbund and Batteries, of course, will be important in getting more support and acceptance for the XEP80, as well.

MR: *When do you think the XEP80 will be out?*

JS: Definitely in the fall. The unit we are showing here has got a real circuit board, and the plastic casing is done.

MR: *You told me that the 80-column chip was an Intel?*

JS: National Semiconductor. (It's called the TMP.)

(Jose Valdes of Atari, sitting across the table from us, volunteered some information about the technical aspects of the XEP80.)

MR: *Are you implementing all of its capabilities?*

JV: Yes, most of them.

MR: *Can you put custom fonts out there?*

JV: Yes. We have 8K, but only need 2K for the display. The extra can be used for page flipping and custom fonts.

MR: *The TMP is like a custom microprocessor that can do everything?*

JV: Yes.

MR: *Part of the processor's capability is the printer driver?*

JV: Yes.

MR: *Is it bidirectional, like a PIA?*

JV: It will probably be unidirectional, output only, to simplify hardware.

MR: *You're going to use a buffer on the output, then. Not that the TMP chip is unidirectional, but the buffer is.*

JV: Yes.

MR: *That's what I found unique about the ST—that the printer port may be used for parallel input, as with **Hippovision**.*

JV: We needed the buffer to drive all printers. A bidirectional buffer would have been more complicated and expensive.

MR: *Does the XEP80 have graphics?*

JV: Block graphics.

MR: *But not bit-image graphics?*

JV: No.

MR: *I understood that you might be able to have a half-screen of text and half graphics, like 400x200 monochrome.*

JS: That's what Lane (Lane Winner, software developer for the XEP80) was explaining to me. Maybe I was confused, (but I thought he said) you could have a half-screen of bit-map graphics.

JV: No. Bit-mapped memory requires a lot more than 8K.

JS: That's why you couldn't do a full screen of it.

JV: I wouldn't call it bit-mapped. I don't think so.

MR: *Maybe graphics could be done with dynamically redefined character sets?*

JS: That would be strange.

MR: *I've seen it done on the Atari 40-column text display—the high-resolution graphics by redefining characters. It was wild.*

JS: We're talking about putting in the ST character set, as well.

MR: *That would be nice.*

JS: There are several other character sets in there now.

In a follow-up phone interview with Lane Winner, who's in charge of writing the driver software for the XEP80, a few technical questions were cleared up.

It was indicated that the 40-column display must be turned off while communication between the computer and the XEP is active (i.e., the ANTIC chip must be shut down, so the critical timing between the computer and the XEP isn't interrupted). If the XEP isn't being updated, then the 40-column display can be switched on. Both can't be updated simultaneously, but it may be feasible to use both in one program.

You'll have to put up with the 40-column display flashing off between updates of the XEP display.

I asked if there'd be a version of the XEP's software handler without the printer driver code, to save RAM for those who have an 850 interface, or serial bus printer (1027 or 1020). Lane said there will probably be just one. It will assume you're talking to the parallel printer port on the XEP, unless none is found. If not, it's assumed a printer is on the serial bus (or 850), and send all subsequent P: outputs there.

The XEP80 will be unidirectional, with block graphics and an ST character set.

You may be able to address two different printers independently—P1: on your XEP, and P2: on the serial bus or 850. The handler is almost complete and is under 700 bytes of code.

Lane cleared up the confusion about bit image graphics. The TMP chip supports it, but has only enough RAM for a half-page of it (laid out horizontally or vertically). It will display the same number of pixels as a mode 8 display on the 8-bit (both take 8K of RAM, each bit representing a single pixel). This is a limitation of the total RAM in the XEP80, not of the TMP control circuitry.

At this writing, Lane does not have a graphics driver built into his handler, although there is a "debug mode," where you can talk directly to the TMP chip, however. This would allow you to set it in the bit image graphics mode and drive it yourself. It would be slow but feasible, according to Lane.

As far as mixing text and graphics on the TMP display, similar to custom display lists on the computer, this will not be available in the XEP80. It would require a ROM change in the XEP itself. This feature won't be supported by Atari, but some enterprising third parties might be able to do it in upgrades.

The 80x24 text display requires 1920 bytes of the XEP's RAM, close to 2K. That leaves room for three additional screens. The XEP80 will support screen flipping. Alternate fonts may be placed in the extra RAM and enabled, I'm told.

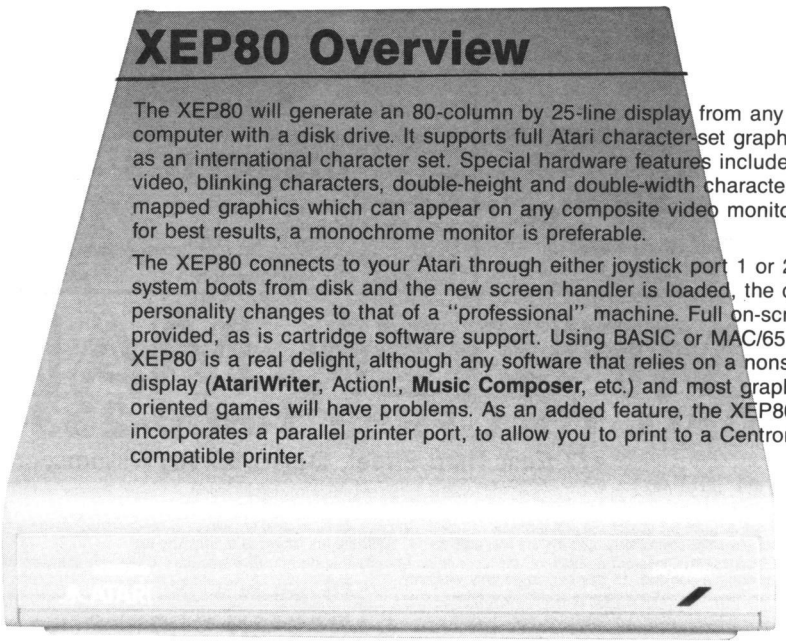
There's a small 256-byte printer buffer in the unit, to let you send text to the printer and talk to the XEP display almost simultaneously.

I asked Lane if Atari is targeting the XEP80 for release at the November COM-

XEP80 Overview

The XEP80 will generate an 80-column by 25-line display from any Atari 8-bit computer with a disk drive. It supports full Atari character-set graphics, as well as an international character set. Special hardware features include inverse video, blinking characters, double-height and double-width characters, and bit-mapped graphics which can appear on any composite video monitor—although, for best results, a monochrome monitor is preferable.

The XEP80 connects to your Atari through either joystick port 1 or 2. Once the system boots from disk and the new screen handler is loaded, the computer's personality changes to that of a "professional" machine. Full on-screen editing is provided, as is cartridge software support. Using BASIC or MAC/65 with the XEP80 is a real delight, although any software that relies on a nonstandard display (**AtariWriter**, Action!, **Music Composer**, etc.) and most graphically oriented games will have problems. As an added feature, the XEP80 incorporates a parallel printer port, to allow you to print to a Centronics-compatible printer.



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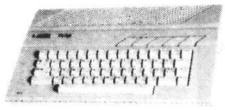

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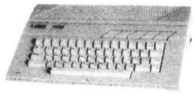

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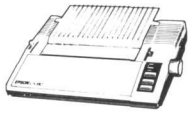

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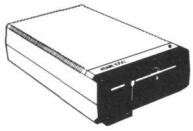

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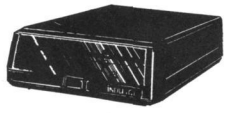

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DEX. "That sounds reasonable," was his comment.

MR: *Any final comments?*

JS: To wrap it up. . . from our standpoint, we're doing what we feel are the key pieces. It's unfortunate that, because people are seeing a lack of software from other parties, they're putting the burden on Atari (to deliver new software). From our standpoint, since we're being really selective, we feel that we are working on the key pieces to carry the product into the future. Other drives, more memory, the 80-column capability—the key hardware that's been missing for so long.

*On behalf of **ANALOG Computing**, I would like to thank John Skruch, Jose Valdes, and Lane Winner for their time and informative talk on the new 8-bit Atari products. It's reassuring to see Atari continuing to support the 8-bit computer systems, despite all the hoopla around the new 16-bit ST computers.*

Matthew J.W. Ratcliff is an Electrical Engineer in St. Louis, Missouri. He has been programming in BASIC and assembly language on the Atari since 1982. He's also active in telecommunications and is one of the main Sysops on the Delphi Atari Sig.

ATARI USERS' GROUPS

Huntsville Atari Users' Group
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Meetings; BBS; newsletter. President: Lamarr Kelley.

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COVOX Voice Master

COVOX Inc.
675-D Conger Street
Eugene, OR 97402
(503) 342-1271
With software $89.95

by Matthew J.W. Ratcliff

Voice Master is a hardware/software package that adds speech recording, playback and recognition to your Atari. The **Voice Master** box plugs into joystick port 2 and is about half the size of a box of disks. A headset, with a microphone and earphones, plugs into the box. The software with the **Voice Master** includes several interesting demos, a Voice Harp music composer, and system software.

Voice Master's documentation is complete and readable. The software, version 1.01, was very impressive. When the disk is booted, your hardware (800, 800XL, or 130XE) is diagnosed, and **Voice Master** configures itself automatically, making the most of available memory.

A bar graph display program is provided, to help you set up your COVOX unit to adjust gain and perform the "calibration" procedure. As you speak into the microphone, the screen comes to life with dancing bar graph lines. Each line indicates a frequency range and power level for your voice.

The demo program is a simple speech recognition demonstration. You're prompted to say four words. The program memorizes them, and you're then prompted to say any of the four words. The program will recognize each and display the word you said. This short demo is impressive—but misleading. The recognition capabilities of this system are limited. Although **Voice Master** can memorize and recognize up to thirty-two words, it has a great deal of trouble distinguishing that many.

I spent about eight hours trying to get a useful data entry program to run. The frustration wasn't worth the effort. Yet, for $89.95, the COVOX is an excellent learning tool. Useful recognition programs can be written with it, if command words are carefully chosen. Your program could be in the form of menus and submenus, each with only four to six commands.

A clock program is also provided on the **Voice Master** disk. You're prompted for all the words needed to speak the time. After you set the time and alarm, it can function as a talking alarm clock.

With the Voice Harp Composer, you can hum or whistle notes into the COVOX as you watch the notes scroll by. This is a sophisticated program, giving you control of eight voices. You also control features like "filter," "octave," "tempo" and more. For someone with a musical background, this might be a useful utility. (I didn't use it much, but then, I have the voice of a bullfrog.) You can even print your musical score from the composer.

Programming the **Voice Master** is simplicity itself. If you want it to learn a word, give it a LEARN command. If you want it to say that word, tell it to SPEAK. "Hold on, there aren't any LEARN or SPEAK commands in Atari BASIC," you say? True, and since Atari BASIC is in ROM, you can't add new commands to the BASIC interpreter itself. The LEARN and SPEAK commands are changed by the **Voice Master** "wedge" to USR commands!

Rather than have you memorize a lot of cryptic USR commands, **Voice Master** provides a "command parser." It has a hook or wedge into the screen editor (the E: handler) that looks for its predefined keywords (LEARN, SPEAK, RECOG, TRAIN, SSLOAD, SSAVE, etc.) If one is seen, it will be translated to a valid USR, command before being passed on to the Atari BASIC interpreter.

While testing the system, I found only one minor bug, which is easily circumvented. The SLOAD command is used to load a prerecorded speech file. **Voice Master** looks for a valid disk filename. If you use a string, such as F$, you'll get an error. You may just enter the valid USR call, or enter it as *SLOAD D:F*, and then list the line. After that, use the editing keys to change the line to *SLOAD = USR(1766,ADR(F$))*, and it will work fine in your programs.

I had more fun with recording and playback of speech and electric guitar (with *no* preamplification). With all the extra bank switch memory on the 130XE, **Voice Master** could record up to 14 seconds of information. When you save these "templates," they can be used in your own BASIC programs. A utility called Loadplay is provided, to load and play back a speech template. It's a short BASIC listing that may be merged with your programs.

Overall, I found the COVOX **Voice Master** impressive. The Voice Harp Composer will be of great interest to the musically inclined. The ability to create talking programs makes it easy to create educational software (like reading or spelling tutorial programs for children). The recognition portion of **Voice Master** is interesting, but of limited practicality. Still, at the price, this unit could make talking computers commonplace

ST LOG™

THE ATARI ST OPERATOR'S MAGAZINE

OCTOBER 1986 ISSUE 7

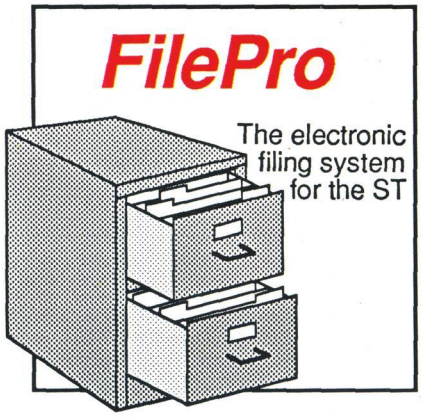
THIS ISSUE:

A tutorial on windows

Mark Skapinker's Clock Boot

PROFESSIONAL PRODUCTIVITY

New ST software from a name you can count on...



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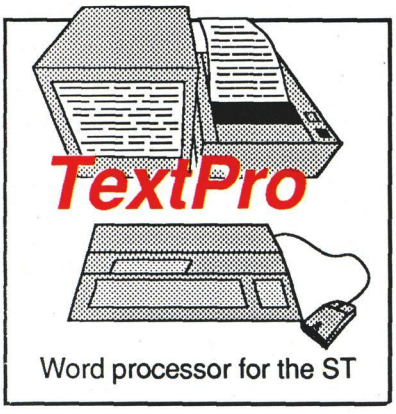

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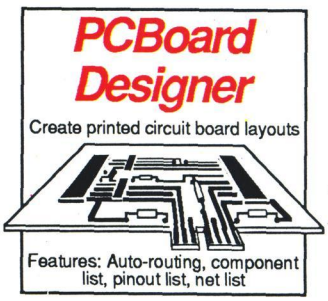

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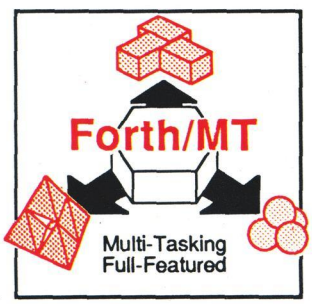

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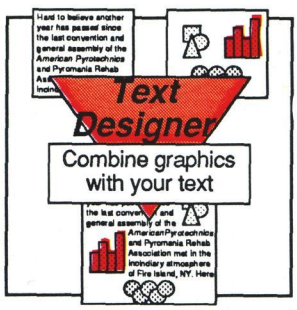

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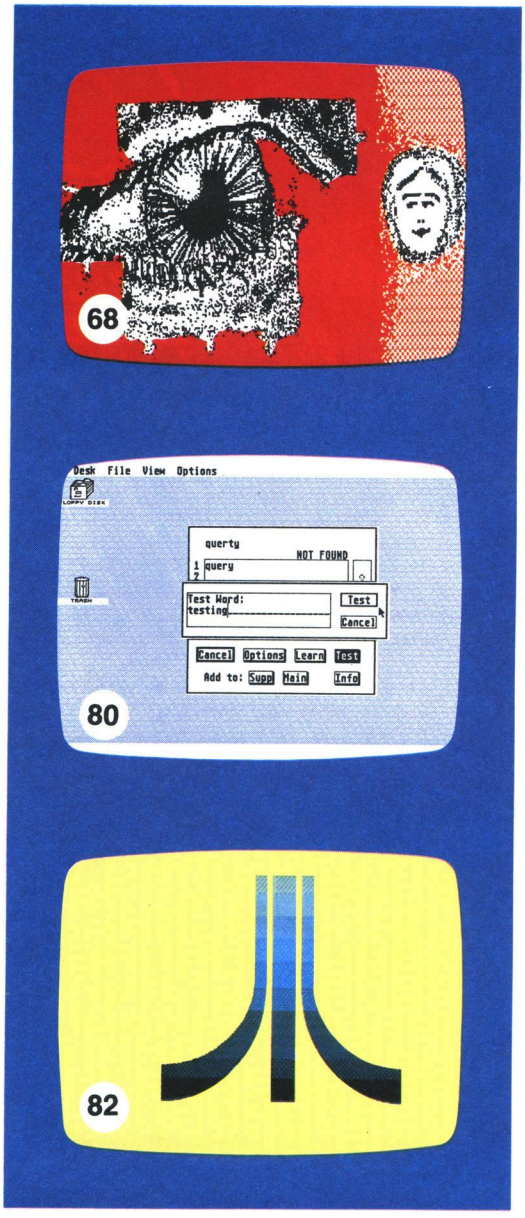
ST-LOG
THE ATARI ST OPERATOR'S MAGAZINE

ISSUE 7
OCTOBER 1986

FEATURES

REVIEWS

COLUMNS



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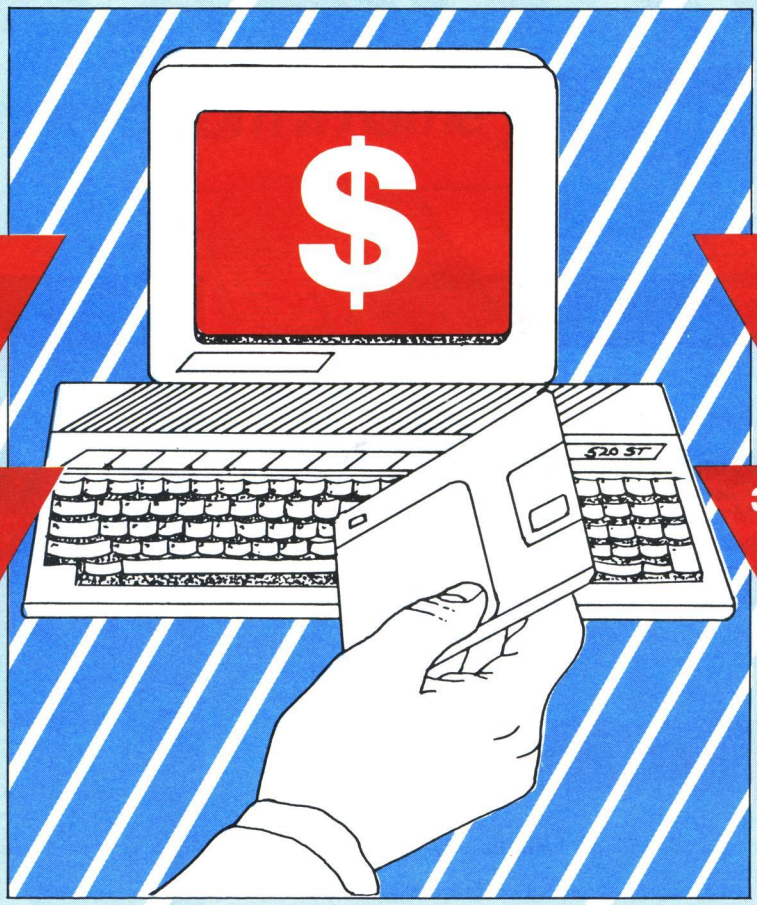

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RULES AND REGULATIONS FOR THE ST-LOG
ST PROGRAMMING CONTEST

1. All entries must be original creations and cannot be submitted, or be under consideration, anywhere else. This includes any other contests or competitions currently underway.

2. Feel free to submit as many entries as you like, as often as you like. The deadline for submissions to the contest is December 31, 1986. All entries must be in by that date to qualify for the contest judging (however, programs received after this date will be considered for regular **ST-Log** publication).

There is no limit to what types of programs we are looking for. Business or educational, graphics oriented or musically inclined, we want to see them all.

3. The entries can be in any programming language of your choice, on 3½-inch single- or double-sided disk, with both run-time and source code. It's quality that counts, not format. If your program is in a compiled language, the compiled object or run-time code must be a free-standing program—one which can be run by someone without a copy of that language. This rule does not apply to programs written in ST BASIC and Logo, which come with the ST. Also, we need to be able to distribute the program legally, without licensing fees or obligation to the language's maker. Contact the manufacturer to find out if the language you're using has distribution requirements.

4. Please make sure that all entries have accompanying documentation, and that all written materials pertaining to the entries (including articles) are submitted as standard double-spaced typewritten manuscript. Please try to make the text as informative as possible, as it pertains to the usage of the program. This accompanying piece could be in the vein of a "making of" the entry, and could include some of your personal programming hints, etc.

5. Any submissions that do not qualify for prizes will be returned only if you supply us with a stamped, self-addressed envelope or mailer. Please do not send originals of your program—make sure you keep a copy for your own use.

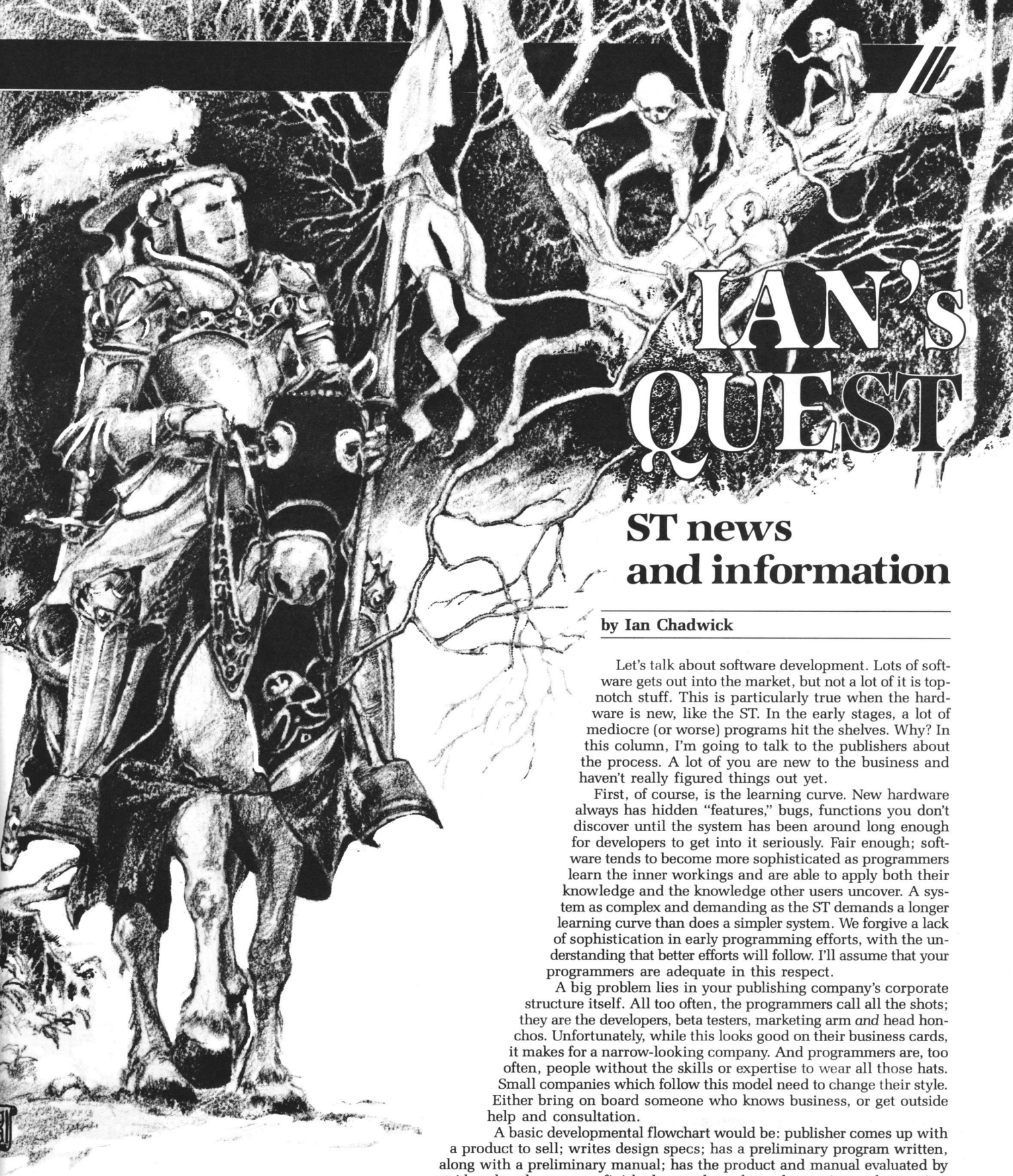
6. Contest judging will be done by the staff of **ST-Log**. The decision of the judges in all contest categories will be final. Contest winners will be announced in **ST-Log** during the first quarter of 1987.

7. This contest is void where prohibited by law. Full-time employees of ANALOG 400/800 Magazine Corp. are ineligible for this contest.

8. Send your entries to: **ST-Log**, c/o ANALOG 400/800 Magazine Corp., P.O. Box 23, Worcester, MA 01603.

Good luck!

THE ATARI ST OPERATOR'S MAGAZINE
ST-LOG



IAN'S QUEST

ST news and information

by Ian Chadwick

Let's talk about software development. Lots of software gets out into the market, but not a lot of it is top-notch stuff. This is particularly true when the hardware is new, like the ST. In the early stages, a lot of mediocre (or worse) programs hit the shelves. Why? In this column, I'm going to talk to the publishers about the process. A lot of you are new to the business and haven't really figured things out yet.

First, of course, is the learning curve. New hardware always has hidden "features," bugs, functions you don't discover until the system has been around long enough for developers to get into it seriously. Fair enough; software tends to become more sophisticated as programmers learn the inner workings and are able to apply both their knowledge and the knowledge other users uncover. A system as complex and demanding as the ST demands a longer learning curve than does a simpler system. We forgive a lack of sophistication in early programming efforts, with the understanding that better efforts will follow. I'll assume that your programmers are adequate in this respect.

A big problem lies in your publishing company's corporate structure itself. All too often, the programmers call all the shots; they are the developers, beta testers, marketing arm *and* head honchos. Unfortunately, while this looks good on their business cards, it makes for a narrow-looking company. And programmers are, too often, people without the skills or expertise to wear all those hats. Small companies which follow this model need to change their style. Either bring on board someone who knows business, or get outside help and consultation.

A basic developmental flowchart would be: publisher comes up with a product to sell; writes design specs; has a preliminary program written, along with a preliminary manual; has the product and manual evaluated by outsiders; has the program finished; goes through another testing cycle; rewrites and debugs; prepares final manual, disk and package; then places it in the distribution stream. Of course, there are a lot of other considerations—contracts with outside programmers, advertising and promotion, market research, project coordination, editing—all depending on the company involved. The weakest areas in this process are usually in market research, design specification compilation and evaluation.

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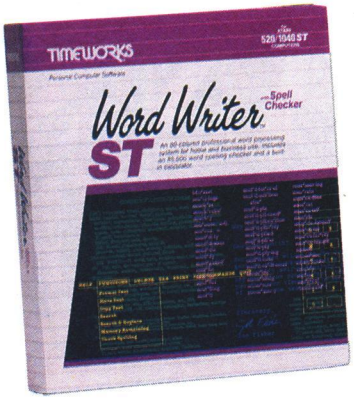

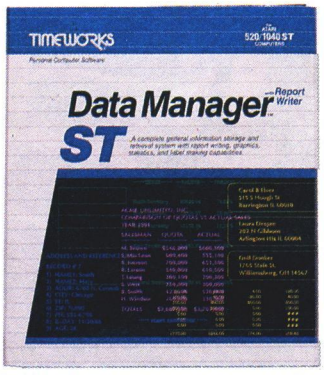

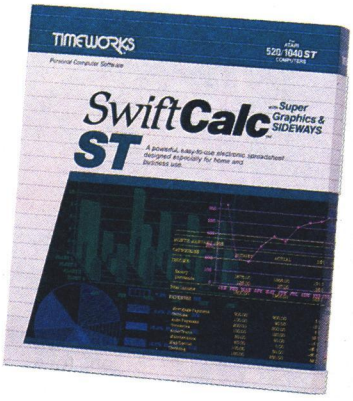

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CIRCLE #121 ON READER SERVICE CARD

First, I assume a company's research finds there is a need or a profitable market for a product. It goes without saying that some level of research is performed, or else you're talking Russian Roulette with your capital. Basic research involves a lot of foot and phone work; you call distributors and retailers first, asking them what's coming and what's been asked for. Read the trade journals and try to find trends or growth areas.

Check out the competition. See who has what out, what it does, and what's due in the next few months (or year). Read reviews to find the strong and weak points. Try to uncover sales figures to see if it's worthwhile and profitable (that's the magic word). Compare prices and see if there's enough margin to undersell or compete at the same price.

You can hire someone to do this for you, or you can have it all done in-house. But, whatever you do, make sure you know the market *first*. Find out *why* a product is demanded or is selling. Who is buying the machines? Will they also buy your program? At what price? Can you make money at that price? Will the program sell more machines or vice versa? Who will stock it? Sell it? Review it? Prepare a written analysis that tells whether or not there's a reason to go ahead and publish. This is done as standard practice in the book publishing industry; it fits the software business, as well.

Next, you write up the design specs for your product. Make sure you buy the competition's packages and see how they handle it. Try to find better, more elegant solutions or features. No, I don't recommend copying and plagiarism, but I do suggest you know what the other companies are doing, then aim at producing a better product with more features than what's currently on the market. The only way you'll know is to buy the competition and test it. Don't kid yourself: if you think other industries don't compare the competitor's products and try to outdo them, you're deluding yourself.

Design specs are *critical*. This is the working scaffold around which you'll build your product. Be as complete and detailed as possible. You may need to change the specs later; be prepared. Write up the essential features first, then potentially attractive features. This is where a lot of brainstorming is necessary. Don't attempt to do it alone; involve everyone in your office if you can. Never look down on ideas, no matter what their source.

With a basic design idea in mind, go outside the company. Ask the users and sellers what they want in a product of that type. Don't think you know it all. *Ask the users*. If your product is a professional one, ask the potential buyers what *they* want. Don't just program something and dump it on the market.

For example, say you decide we need another word processor (we do, but I'll cover that in another column). Go to professional writers, or users who write several hours daily. Ask them what they need, if they want mouse or keyboard commands, or both. Do they need or want GEM? How many keystrokes will they accept to implement a command? Do they need to search and replace bare carriage returns, and do they need windows and buffers? How large a document do they plan to write? Do they use a hard disk or a spelling checker? Is ASCII file output needed? Find out what they're using now, and why they like or dislike it. Ask about printers, speed, fonts, and everything else you can think of. Put it all in writing.

This is a critical, often overlooked step. It pays to talk to users and find out what they're doing and what they need. It also pays to examine the best-sellers and the well-reviewed products from another hardware system. You can see what's worked there—and why. Many of the ideas and innovations can be carried over to the ST environment. Don't be afraid to incorporate a good idea into your product, as long as you write it yourself.

> *"Get the specs right first... by asking users what they need."*

An amazing amount of software hits the market without ever going though an elementary design stage. How often have you wondered, "Why doesn't it do this?" or thought, "It would be so much easier if it did it this way...," or "Why haven't they included this painfully obvious and necessary feature?" I haven't found much software that *doesn't* bring up these thoughts. That's why it's important to get the specs right *first*. And the only way you'll do so is by asking users what *they* need. Remember, in any other manufacturing or publication industry, fully developed and understood design specs are crucial.

Evaluation is the second part of this two-stage process. It's done after you've got some of the program written, enough to test it outside. This is also a key issue: go *outside*. People in the real world will find bugs and make programs crash in ways you never even considered. If you ask a person to press a numeric key, they'll press *A*, or a function key. They'll change disks when they shouldn't, choose the worst menu option, enter bad filenames, forget to turn on the printer, and everything else. And more. They'll *also* be able to find design flaws and make suggestions to improve them. Your programmers can't see this; they've worked with the program too closely. They wrote it; they know *not* to press *A* when *6* is expected.

Evaluation is a barometer for your product. Get *professional* users (I feel I *must* hammer that word home. . . *Don't* depend on your friends, your wife or hubbie, your mother, or your kids to test the product). Get someone who knows the field, uses similar products, needs the product or would use it if available—and who's dependable and willing to be critical. Pay them for their efforts, or promise them a finished copy. Mention them in the credits, but make it a business transaction. Demand a written report and feel free to ask for clarification or expansion on points you don't understand.

This is the make-it-or-break-it point. If your evaluators come back with a lot of criticisms, you'd better decide whether to redesign and rewrite, or to scrap the project altogether. I do this type of work for several companies, including Batteries Included and Antic. My reports are deadly; I'm *very* critical and tear the products to pieces. I test everything, then recommend which points *must* be changed to sell the product and which *should* be changed to improve it. I can't foresee or find every technical flaw, but I cover the user end completely. When these companies combine my reports with those from other sources, they have a good, detailed, critical analysis of the program. That's the base they need, to decide where to go next.

Of course, the needs and demands of a professional user are different from those of the casual user. I'm a professional writer: I spend eight to twelve hours every day (weekends, too) in front of one of my computers, writing. I need different, often more powerful or complex things in a word processor than does the person who writes a few articles or letters. I've used a dozen different computer systems and know what most major word processors can and can't do. But my evaluation of a word processor will take this into account.

If the program suits my needs, it will suit almost anyone in the business or professional market. This isn't true the other way around. If your testers are casual users, the result will be a program they can use, but it's unlikely they'll be able to see or appreciate what a regular or demanding user requires. Know your intended market.

By the same token, I would only use a project management program casually, so my report can only deal properly with the user interface and bugs. I couldn't tell whether or not the program design would best suit a professional project manager. I use speadsheets regularly, so I can evaluate them, but I can't evaluate an accounting package as competently.

for and know the basics. Some should be technically oriented and some just competent users. By getting technical and non-technical (not casual) reviewers, your company gets a well-rounded perspective on the product. Generally, if your original design specs were properly developed, you won't face major rewrites or redesign at this stage.

If your evaluations come back negative, go back to square one. It's better to redesign and produce a good, finished product than produce a half-finished one. You'll only get bad reviews, customer dissatisfaction and a bad reputation with the latter. Think about the general reaction to **VIP Professional** when it arrived; it had many bugs and lacked the promised GEM interface. Most of the negative reaction could have been avoided by following a reasonable design/evaluation cycle, rather than rushing it out.

Don't confuse evaluation with testing. Testing is done on a "finished" product to iron out any last bugs, wrinkles or problems. It is *not* an invitation for design analysis. This can be done by competent, but not necessarily professional, users. It can be done in-house by people who are unfamiliar with the program, but you should send a few outside as well, to cover all bases. You can never test software too much.

Most of my criticisms of programs are due to weaknesses in these steps—or the lack of them, in some companies. No amount of professional programming expertise can make up for sloppy research or design. My own background includes both software and trade book editing for major publishing houses. *Nothing* got published without market research, financial analysis, and, where appropriate, design and evaluation.

There are other issues which can change the reaction to your products: packaging and documentation are two of the more important. Both must be professional and complete. Don't leave ad copy, jacket copy, or—especially—your manuals in the programmers' hands. Get them written by people who understand *English* and can write it adequately. Have all copy read by outsiders. Have them comment on it, along with the program. This goes for all text *within* the program as well: make sure it is fully proofed and edited. Don't let something like *your up $1* appear, when *you're* was intended (as appears in Soft Logik's **Electro Solitaire & 21**).

Get good package design—done by artists, not someone in the back room who took art one year in school. Make sure they understand that it has to sit on a store shelf, both face and spine out. Make sure they understand color, type and the need for a readable package. Above all, *be professional* in every stage, in every activity and every outlook.

*Ian Chadwick is author of **Mapping the Atari** and several software manuals. He worked in the publishing business on and off for fifteen years. He was also an itinerant fruit picker, short order cook, game store manager, magazine editor and journalist. He lives in Toronto with Susan, their six cats and one dog. He is currently writing a murder mystery and trying to teach his dog Pascal.*

WHAT IS ST-CHECK?

Most program listings in **ST-Log** are followed by a table of numbers appearing as DATA statements, called "ST CHECKSUM DATA." These numbers are to be used in conjunction with **ST-Check** (which appeared in **ANALOG Computing/ST-Log** issue 41).

ST-Check (written by Clayton Walnum) is designed to find and correct typing errors when readers are entering programs from the magazine. For those readers who would like copies of the article, you may send for back issue 41 ($4.00).

ANALOG Computing/ST-Log
P.O. Box 625, Holmes, PA 19045

Fast/BASIC-M Release 1.3

PHILON, INC.
641 Avenue of the Americas
New York, NY 10011
(212) 807-0303
ST Disk $129.00

by Bruce D. Noonan, M.D.

Learning a new language on a computer is a major chore for some of us. Many of today's ST programmers learned on the 8-bit Ataris. We had Atari BASIC, Atari Microsoft BASIC, assembly and a few others to choose from. Now that the ST has arrived, we have ST BASIC, Logo, C, 68000 assembly, Pascal, Prolog and Modula-2, plus promises of COBOL, FORTRAN and several others. What a programmer wants in a chosen language is flexibility, ease of use and accuracy, as well as maximum access to the capabilities of his computer.

Philon has produced a product which takes source code written in BASIC and compiles it into machine language for optimum speed. We refer to programs thus created as "stand alone" programs, since they don't require the presence of a language "interpreter" in order to run.

Programs written in Atari's ST BASIC, on the other hand, require that BASIC be run first, with the user's program loaded in afterward. If you've dealt with many ST BASIC programs, you know how incredibly slowly they run. If you constantly move the mouse while an ST BASIC program is running, you can bring a running program to a virtual standstill.

Fast/BASIC-M is close to Microsoft BASIC and ST BASIC in syntax. With the exception of a conspicuous absence of window, editing and debugging commands, it has commands and statements nearly identical to those of ST BASIC. Thus, you can write and debug your ST BASIC program prior to compiling it.

Most statements are compatible, such as those creating sequential files or random files by setting up fields. But you don't have the option of printing to a printer. What? LPRINT doesn't print to the printer? That's right, folks. The **Fast/BASIC** LPRINT function merely "prints" to a disk file.

When you want to print, the program first creates and prints formatted data to the print file called LINEPRIN.TER. You must then terminate the program and return to the GEM desktop to dump the file, by double clicking the LINEPRINTER icon and selecting "print" instead of "show." This is, in my opinion, a handicap for commercial applications where you need to enter data and get immediate hard copy.

Although **Fast/BASIC** lacks sound and graphics commands, just before press time Philon sent me a free update. It contains two functions: VDISYS and GEMSYS. By poking in the proper numbers to GEM arrays, you can utilize the graphics capabilities for which the ST is renowned.

To set up functions, you must also define two other functions, to translate **Fast/BASIC**'s 32-bit integers to 16-bit words and back again, in order to access the GEM routines. The documentation covers this thoroughly and adequately, although, to a beginner, these routines may appear somewhat difficult to implement.

The language is versatile enough, however, to permit saving the arrays and setup procedures in a %INCLUDE file, so that they needn't be typed in for every program, and can be accessed by the compiler at compile time. Trying to use the GEMSYS function to access AES routines (such as dialog boxes) would be very tedious, indeed. Without the Resource Construction Set in the Atari GEM Programmer's Kit, merely designing a dialog box would consume many hours and volumes of code. Setting up the TEDINFO and OBJECT structures (which contain data relative to strings, coordinates of dialog boxes and their whereabouts in memory) could be very frustrating. It would be helpful if Philon would define the structures and include them in the package, along with a "Resource Construction Set" to output BASIC code %INCLUDE files.

The language itself has some peculiarities. The rather unusual setup of GOTOXY followed by PRINT statements of ST BASIC is replaced with the more common PRINT AT command of Microsoft BASIC. But strangely, the *y* variable precedes the *x* variable (as in C)—meaning that, when you're porting over 8-bit Microsoft BASIC programs, you'll have to reverse the *x* and *y* variables in all the PRINT AT statements.

Another unusual aspect of this language is the lack of necessity for line numbers, except for use as labels in GOTO and GOSUB commands. Line numbers are left in merely as a convenience. You could label several statements with the same line number, and the program would execute without a hitch—provided the line number wasn't referenced as a label. The statements are simply executed in sequence. Thus, since the line number is ignored when editing, you must be careful to insert the statement in the correct position, or the program won't run properly.

Furthermore, there's no limit to the length of a statement line. By simply appending the underscore character at the end of a line (e.g., GOSUB_ RETURN), the line may continue on the next line in

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256K XL

This 256K ram upgrade gives you compatibility with the 130XE, plus gives you an additional 128K of RAM for a total of 256K. With this upgrade you can run software designed for the 130XE including Basic XE, Disk operating systems, etc. Internal installation. Does not use expansion bus. Some soldering required. MYDOS and manual included with 256K upgrades. MYDOS lets you configure Ramdisk up to 192K, or 1522 sectors. Use Basic XE in extended mode, plus have 128K ramdisk. etc.

Don't confuse our upgrade with others you may have heard about. Ours supports Antic CPU control, so you don't have to worry about overwriting the screen when doing bank selecting. Some programs will not run properly if this is not controlled. Our upgrade also protects the main memory. During banked operations, you cannot accidentally access the main memory bank and wipe it out.

Installation available. Check with your dealer or contact Newell Industries for more details.

RAMROD XL/XE

Allows the use of three different operating systems. comes with OSNXL OS that includes the FASTCHIP floating point routines, and OMNIMON XL machine language monitor. The OSNXL OS is compatible with the 400/800 OS.

The OMNIMON XL is a resident monitor with all the debugging tools needed for any application. Interrupt and examine any program (including cartridges) easily. Includes read/write to disk, binary load, directory, assembler, disassembler, single step execution, drive control, change registers, hex conversion/arithmatic, search/ display/ alter/ move/ relocate/ verify memory, hex or character format and more.

FASTCHIP

The FASTCHIP floating point routines can give you up to four times the speed of the original floating point routines. Atari basic uses these routines for almost every operation. Spreadsheets and other languages also use these routines. You can see the difference.

SCXM COPIER

This program was designed for use with Atari 130XE, and 256K 800XLs with the Newell Industries 256KXL ram upgrade. It should not be used with other computers unless they support this bank switching method. This program supports both single and double density disk drives up to 2880 sectors per disk. Copies a full disk in just one pass. Make multiple copies while reading the source disk once.

SBM ST

This system was designed to operate in a wholesale or retail environment. SBM ST is an inventory control, point of sale program that produces invoices, purchase orders, statements, mailing labels, quotes, sales and account reports, plus much more.

Inventory control:

Each inventory record consist of item number, part number, description, vendor number, quantity on hand, location, reorder point, quantity on order, cost, sale price, quantity sold, dollar amount sold, and product group.

Accounts control:

Account records consist of account number, name and address, terms, total purchased, total paid, last invoice date, and balance due.

General information:

Mailing labels may be printed for all or selected accounts and vendors. Purchase orders may be printed with automatic update of inventory records. Sales reports consist of daily, periodic, and annual. Tracking of up to 30 salespersons for figuring commissions, etc. Ten programmable tax rates, seperated and recorded.

Capacities:

Parts (items) - 32,767 per inventory file, unlimited number of files.

Accounts - 32,767 per account file, unlimited number of files.

Vendors - 32,767 per vendor file, unlimited number of files.

Estimated capacity per media:

Single sided drive - 2000 records. Double sided drive - 4000 records. 20MB hard disk - 110,000 records.

MYDOS DOS

Compatible with 2.0S, but has the serious user in mind. Supports all 5&1/4 and 8 inch drives. Single and double sided and density. Also support for hard disk. Ramdisk support up to one megabyte.

OMNIVIEW

Now get 80 columns with your 600/800XL,65/130XE. Compatible with LJK Products, BASIC, etc. Enter 80 column mode easily. Supports CPM on ATR 8000. Also comes with Fastchip floating point routines and easy access to additional ram. Also comes with omniwriter word processor and omniterm modem program.

For a complete list of products and prices, contact Newell Industries, 602 E. Highway 78, Wylie, TX. 75098. Phone 214-442-6612. Dealer and distributor inquiries welcome.

CIRCLE #125 ON READER SERVICE CARD

the editor. You cannot break up string constants, keywords, identifiers or statement numbers with an underscore, however, and some statements (such as compiler directives) must appear on their own line. Blank lines may be inserted in the program for legibility.

On the plus side. . .the program works flawlessly. Well, almost. One little thing not mentioned in the documentation is that another file, TERMCAP, *must* reside on the same disk as the compiled program, or it won't run. Philon says this will also be corrected, but meanwhile, whenever a program file is copied to another disk, remember to copy TERMCAP, as well.

Imagine my frustration when my program ran on the compilation disk, but not on a copy. I had to systematically delete or rename files, until I found the necessary accompanying file.

Fast/BASIC-M comes with a 240-page loose-leaf manual, including an index. For the most part, it's well written, and examples are helpful and instructive. It is *not* a BASIC tutorial, however, and assumes familiarity with BASIC programming techniques.

There are two types of floating-point formats, yielding either fourteen or sixteen digits of accuracy: BCD (Binary Coded Decimal) and IEEE (Institute of Electrical and Electronics Engineers). This level of precision exceeds that in the Alcyon C compiler, initially released by Digital Research in Atari's own programmer's kit (although Atari now has a double precision version, available as a $20.00 upgrade). The manual goes into some detail describing the uses of each, and the programmer must decide which to use when compiling.

The package also includes five unprotected single-sided disks, one of which is the "Developer Disk Utilities" from the Atari developer's kit. This contains the Microemacs Editor, the LINK68PRG and RELMOD.PRG, and command files.

The compilation instructions are quite detailed and complete, and, if carefully followed, result in a working program. Just be sure to check the notes on which files must be moved to which disks for BCD math. Having a hard drive or 1 meg of memory with a RAMdisk really saves time and wear on the floppy drives.

There are stern warnings on the back of the binder, telling the user not to make more than three copies of the program and/or its run-time library. Only your own use of a compiled program on a single computer system is authorized, without royalty payments to Philon.

Philon told me verbally that this limitation no longer exists, as policing thousands of users would clearly be unmanageable. Thus, license to use compiled programs commercially is *gratis*—a reasonable decision. After all, who would want to invest $130.00 in a system capable of producing commercial programs on a "power without the price" computer, to find the cost of each compiled program sold would have to be hiked $15.00 or so to pay the royalty?

All in all, I'm pleased with the ease with which **Fast/BASIC-M** compiles and produces working programs. It would be helpful to have an RS232 interface, and again, Philon is working on an upgrade to include this. Their upgrades are to be available (cost not known) to all registered purchasers, as changes are finished.

Philon was responsive to my questions and appears dedicated to supporting its customers. If the lack of a printer interface is corrected—and an interface containing the AES supporting structures is added—this would become a terrific package. In its present state, however, I would have to rate **Fast/BASIC-M** a *B*.

Dr. Noonan is an ophthalmic surgeon in Edmonds, Washington. He's been interested in computing since college, and has developed a program on the 8-bit Atari that magnifies text files on the screen, plotting the text in graphics modes 5 and 7, for low-vision patients.

ST news!

A SHRINK IN A BOX

Dr. Xes is an advanced version of the old "artificial intelligence" program *Eliza*, which mimicks a psychotherapy session.

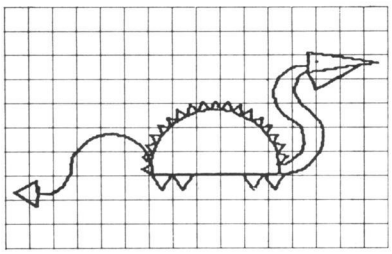
Taking advantage of the ST's memory and speed, **Dr. Xes** interacts with the user to the point where it's close to impossible to tell whether you're talking to man or machine. **Dr. Xes** lets you learn more about artificial intelligence, psychotherapy and yourself.

Selling for $49.95. Rosetta Stone Software, 4000 MacArthur Blvd., Suite 3000, Newport Beach, CA 92663 — (714) 851-6464.

CIRCLE #177 ON READER SERVICE CARD

LOGOWORLDS

This spiral-bound book, meant for the elementary or middle school teacher who may be a computer novice, provides a practical perspective for bringing Logo into the classroom. Interested individuals will gain a better understanding of the language, enabling them to teach it to children or adults.



Each chapter contains a content section, in which Logo concepts with complete explanations and examples are given. The book has 301 pages written by Rachelle S. Heller, C. Diane Martin and June L. Wright.

Order via ISBN 0-88175-031-X. Priced at $19.95, from Computer Science Press.

CIRCLE #179 ON READER SERVICE CARD

FULL-FEATURED COLOR WORD PROCESSOR

Colorwriter, a GEM-based word processor, lets you edit four documents simultaneously, using the ST's windowing. Color facilitates editing, highlighting, and text and cursor positioning. A user-modifiable menu permits printer control codes to be added or deleted, and there's also high-speed scrolling.

Colorwriter lists for $69.95, from Shanner International, 453 Ravendale Drive, Mountain View, CA 94043 — (415) 964-2992.

CIRCLE #182 ON READER SERVICE CARD

68000 PRIMER

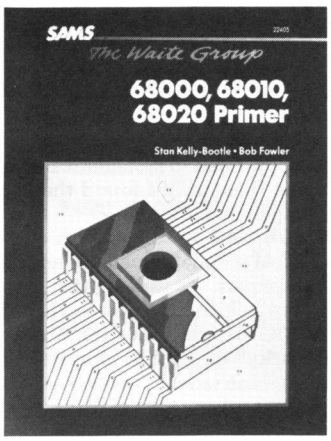
Howard W. Sams & Company has recently released the ***68000 Primer***, a book written to introduce novice or experienced computer programmers to the instruction set and addressing modes common to the 68000 chip family (including the 68000, 68101 and 68020).

The ***68000 Primer*** features an introduction to the 68000 chips, plus information on: chip architecture, how to program in assembly language, how to use the 68000 fully, and how code mapping works.

Also covered: how to minimize file lockups, how to use various instructions and registers, and how these chips are used in multi-user systems. The 368-page book was written by Stan Kelly-Bootle and Bob Fowler.

The ***68000 Primer*** sells for $21.95. For more information, contact: Howard W. Sams & Co., 4300 W. 62nd Street, Indianapolis, IN 46268.

CIRCLE #178 ON READER SERVICE CARD



AC/FORTRAN

The only ANSI FORTRAN now out with a debugger, this one supports virtual arrays and overlays, and can download mainframe programs, with minimal modification.

AC/FORTRAN also provides several tools for large program development, and is source compatible with the similar compiler for the Amiga and Microsoft FORTRAN for the Mac (among others). Features 32-bit integer operations, dynamic linking, IEEE floating point numbers, and much more.

The price is $199.00, from Absoft, 4268 N. Woodward, Royal Oak, MI 48072 — (313) 549-7111.

CIRCLE #180 ON READER SERVICE CARD

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I*S Talk is an advanced telecommunications package designed for ease of use *and* power. A 250K capture buffer, three levels of macros, auto-dialing and log-on sequences, an over 50,000-word built-in spelling checker and GEM compatibility are only a few of the features.

Use keyboard or mouse entry, or both. **I*S Talk** links with other software in the series (like I*S **Time and Billing**). For color or monochrome, **I*S Talk** needs TOS in ROM.

The cost is $79.95, from Batteries Included, 30 Mural Street, Richmond Hill, Ontario, Canada L4B 1B5 — (416) 881-9941.

MIDI FOR MUSICIANS

This recently introduced oversized paperback is a comprehensive introduction to MIDI (Musical Instument Digital Interface). As its title proclaims, it's aimed toward the musician whose needs are professional (or those who aspire to professionalism).

It doesn't matter what instrument you've chosen to concentrate on; you'll learn about the evolution of MIDI, how MIDI can solve musicians' problems, the MIDI language and MIDI applications. There are even directions for setting up and using your own MIDI-based recording studio. Presented in an easy-to-understand style, ***MIDI for Musicians*** also covers the currently available MIDI accessories and software.

The 105-page book is retailing now for $14.95. Written by Craig Anderton, through Amsco Publications. You'll be able to order it from your local bookstore by giving them the ISBN number 0-8256-2214-X.

CIRCLE #183 ON READER SERVICE CARD

FOR YOUR IBM ATARI ST MACINTOSH AMIGA

"EDITOR'S CHOICE!" PC MAGAZINE

"... low price makes this capable package appropriate for professional and individual investors ... GEM interface provides flexiblility and easy communications ... flexible reports and What-If analysis ... the developers obviously consulted extensively with a stockbroker who knows his business." PC MAGAZINE

And we know our own business. Batteries Included has been providing excellent, useful and inexpensive software for over eight years, for all the major computer systems. In developing this superb investment management package we worked closely with Lee Isgur, First Vice-President of PaineWebber N.Y. and one of the world's leading financial analysts. **THE ISGUR PORTFOLIO SYSTEM** will give you all the answers you've been looking for.

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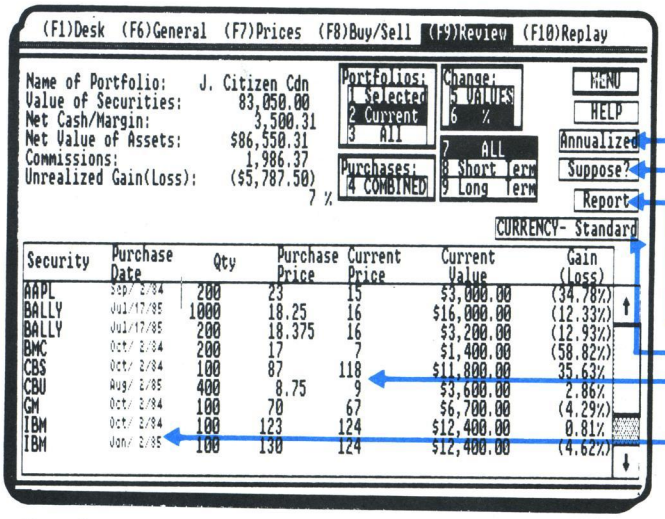

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IPS telecommunications module is pre-set to receive Dow Jones, Compuserve, The Source and InfoGlobe. IPS updates your portfolios automatically with the latest data. Then, makes use of powerful analytical features that show you the most profitable decisions.

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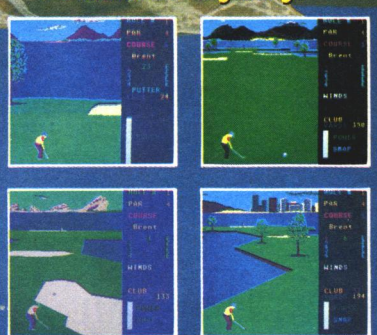

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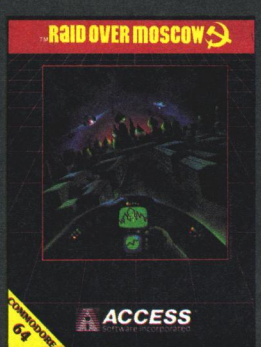

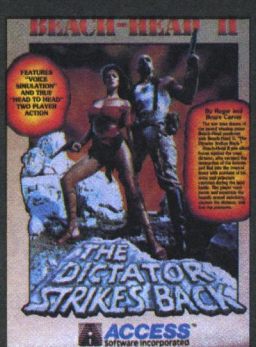

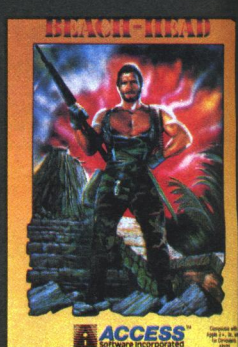

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C-MANSHIP

by Clayton Walnum

Most of you, I hope, noticed the absence of this column last month. No, I didn't skip town. The summer CES reared its ugly (but interesting) head and gobbled up all my time. Add the fact that I had to finish programming last month's 8-bit feature game, **Moonlord**, and you'd be correct in envisioning your friendly author scurrying about like a squirrel desperately storing nuts for the winter even as the first flakes of snow drift from above. I still haven't got my breath back, and, as you can see by the length of this month's listing, I haven't begun to relax yet.

A week's trip to Chicago also gave the mailman a chance to play the trick he's so fond of. It took me a couple of days to locate my desk under the stack of submissions and letters threatening to overflow onto the floor. In that stack was a question from John Lambert.

> I . . . noticed in your last article that the commands open(),and write() were used in the program. In both my developer's documentation and a book on C that I purchased, I did not notice any such command. There is, of course, fopen() and fwrite(), which I assume to be the same. What worries me is that there are other commands available that are not documented . . . is there any way to find all the commands available?

First of all, fopen() and fwrite() are not the same as open() and write(). The former are higher-level functions. When you open a file with fopen(), you have access to such functions as fwrite(), which allow *formatted* output, just like printf(). You can see these higher-level functions used in this month's sample program. Both open() and write() are low-level functions. If you look at their descriptions in your documentation, you'll see you have to do a lot of the work to get the output the way you want it. There's a good discussion of I/O functions in chapters 7 and 8 of *The C Programming Language* by Kernighan and Ritchie, published by Prentice-Hall.

As for the documentation, the functions are all there if you look hard enough. For instance, you can find open() on page 2-39 of the developer's kit's C programming guide, or on page 10-17 of the **Megamax** documentation. When you're looking for a particular function, you may have to look in several places. There are the standard C functions, as well as all the routines for the AES, VDI, Bios, Xbios and GEM DOS. Nobody said programming an ST was going to be easy. When you jump into a new project, be prepared for a lot of manual hunting.

The tough stuff.

Our last journey took us through a strange, sometimes confusing region of C, pointers. It was our first confrontation with some of the more sophisticated citizens of that world. As we move deeper, we'll have to stay on our toes, checking every street and alley, lest that great mind befuddler confusion leap out and bring us down.

It all sounds a bit grim, but from this point on, alertness and perseverance will be your best friends. We'll get back to pointers again; you can be sure of that. Right now, let's check into a convenient way of organizing data, "structures."

Just your type.

Structures offer a way to keep related data items together, allowing easy access to each element. Database applications are a perfect example. Suppose you're the owner of a store and want to keep track of your receivables. You'll need to know, at a minimum, the customer's name, address and amount owed. It would be nice if there were an array type that could store both character strings and floating point numbers. Guess what? Structures to the rescue.

Setting up a structure is really defining a new data type,

one that's custom designed for your own use. Each "member" of the structure can be any data type you wish, even another structure. Let's set up a structure for our store's receivables:

```
struct account {
        char name[20];
        char address[36];
        char city[30];
        float balance;
      };
```

The keyword struct, followed by the name account, tells the compiler we're going to set up our own data type, and that we're going to call this data type account. The structure's members are declared in the same way you'd declare conventional variables, though enclosed with C's ubiquitous braces. The structure declared above contains four members: a 20-element character array called name, a 36-element character array called address, a 30-element character array called city, and a floating-point variable called balance.

Now that we've declared our structure, we have a new data type at our disposal, but we still don't have a variable of that type we can use. Think about it for a minute. If we want an integer variable, we must declare it as type int. If we want a character variable, we must declare it as type char. So it follows that, if we want an account variable (the name we gave our new data type), we must declare it as type account:

```
struct account record;
```

We've just told the compiler we want a variable called record which is a structure of type account. That's all there is to it, almost.

Filling it in.

We've got our variable record all set up, but there's still one minor problem. It contains no data. As I'm sure you suspect, initializing a structure is going to be different from initializing the simpler data types. Well, yes. . . and no.

```
struct account record = {
        "Clay Walnum",
        "15 Notgonnagivemyaddress Ave.",
        "Atariland, MA 06116",
        155.97
        };
```

The main difference between this initialization and that of other data types is that we don't have to include the element's name along with the data. We only have to fill in the information. The compiler knows the first element goes into the field called name, the second into the field called address, etc. We gave it that information when we defined the structure type account.

When initializing a structure, be sure to enclose the data in braces and separate each element with a comma.

Getting it out.

We now have our structure declared and initialized with data. Just as we need access to each element of an array, we need access to each member of a structure. How can we get at the data? We simply refer to the name of the structure and the name of the element within the structure, separating each with a period:

```
record.name
record.address
record.city
record.balance
```

The first example will give us the string *Clay Walnum*. We can manipulate this data the same way we would any string of characters. For example:

```
s = record.name;
```

will point the character pointer s to the string stored in the first member of the structure record.

The second and third examples are similar to the first.

The fourth example will give us the floating-point value of *155.97*. We might want to use it in this way:

```
printf("Bal = %f\n", record.balance);
```

Layers upon layers.

I stated that the elements of a structure could be of any data type, including another structure. Let's take the structure we've created one step further. It might be nice to have the city, state and zip code in their own elements. We could, of course, just add a couple of members to our original structure. But what if we wanted, for the sake of clarity, to keep all the information within the member city? We'd do it like this:

```
struct where {
        char c[20];
        char s[2];
        char z[5];
      };

struct account {
        char name[20];
        char address[36];
        struct where city;
        float balance;
      };

struct account record;
```

Now take a deep breath, and we'll attempt to wade through this. Our structure account still contains the same information. The difference is that the member city is now a structure of type where, and where contains the members c, s, and z.

Got that? Try to imagine the structure account as a big box. Inside this box are three other boxes called name, address, city, and balance. Inside the city box are three even smaller boxes called c, s, and z.

Now when we refer to the city member, we need to access the nested members c, s, and z. If you think about it for a minute, you might come up with the following:

```
record.city.c
record.city.s
record.city.z
```

And you'd be correct. In the first case, we're accessing c, which is a member of city, which is a member of record. In the second, we end up with s, which is a member of city, which is a member of record. I bet you can figure the third one out for yourself.

More layers!

I'm not through confusing you, yet. Just as you can have arrays of integers or arrays of characters, you can have arrays of structures. In fact, in the case of the database for our imaginary store, arrays of structures are a necessity.

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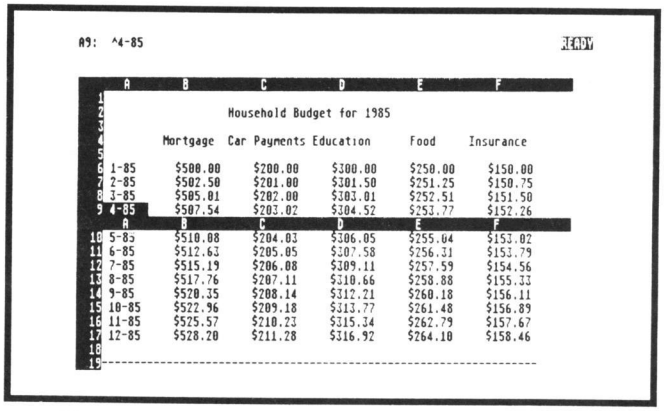

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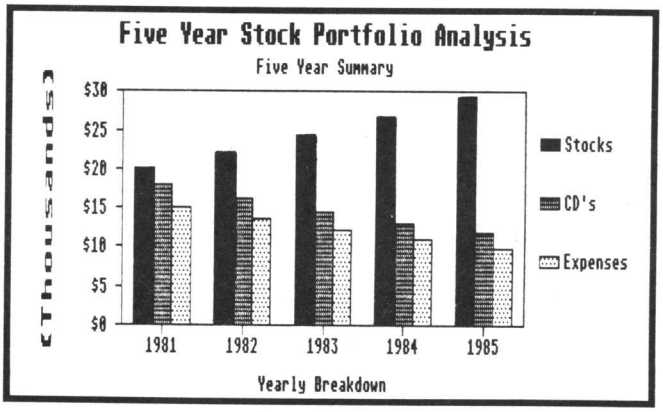

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What good is a database with only one entry? We *could* leave things the way they are and load the records from disk one at a time, but that would be inefficient. Imagine trying to sort a database that way. Not me, buddy. I want them all in memory where I can play with them *fast*.

Arrays of structures aren't as scary as they sound. One small change to your structure variable declaration, and you've got it:

```
struct account record[100];
```

We now have room for one hundred records of type account.

Accessing each element of our structure array is just as simple:

```
record[index].name
record[index].address
record[index].city.c
record[index].city.s
record[index].city.z
record[index].balance
```

As we vary index from zero to the maximum number of elements in our array, we can access each member as shown above. We also retain control over arrays that make up some of the members of our structure. For instance, if we wanted the third letter in the character array name:

```
record[index].name[2]
```

An important point.

In the last column, we talked about pointers. Can we use pointers with structures? Sure can. The first step is to declare our pointer, a simple process:

```
struct account *sptr;
```

Now that we have our pointer, we must initialize it:

```
sptr = &record[0];
       or
sptr = record;
```

This assigns the address of the first byte of our array of structures to the pointer sptr. Suppose this address turned out to be *72000*. Using what you've learned about pointers and structures, see if you can calculate the address we'd be pointing to if we added *1* to sptr.

The answer is *72096*. How did you do? Remember that a pointer is kept well informed about the data type it's associated with, even if that data type is made up, as is a structure. sptr knows that there are 96 bytes in each of our array elements. We get this figure by adding together the length of each structure member:

```
name       30
address    35
c          20
s           2
z           5
balance     4
          -----
          96 bytes
```

Let's say that x is the length, in bytes, of the data type we're pointing to. Then, when we increment a pointer, we're asking it to point to a location in memory which is x bytes ahead of our current location. In the case of our array, we're pointing to the next element, record[1], which begins at an address 96 bytes higher than our current address, or a final address of *72096*.

Pointing to a member.

A pointer to the first member of a structure is only slightly useful. We need to get at the rest of the members, as well. As always, C is there with the answer. Assuming sptr equals &record[0], then:

```
(*sptr).name equals record[0].name
(*sptr).city.c equals record[0].city.c
```

A more popular (and less cryptic) way of writing the above would be:

```
sptr->name equals record[0].name
sptr->city.c equals record[0].city.c
```

Either method is fine—and gives the same results.

Functions and structures.

The last thing we need to know in order to take full advantage of structures is how to pass them to functions. As has been evident throughout this article, structures aren't handled any differently, for the most part, than is any other data type. Nothing's going to change now.

The most obvious method of passing information from a structure to a function is by value:

```
t=add_em( record[index].balance,
          record[index+1].balance );

float add_em(x, y)
float x, y;
{
   return(x + y);
}
```

Here, two values from our array of structures are passed into the parameters x and y. The values are added, and the result returned to the calling function.

But what if we want to modify the contents of the structure directly? As in the past, we resort to pointers:

```
change_em(&record[1]);

change_em(sptr)
struct account *sptr;
{
   sptr->name = "Felix";
}
```

In the above example, we've passed the address of the second member of our array of structures to the function change_em(). This address is stored in the pointer sptr, where it's used to access the member name.

The listing.

This month's sample program is larger than anything we've done in the past. I got overzealous, but I wanted to put something moderately usable together. There are many things in the program we haven't covered, and I've run out of space (and then some). Next month, we'll clear up some of the leftover mysteries. At any rate, the program contains working examples of everything we've discussed here, as well as a lot of other little tidbits you can sort through.

What does it do? I thought you'd never ask. The program is a simple address database. You can enter addresses from the keyboard or disk, then print them to the screen—or to the printer in label format. As I said, it's simple. There's plenty of room for enhancements. A sorting feature could be added, or maybe a fancier input routine. To keep data from scrolling off the screen, labels are limited

to a maximum of eight. You could add some code that would wait for a keypress each time the screen fills, then increase the number of addresses in the database.

Due to the size of this program, I wasn't able to spend the time necessary to make it compatible with both the **Megamax** and Atari developer's kit compilers. I used **Megamax** (otherwise, I'd still be waiting for the first compile) to develop it, so you'll have to do a little fiddling to get it to work with the developer's package. I know the printer routines act strangely under Alcyon. It will compile cleanly, though, with either package.

That's it. Next month, we'll clean up loose ends and prepare for the exciting exploration of GEM itself.

The author would like to thank Douglas Weir for his programming assistance.

Listing 1.
C listing.

```
/*************************************/
/*   C-manship listing 1, St-Log #7    */
/*      Developed with Megamax-C       */
/*************************************/
#include <stdio.h>
#include <osbind.h>

#define RETURN 13
#define BACKSPACE 8
#define MAX 8
#define PRINTER_OFF 0
#define NOFILE ((FILE *)0)

FILE *fopen();
FILE *fclose();

int work_in[11];
int work_out[57];
int handle;

int contrl[12];
int intin[128];
int ptsin[128];
int intout[128];
int ptsout[128];

struct name {
            char fname[11];
            char lname[11];
    };
struct rec {
        struct name names;
        char street[30];
        char city[30];
    };

main()
{
   int num_recs, load;
   struct rec address[MAX];

   open_vwork();
   num_recs = load_file(address, &load);
   output(address, num_recs);
   if (load=='N' || load=='n')
      save_file(address, num_recs);
   printf("press key\n");
   Cconin();
   v_clsvwk(handle);
}

open_vwork()
{
    int i;
    for (i=0; i<10; work_in[i++] = 1);
    work_in[10] = 2;
    v_opnvwk(work_in, &handle, work_out);
```

```
}

load_file(recp, load)
struct rec *recp;
int *load;
{
   int num_recs;

   Cconws("Load file? ");
   while((*load=Cconin)!='Y' && *load!='y' && *load!='N' && *load!='n');
   printf("\n\n");
   if (*load == 'N' || *load == 'n')
      num_recs = get_records(recp);
   else
      num_recs = disk_file(recp);
   return(num_recs);
}

get_records(recp)
struct rec *recp;
{
   int ans, i;

   ans = 'y';
   i = -1;
   while ((ans=='Y' || ans=='y') && i+1<MAX) {
      ++i;
      Cconws("FIRST NAME: ");
      get_str(recp->names.fname, 10);
      Cconws("\n LAST NAME: ");
      get_str(recp->names.lname, 10);
      Cconws("\n    STREET: ");
      get_str(recp->street, 29);
      Cconws("\n      CITY: ");
      get_str(recp->city, 29);
      Cconws("\n\nAnother (y/n)? ");
      ans = Cconin();
      printf("\n\n");
      ++recp;

   }
   return(i+1);
}

disk_file(recp)
struct rec *recp;
{
   FILE *p_file;
   char filename[15];
   int num_recs, x;

   p_file = NOFILE;
   while (p_file == NOFILE) {
      Cconws("Filename: ");
      get_str(filename,14);
      printf("\n\n");
      p_file = fopen(filename, "r");
      if (p_file == NOFILE)
         printf("No such file!\n\n");
   }
   fscanf(p_file, "%d", &num_recs);
   for (x=0; x<num_recs; ++x) {
      fscanf(p_file, "%s", recp->names.fname);
      fscanf(p_file, "%s", recp->names.lname);
      fscanf(p_file, "%s", recp->street);
      fscanf(p_file, "%s", recp->city);
      ++recp;
   }
   return(num_recs);
}

output(recp, num_recs)
struct rec *recp;
int num_recs;
{
   int status, device;

   status = PRINTER_OFF;
   while (status==PRINTER_OFF) {
      Cconws("Print to screen or printer (s/p)? ");
          device = Cconin();
      printf("\n\n");
      if (device == 'p' || device == 'P')
         status = printer(recp, num_recs);
      else {
```

```
            screen(recp, num_recs);
            status = -1;
         }
      }
   }

   save_file(recp, num_recs)
   struct rec *recp;
   int num_recs;
   {
      FILE *p_file;
      char r,x;
      char filename[15];

      Cconws("Save file? ");
      while ((r=Cconin)!='Y' && r!='y' && r!='N' && r!='n');
      printf("\n\n");
      if (r == 'Y' || r == 'y') {
         p_file = NOFILE;
         while (p_file == NOFILE) {
            Cconws("Filename: ");
            get_str(filename, 14);
            printf("\n\n");
            if ((p_file=fopen(filename, "r")) == NOFILE)
               p_file = fopen(filename, "w");
            else {
               p_file = NOFILE;
               Cconws("File already exists.  Delete it? ");
               if ((r=Cconin()) == 'Y' || r == 'y')
                  p_file = fopen(filename, "w");
                  printf("\n\n");
            }
         }
         fprintf(p_file, "%d\n", num_recs);
         for (x=0; x<num_recs; ++x) {
            fprintf(p_file, "%s\n", recp->names.fname);
            fprintf(p_file, "%s\n", recp->names.lname);
            fprintf(p_file, "%s\n", recp->street);
            fprintf(p_file, "%s\n", recp->city);
            ++recp;
         }
         fclose(p_file);
      }
   }

   screen(recp, num_recs)
   struct rec *recp;
   int num_recs;
   {
      int x;

      v_enter_cur(handle);
      for (x=0; x<=num_recs-1; ++x) {
         pos_cur(x,0);
         printf("Record #%d\n", x+1);
         pos_cur(x,1);
         printf("%s %s\n", recp->names.fname, recp->names.lname);
         pos_cur(x,2);
         printf("%s\n", recp->street);
         pos_cur(x,3);
         printf("%s\n\n", recp->city);
         ++recp;
      }
   }

   printer(recp, num_recs)
   struct rec *recp;
   int num_recs;
   {
      int x, status;
      FILE *p_file;

      status = Cprnout(0);
      if (status == PRINTER_OFF) {
         printf("Turn on printer!\n");
         return(status);
      }
      p_file = fopen("LST:", "w");
      p_file->_fd = 3;
      for (x=0; x<num_recs; ++x) {
         fprintf(p_file, "%s %s\n", recp->names.fname, recp->names.lname);
         fprintf(p_file, "%s\n", recp->street);
         fprintf(p_file, "%s\n", recp->city);
         fprintf(p_file, "\n\n\n");
```

```
        ++recp;
    }
    fclose(p_file);
    unlink("L$T:");
    return(status);
}

pos_cur(i,1)
int i,1;
{
    int x, y;

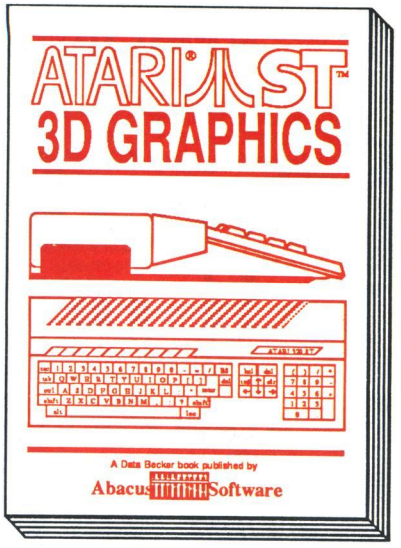
    if ((i+1)%2 == 0)
        x = 50;
    else
        x = 10;
    y = ((i/2)*5)+4+1;
    vs_curaddress(handle,y,x);
}

int get_str(s, mx)
char s[];
int mx;
{
    int p, code;

    p = 0;
    code = Cconin();
    while (code != RETURN && p <= mx-1) {
        if (code != BACKSPACE) {
            s[p++] = code;
        }
        else if (p > 0) {
            s[--p] = '\0';
            putchar(BACKSPACE);
            putchar(' ');
            putchar(BACKSPACE);
        }
        code = Cconin();
        s[p] = '\0';
    }
    if (p = mx)
        printf("\r\n");
}
```

REQUIRED READING

FOR THE ATARI® ST™



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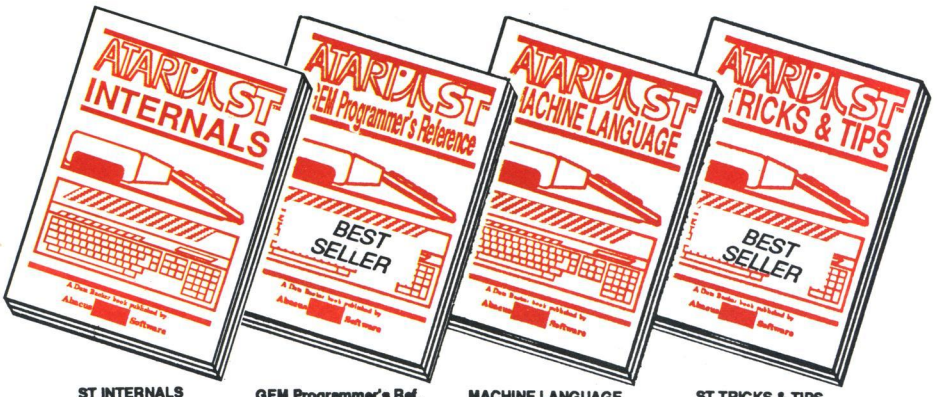

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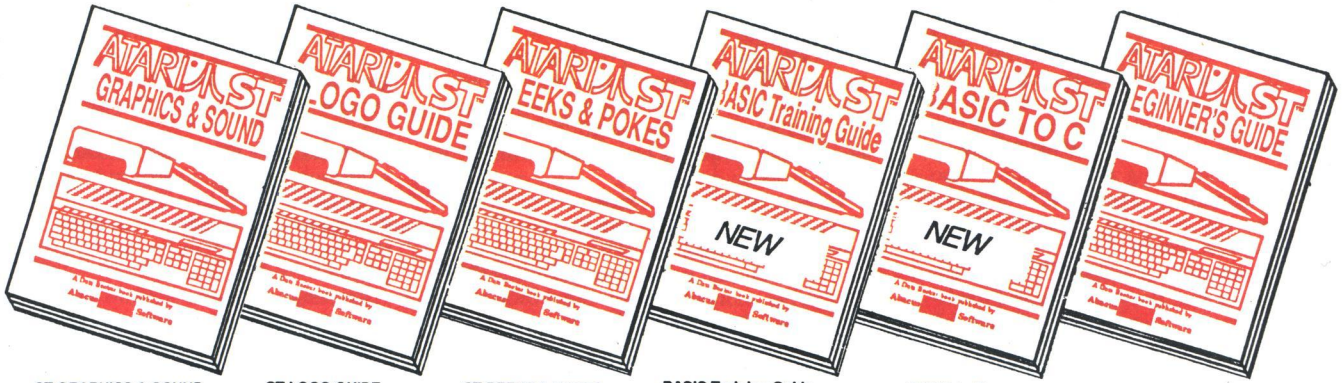

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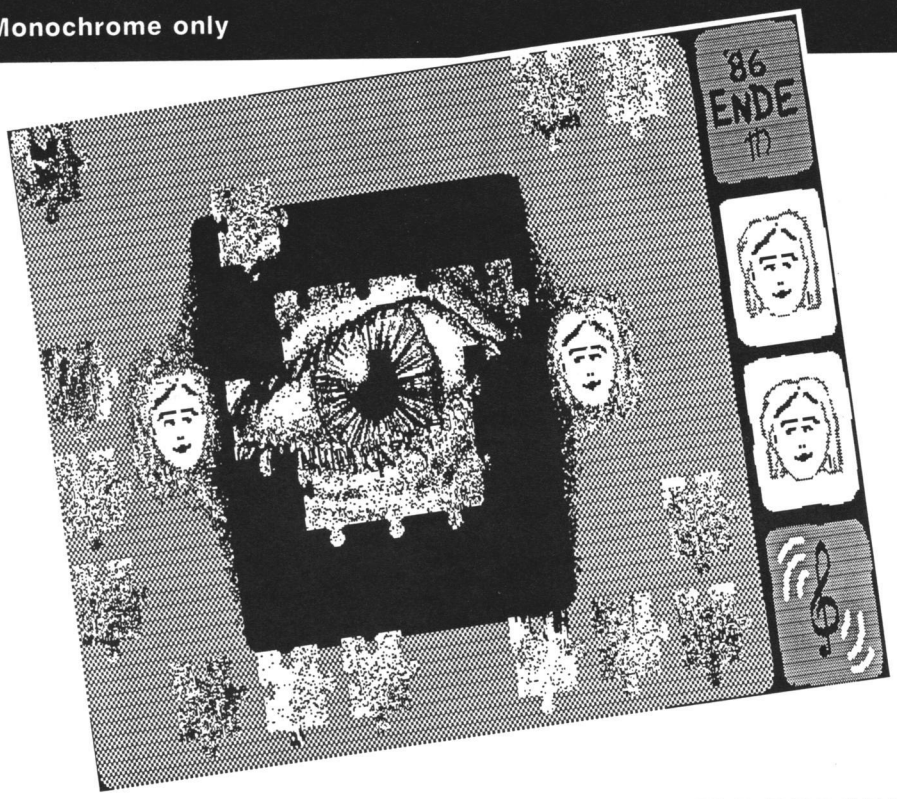


Puzzle it out

West German software available for your ST.

WITH A BONUS PUZZLE PROGRAM FOR DISK SUBSCRIBERS

by Douglas Weir

This month, **ST-Log** disk subscribers get (among other things) **PuzzlePuzzle**, a delightful "multidimensional puzzle game" produced by TommySoftware, a West German company. **PuzzlePuzzle** comes with its own original music and is being distributed as "shareware" by its developer (for more information, see the title screen). **ANALOG Computing** urges readers who enjoy the program (just about everybody, we believe) to send the requested $10.00 to the address below.

Mr. Thomas Maier, head of TommySoftware, writes that the response to **PuzzlePuzzle** so far has been "very, very bad." It will be a shame if this program, which is a real work of art (and there are very few ST programs of which that can be said), does not repay its developers for some of the effort required to produce it.

For those who aren't disk subscribers, here's a brief description of the program: **PuzzlePuzzle** consists of a cleverly arranged sequence of (not difficult) puzzles, which the player assembles using the mouse. A distinctive and haunting musical accompaniment can be switched on or off. We haven't counted the puzzles, but TommySoftware says there are over twenty-five. There are a couple of surprises for the player, which we don't want to give away here. But we do suggest that you look at the customized mouse cursor closely when you end the program.

Note: **PuzzlePuzzle** runs only in high resolution (i.e., on a monochrome monitor). It's a good excuse for color monitor owners to look for one of the many bargains that seem to be available now on monochrome monitors.

We were so impressed by this program that we wrote to TommySoftware (with our $10.00 check), asking for information on other ST programs they might have under development. Here's a list of titles currently or soon to be available.

Crypt_it — A GEM-driven program that encrypts "data and program files." Allows different levels of coding through usage of individual passwords. Requires ST, disk drive, monochrome or color monitor, for 98 DM (Deutsch Marks) plus postage. Available now.

LineWorks — A programmable 3D animator, GEM and TOS compatible. Runs with C and Pascal programs (future version will run with BASIC). Executes X32 files produced by MUSIX32. Requires ST, disk drive, monochrome or color monitor, for 148 DM plus postage. Available August 1, 1986.

LisPas II ST — Fast GEM-driven List interpreter (with windows, mouse usage, etc.) Contains over 130 functions; usable with any ASCII editor. Has "easy-to-use redraw routines for windows." Requires ST, disk drive, monochrome or color monitor (medium or high resolution), for 298 DM plus postage. Available now.

LisPas III ST — Enhanced version of **LisPas II**, with expanded graphics facilities, expanded GEM access, and more. Requirements: same as for LisPas II. Cost is 298 DM plus postage. Upgrades to **LisPas II** will be available "at a low price." Available November 1986.

Lock_it I — GEM-driven copy protection program. Runs with C and Pascal programs. Requires disk drive, monochrome or color monitor, for 298 DM plus postage. Available now.

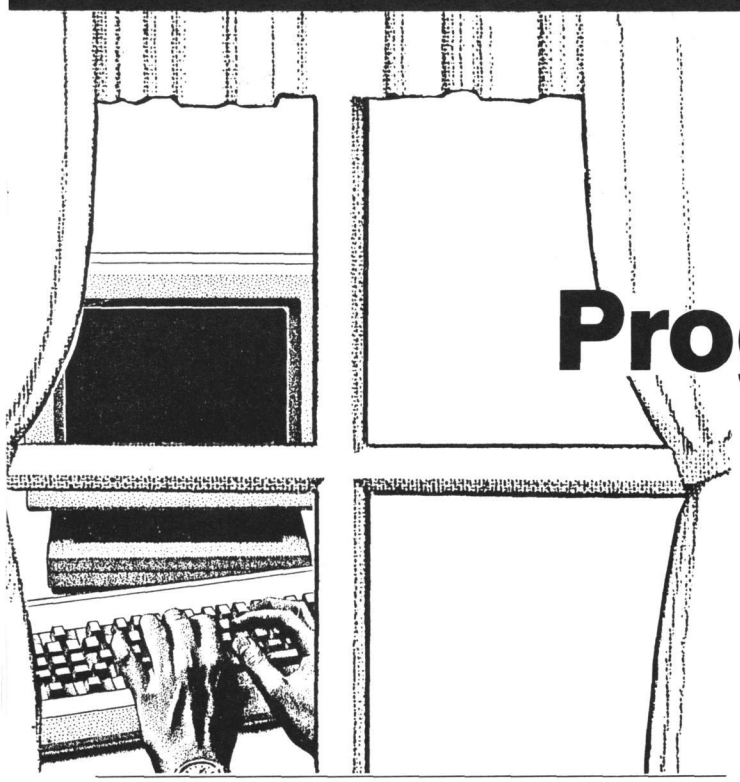
MUSIX32 — Full-featured GEM-driven, mouse-controlled music construction set (apparently used to create the music for **PuzzlePuzzle**). Requires disk drive, monochrome or color monitor, for 89 DM plus postage. Available now.

Personal Address — GEM-driven program "stores address data and allows various printouts" (telephone and mailing lists, address labels, mailmerge, etc.) Requires ST, disk drive, monochrome monitor. Available in German only for 98 DM plus postage, August 1, 1986.

Except for **Personal Address**, all programs are available in English and German. We hope to publish reviews of some of these programs in the near future.

TommySoftware is still searching for a U.S. distributor; until then you'll have to order software direct from them. Their address is: TommySoftware, Mainzer Landstrasse 147, D-6000 Frankfurt/M. 1, West Germany.

Please note that prices are given in German, not U.S., currency.



Programming with G

by Douglas Weir

Here's something I wish had been available when I started learning GEM—a deluxe shell program that demonstrates how to create and use windows under GEM. But I should begin with a couple of warnings.

First, the entire source code for wwx.c is long—too long to be reprinted in its entirety here. It can be found on the ST subscription disk. However, the essence of the program lies in two relatively short functions and their associated data declarations. These two functions handle screen-area clipping and window buffer manipulation, and window redrawing, respectively. The source code for this part of the program is printed here, surrounded by some other crucial fragments.

The second warning is a corollary of the first. Because the part of wwx.c given here is not a complete program, and because so much territory is covered, I assume you're reasonably familiar with C and have already done some GEM programming. You'll need (besides a C compiler, of course) a fairly good set of GEM documentation—for example, the Abacus *Atari ST GEM Programmer's Reference* or the Megamax C manual should be adequate.

Finally, it will be very helpful if you have one of the many versions of Atari's apskel.c program floating around. Pages 172-178 of *Atari ST Tricks and Tips,* also published by Abacus, contain an almost exact copy of apskel.c. Since this program seems to have become a *de facto* standard, I've tried to make wwx resemble it as nearly as possible.

I must emphasize that the code in this article is only a *part* of wwx and is not "stand-alone." But, if you have the ingredients listed above, it shouldn't be difficult for you to write the rest of your own program. ST disk subscribers will have the complete version of wwx, which is ready to use as a GEM shell.

Window workings.

For me, GEM *is* windows. The VDI graphics routines are important, but their ancestors can be found in BASIC's "circle" and "line" statements, and it isn't very difficult to use them effectively. But try bulling your way through some code that will create and manipulate two or three (or more) windows simultaneously—*and* will let the user change their contents, resize them, move them around and activate desk accessories on top of them . . . and yet will always restore each window's current contents when necessary. Try this working with apskel as a model and you'll be in trouble quicker than you can say "ten thousand global variables."

The apskel program shows how to make the simplest use of one window. It's fine if you want to use only one window, and if you're satisfied with its restricted definition of a "redraw" operation.

The scheme followed in apskel is simply to redraw the window's original contents whenever GEM says the window must be "redrawn." But what if the contents have changed (say, due to user input)? Obviously, the current contents of all windows must be preserved somehow and then used as input for redraw operations. Yet the documentation isn't at all clear as to how one should go about accomplishing this.

The idea is simple: for each window used in your program, you reserve a memory area equal to the maximum size of the window. Usually, this will be the same as the ST screen memory size, 32K bytes. Every time the contents of a window change, you must update the contents of that window's buffer. Then when a window must be redrawn, your program simply transfers the contents of the window's buffer back to the window.

Of course, there's a bit more to it than that. The most important detail involves clipping. Suppose your program

GEM windows

displays two windows, and suppose the top ("active") window partially hides the window underneath it. Now the user moves the active window slightly, so that more (but still not all) of the bottom window is displayed. Your program must now redraw the visible part of the bottom window. However, the portion still hidden by the top window must be "clipped" (i.e., must not be redrawn).

This means that, whenever you transfer window data to or from its buffer, you must make sure the screen area is properly clipped—in other words, that you're working only with the portion of the screen which really "belongs" to that window.

In practice, clipping isn't as complicated as it may sound. After all, when you're updating a window's buffer (transferring data from the screen memory), the clip area will always be a simple square or rectangle. This is because, by definition, only the contents of the active window can be changed, and the active window never has other windows on top of it. Doing a redraw of a partially hidden inactive window sounds more difficult—in this case, the area to be redrawn could be L- or U-shaped, or worse.

GEM provides a VDI function—vs_clip()—which sets the clip area of a window. However, it doesn't do the whole job, and must be preceded by some additional code for our purposes. The details of figuring out just what portions of an inactive window are to be redrawn are demonstrated in the function do_redraw(), which is listed below. Here, I want to explain the mechanics of setting up the window buffers, and of transferring data between them and the screen memory.

We'll use a GEM VDI function, vro_cpyfm(), one of the so-called "raster" functions. This one simply copies blocks of data from one memory area to another, very quickly. It expects five parameters. The first two will never change in our program. The first is the application's handle. The second is a code specifying how we want the source data to be combined with the contents of the destination. In our case, we will always want a window to "cover" whatever is "underneath" it, so we specify that the destination should contain only the source data when the transfer is completed.

The next parameter is an array of eight integers, containing the dimensions of the source and destination memory areas, respectively. The dimensions are expressed as the x- and y-coordinates of the top left and bottom right corners of both areas. The contents of this array will change as we save or redraw different portions of various windows.

The last two parameters are pointers to two GEM structures (called FDBs, for "form definition blocks") which describe the source and destination memory blocks, respectively. The GEM header file gemdefs.h contains a declaration for this structure, and a commented version can be found in the listing below. Once the window buffers have been set up and described with an FDB (one for each buffer), and once the screen memory has been described in its own FDB, the contents of these structures will not change.

To use vro_cpyfm() in window buffering and redraw operations, we must do the following. First, we declare an FDB for the screen memory (I call mine wind_actv) and fill in the proper values. Next, we initialize an FDB for each window we plan to use. In wwx, each window's FDB is found in a structure describing the window. The structures are organized into an array, called ww[] (see below for more details). So, to access the first member of the FDB for ww[0], you would refer to ww[0].wind_buff.fd_addr.

Now we're ready to use vro_cpyfm(). Let's look at the

portions of wwx.c reprinted here and see how you can use these to write your own window-handling shell program.

The data declarations come first. The most important of these is the structure type w__pack. Your program should declare an array of these structures; I call mine ww, and the number of its elements is determined by NR__WWS. Each element of the array will contain all the pertinent data for one of your program's windows. If you want to have three windows, your array will contain three elements; if you want only one window, your array will consist of a single element. (Feel free to add members to this structure declaration if there is additional information about your windows that you want to keep track of.)

Within your program, the subscript numbers of the array elements will be your means of identifying separate windows. Suppose you have three windows; you'll have three array elements, namely ww[0], ww[1] and ww[2], containing the data that describes each window.

After a newly created window is first drawn, the contents must be saved to its buffer. This is accomplished by calling set__clip(), which figures out the window's real clip area on the screen, the corresponding area in its buffer, and the source/destination coordinates to be passed to vro__cpyfm(). The sixth parameter to set__clip() has the value *TRUE* if a redraw operation is being prepared (i.e., if data is to be transferred from the buffer to the screen), or *FALSE* if the buffer is being updated (data transferred from the screen to the buffer). In this case, obviously, the parameter will have the value *FALSE*.

After the call to set__clip(), vro__cpyfm() is called to perform the actual transfer. The process of creating the window and drawing it for the first time is now complete.

Further redraw or save operations follow the same pattern. In all cases set__clip() must first be called, both to set the clip area for GEM and to establish which kind of operation (redraw or save) is about to take place, and, of course, to determine the coordinates for the data transfer.

A redraw operation is a bit more complex than a save, however. This is because a redraw is performed in stages, as GEM passes to the application a series of rectangles which define possibly irregular areas of inactive windows to be redrawn. Each rectangle is first clipped, then redrawn. The listing of do__redraw() below will show how this is done.

The following sketch of the overall plan of wwx, which includes the complete listings for set__clip() and do__redraw(), will, I hope, make clear how a program determines when to save or redraw windows, and how it manages more than one window.

(see listing, opposite)

Listing 1.
C listing.

```
/* WARNING: THIS IS NOT A COMPLETE PROGRAM!
*         --it is only a sketch showing how you should organize
*           the main elements of your own window-handling shell
*           program, using the data declarations and functions
*           given. The complete version of "wwx.c" can be found
*           on the ST subscription disk.
*
*           As far as it goes, the code below is self-contained--
*           i.e., there are no undefined references, and it will
*           compile as printed (except that the 'do...while' loop
*           in 'gem_loop()' has no condition). But you must add
*           a lot of code to make a working program out of it.
*
*           The comments are intended to suggest what the missing
*           code should do. Essentially you should "fill in the
*           blanks" with the Atari program "apskel.c", or a similar
*           GEM shell program, as a guide.
*
*           The final versions of "wwx" were compiled with Megamax C,
*           but earlier versions compiled with Alcyon C worked fine,
*           and except for some differences in '#include' files, there
*           should be no problem with Alcyon.
*/

/* "include" header files and data declarations and definitions
    go here. Among these the following are necessary:
*/
#define TRUE 1
#define FALSE 0
#define ONE 1
     /* ...handy indivisible graphics constant          */
#define S_ONLY 3
     /* ...straight transfer code for 'vro_cpyfm()', from "obdefs.h"   */
#define NR_WWS 1
     /* ...number of windows in your application        */
     /* ...change this to suit your needs               */
#define WF_WORKXYWH 4
#define WF_FIRSTXYWH 11
#define WF_NEXTXYWH 12
#define WM_REDRAW 20
     /* ...above four are from "gemdefs.h"             */

/* following is from "gemdefs.h":                       */
typedef struct fdbstr
{
     long fd_addr;     /* address of memory area-- here is where the  */
                       /*   the start address of your buffer would    */
                       /*   go, or (if you are describing screen      */
                       /*   memory) the base address of the screen,   */
                       /*   returned by 'Logbase()', xbios function 3 */
     int fd_w;         /* width of area in pixels                     */
     int fd_h;         /* height of area in pixels                    */
     int fd_wdwidth;   /* width of area in words                      */
     int fd_stand;     /* raster format: this will always have the    */
                       /*   value 1, for standard format              */
     int fd_nplanes;   /* number of bit planes:                       */
                       /*   1 for hi res, 2 for medium res,           */
                       /*   4 for low res                             */
     int fd_r1;        /* reserved-- leave this alone                 */
     int fd_r2;        /* reserved-- leave this alone                 */
     int fd_r3;        /* reserved-- leave this alone                 */
} FDB; /* One of these is used to describe the screen memory, and     */
       /*   one is used for each of the window buffers. They are      */
       /*   required by 'vro_cpyfm()'.                                */

/* following is from "obdefs.h":                                      */
typedef struct grect
{
     int g_x;       /* top left x coordinate                         */
     int g_y;       /* top left y coordinate                         */
     int g_w;       /* width of area                                 */
     int g_h;       /* height of area                                */
} GRECT; /* A simple structure to hold a set of coordinates and      */
         /*   dimensions describing a graphics area. Required by     */
         /*   'rc_intersect()'.                                      */

/* following is my own declaration:                                   */
struct w_pack  /* describes window data                               */
{
     int wi_handle;      /* window handle                            */
     int fulled;         /* TRUE => window is currently max size     */
     int xold,yold,hold,wold;  /* previous dimensions of window      */
     FDB wind_buff;      /* describes window's buffer for 'vro_cpyfm()' */
     int xwork,ywork,hwork,wwork; /* work▼ dimensions of window       */
     int w_kind;         /* first arg to 'wind_create()' (GEM call)...  */
          /* ...consists of bit flags describing window's attributes   */
     int max_dims[4];    /* window's maximum dimensions in x,y,w,h form */
     int st_dims[4];     /* window's initial dimensions in x,y,w,h form */
     char t;             /* TRUE => window has title                    */
     char *title;        /* title string, if any                        */
     char s;             /* TRUE => window has subtitle                 */
     char *subtl;        /* subtitle string, if any                     */
     int closed;         /* TRUE => window is closed                    */
};
 /* global variables come next (identified by "_G")...                 */

 int screenx_G, screeny_G;      /* identical to top left x,y of desktop  */
 int handle_G;                  /* virtual workstation handle            */
 int msgbuff_G[8];              /* event message buffer-- 15th arg pas-  */
                                /*   sed to 'evnt_multi()' (GEM call)    */
 int r_height_G;                /* pixel height of screen-- depends on   */
                                /*   resolution                          */
 int r_width_G;                 /* pixel width of screen-- depends on    */
                                /*   resolution                          */
 int hidden_G;                  /* TRUE => mouse is hidden               */

 /* ...of course, there will be many more of these in the full version  */

 int contrl[12];      /* these must be declared, of course             */
 int intin[128];
 int ptsin[128];

 /*********************************************************************/
 /* following is an outline idea of what the main program might look  */
 /*   like...                                                         */
 main()
 {
      struct w_pack ww[NR_WWS];      /* the array describing all windows */
      FDB wind_actv;                 /* describes screen memory for      */
                                     /*    'vro_cpyfm()'                 */
      int raz_pts[8];                /* source/destination coordinate    */
                                     /*    packet for 'vro_cpyfm()'      */
      char *screen[NR_WWS];          /* pointers to window buffers       */
           /* NOTE: these are declared as pointers because Megamax C     */
           /*       will not allow data structures to be declared        */
           /*       larger than 32K. 'malloc()' is then called to dy-    */
           /*       namically allocate the necessary memory. For DRI     */
           /*       (Alcyon) C, you can just declare arrays of 32K.      */
           /*       ...At any rate, one of these pointers would go into  */
           /*       the 'fd_addr' member of each window's FDB, which is  */
           /*       itself the 'wind_buff' member of the window's        */
           /*       'w_pack' structure.                                  */

      /* Do the following:                                             */
      /* 1. Initialize GEM, AES, VDI, and get the desktop coordinates. */
      /*                                                               */
      /* 2. Fill in the desired values for each element of 'ww[]', then */
      /*    open the windows. It's a good idea to establish the array  */
      /*    subscript of one window which will be the "main" window--  */
      /*    i.e., when that window is closed, the program closes the   */
      /*    other open windows and terminates.                         */
      /*    When each window is drawn for the first time, save its ini- */
      /*    tial contents into the window's buffer by (a) calling      */
      /*    'set_clip()' with the 'redraw' parameter set to FALSE and  */
      /*    then (b) calling 'vro_cpyfm()' with 'wind_actv' as the     */
      /*    source raster and the window's FDB as the destination      */
      /*    raster, e.g.:                                              */
      /*                                                               */
      /*        set_clip(ww,ww->xwork,ww->ywork,ww->wwork,ww->hwork,   */
      /*                 FALSE,raz_pts,wind_actv);                     */
      /*        vro_cpyfm(handle_G,S_ONLY,raz_pts,wind_actv,           */
      /*                  &(ww->wind_buff));                           */
      /*                                                               */
      /*    --NOTE that here 'ww' and 'wind_actv' are pointers. (The   */
      /*    idea is that these calls are made from another function    */
      /*    which receives these pointers as parameters, just as       */
      /*    'do_redraw()' below.)                                      */
      /*                                                               */
      /* 3. Set up the mouse shape, etc., and load in the menu resource */
      /*    file, if desired.                                          */
      /*                                                               */
      /* 4. Now call 'gem_loop()', which will read the mouse and key-  */
      /*    board and do all the usual stuff until the program ends    */
      /*    (i.e., all the windows are closed)...                      */

      gem_loop(ww,&wind_actv,raz_pts);
 }

 /*********************************************************************/
```

```
/* following is an outline of the program's main interpretive loop:   */
int gem_loop(ww,wind_actv,raz_pts)                                     */
struct W_pack ww[];  /* Window structure array                        */
FDB *wind_actv;      /* screen memory FDB for 'vro_cpyfm()'           */
int raz_pts[];       /* source/dest packet for 'vro_cpyfm()'          */
{
    int ii;          /* index variable  */
    int ww_ix;       /* array subscript of current window structure  */

    do  /* do the following till user closes main window or what-     */
        /*  ever you want him to do to show that he's finished        */
        {
        for (ii = 0; ii < NR_WHS; ii++)          /* look at all windows */
            {
            /* ii current 'evnt_multi()'                               */

            /* 2. Figure out the array subscript of the window         */
            /*    the AES is talking about by comparing                */
            /*    'msgbuff_G[3]' with the 'wi_handle' members of       */
            /*    each of the array elements. Put this subscript       */
            /*    into 'ww_ix'.                                        */

            switch (msgbuff_G[0])
            {
            /* 3. Check for possible window management messages--      */
            /*    for example...                                       */

                case WM_REDRAW:
                    do_redraw(&ww[ww_ix],msgbuff_G[4],msgbuff_G[5],
                        msgbuff_G[6],msgbuff_G[7],wind_actv,raz_pts);
                    break;

            /*  ... NOTE that you have to watch out for a lot         */
            /*  more than is suggested by the rather sparse           */
            /*  code in 'apskel.c'. For example, a WM_SIZED mes-      */
            /*  sage will require a redraw operation, even            */
            /*  though 'apskel' essentially does nothing about        */
            /*  this message.                                         */
            }

            /* 4. Here you could process some possible keyboard       */
            /*    input. If so, when you detected a mouse button      */
            /*    pressed or mouse movement or anything that would    */
            /*    indicate that the user had gone back to moving      */
            /*    the windows around, or whatever, you would          */
            /*    save the updated window contents to the buffer      */
            /*    before leaving your keyboard-input subroutine       */
            /*    and continuing with AES processing in               */
            /*    'gem_loop()'...

        }  /* end of 'for' loop  */
    } while ( ...while the user doesn't close the main window,
              ...or whatever-- your own stopping condition goes
                 here

    /* 5. Close any other windows not already closed, and exit from   */
    /*    the program.

}

/*************************************************************************/
/* following are the two important user-programmed functions for         */
/* window manipulation --THESE FUNCTIONS ARE COMPLETE...                 */

/*****
*
* set_clip-- set clipping rectangle for draw or redraw, and set up
*            coordinates for raster operation.
*
*****/
int set_clip(ww,x,y,w,h,redraw,raz_pts,wind_actv)
struct W_pack *ww;  /* pointer to a window data structure             */
int x,y,w,h;        /* dimensions to be transformed into clip rect    */
int redraw;         /* TRUE =) this is preparatory to a redraw        */
int raz_pts[];      /* source/dest packet for raster operation        */
FDB *wind_actv;     /* pointer to FDB for screen                      */
{
    int clip[4];    /* coordinates of clipping rectangle              */

    /* find the region in the window buffer corresponding             */
    /* to the area to be redrawn in this window                       */
    /* this is a GEM call                                             */
    wind_get(ww->wi_handle,WF_WORKXYWH,&(ww->xwork),&(ww->ywork),
             &(ww->wwork),&(ww->hwork));

    /* truncate dimensions extending beyond screen edge               */
    if ((x + w) > r_width_G)
        w = r_width_G - x;
    if ((y + h) > r_height_G)
        h = r_height_G - y;

    /* calculate rectangle for 'vs_clip()'                            */
    clip[0] = x;
    clip[1] = y;
    clip[2] = x + w - ONE;
    clip[3] = y + h - ONE;

    /* calculate coordinates for raster operation                     */
    if (redraw)
    {
        /* buffer == source                                           */
        raz_pts[0] = screenx_G + x - ww->xwork;
```

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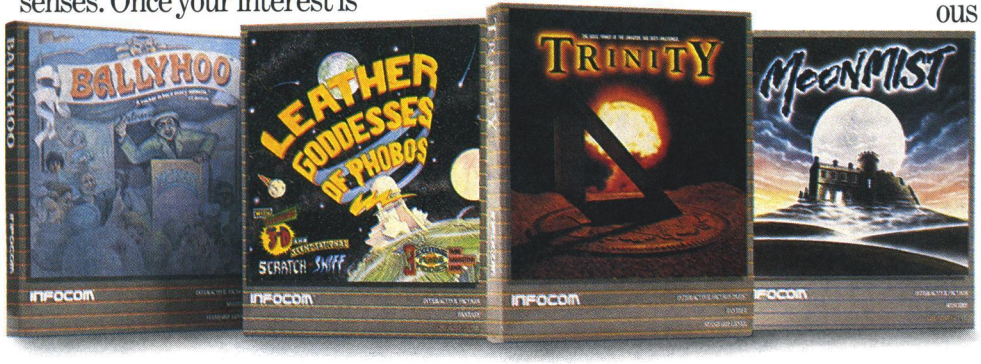

```
    raz_pts[1] = screeny_G + y - ww->ywork;
    raz_pts[2] = (raz_pts[0] + w - ONE);
    raz_pts[3] = (raz_pts[1] + h - ONE);
    raz_pts[4] = clip[0];
    raz_pts[5] = clip[1];
    raz_pts[6] = clip[2];
    raz_pts[7] = clip[3];
  }
  else
  {
    /* buffer == destination */
    clip[0] = raz_pts[0];
    clip[1] = raz_pts[1];
    clip[2] = raz_pts[2];
    clip[3] = raz_pts[3];
    screenx_G = raz_pts[4];
    screeny_G = raz_pts[5];
    w = (raz_pts[6] + ONE) - raz_pts[4];
    h = (raz_pts[7] + ONE) - raz_pts[5];
  }

  /* set clip rectangle for GEM     */
  /* this is a GEM call             */
  vs_clip(handle_G,1,clip);
}

/*****
 *
 * do_redraw-- redraw an application window.
 *
 *****/
int do_redraw(ww,xc,yc,wc,hc,wind_actv,raz_pts)
struct w_pack *ww;      /* pointer to a window data structure          */
int xc,yc,wc,hc;        /* msgbuff_G[4..7]: dimensions of area to be   */
                        /* redrawn                                     */
FDB *wind_actv;         /* pointer to FDB for screen                   */
int raz_pts[];          /* area/dest packet for raster                 */
{
  GRECT t1,t2;          /* from 'obdefs.h': holds rect dimensions      */
                        /* t1 == dimensions of rectangle from rect-    */
                        /*       angle list                            */
                        /* t2 == dimensions of area to be redrawn,     */
                        /*       from parms

  /* hide the mouse-- this is a GEM call  */
  if (!hidden_G)
  {
    graf_mouse(256,(long)0x0);
    hidden_G = TRUE;
  }
  t2.g_x = xc;          /* transfer parms (rather clumsily-- but       */
  t2.g_y = yc;          /*  the structures are required by             */
  t2.g_w = wc;          /*  'rc_intersect()' below, and the args as    */
  t2.g_h = hc;          /*  passed are elements of 'msgbuff_GII');     */

  /* get the first rectangle from rectangle list   */
  /* this is a GEM call                            */
  wind_get(ww->wi_handle,WF_FIRSTXYWH,&t1.g_x,&t1.g_y,&t1.g_w,&t1.g_h);

  /* keep redrawing while there are valid rectangles in the list  */
  while (t1.g_w && t1.g_h)
  {
    /* if the rectangles intersect, redraw that area      */
    if (rc_intersect(&t2,&t1))      /* a GEM call         */
    {
      set_clip(ww,t1.g_x,t1.g_y,t1.g_w,t1.g_h,TRUE,raz_pts,
               wind_actv);

      /* raster from buffer into current window    */
      /* this is a GEM call                        */
      vro_cpyfm(thandle_G,3,ONLY,raz_pts,&ww->wind_buff),
                wind_actv);
    }
    /* get the next rectangle from the list      */
    /* this is a GEM call                        */
    wind_get(ww->wi_handle,WF_NEXTXYWH,&t1.g_x,&t1.g_y,&t1.g_w,
             &t1.g_h);
  }
  /* show the mouse-- this is a GEM call      */
  if (hidden_G)
  {
    graf_mouse(257,(long)0x0);
    hidden_G = FALSE;
  }
}
```

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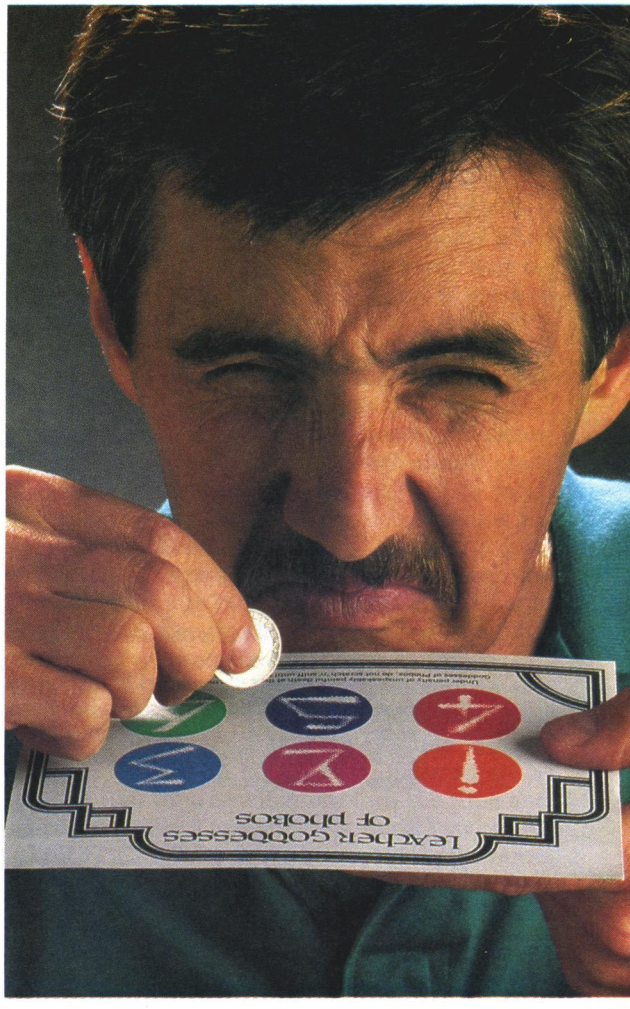

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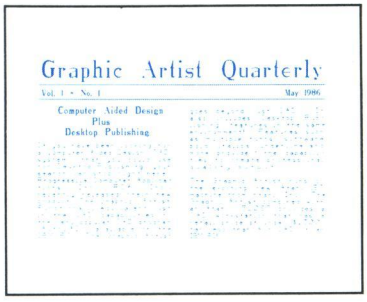

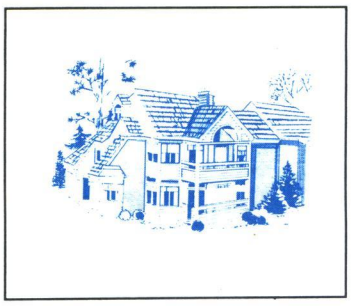

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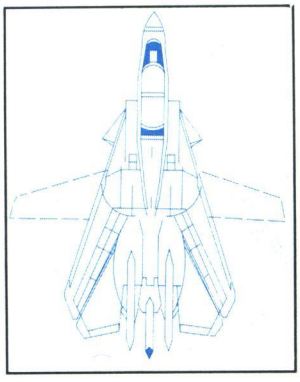

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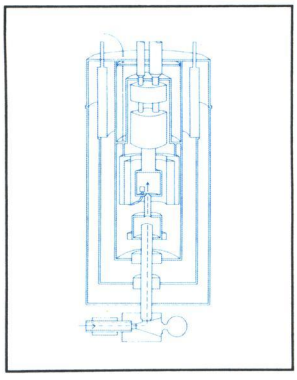

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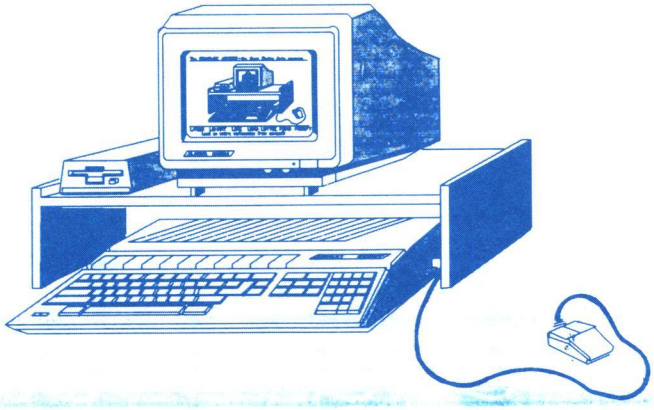

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CIRCLE #140 ON READER SERVICE CARD

Setting the clock on your ST

A simple alternative to using the control panel desk accessory

(or: How to "Include the Batteries" where one was excluded)

by Mark Skapinker

The Atari ST is designed with an internal clock. What's been left out is a battery to allow the ST to "remember" the time from the point at which it was switched off until next time you switch it on—an oversight by Atari, when you consider that a simple battery would cost just a dollar or two. Having the date and time set is a help in using your ST; when you create new files, the ST writes the time and date of their generation. This capability is also important to some programs that use the date and time—**Thunder!**, for example, which can automatically insert the information into documents for you.

This means that, every time you switch on your ST, you need to reset the date and time. A number of companies have developed "clock cards," which plug into the ST to do this for you. If you don't own such a card, the only way to set the time and date in each case is by using the "control panel" desk accessory. This method isn't convenient at all, because it means you must have the desk accessory present always; you must remember to go and set the clock; and you need to type in the complete date and time in each instance, from the default of November 25/85. It's hardly worth the effort!

There had to be an easier way. For that reason, I developed the little program BICLOCK.PRG for Batteries Included, who have decided to place the program into public distribution, as a service to the ST community. Feel free to make copies of this program.

It's based on three very simple principles: first, the ST has a way of allowing you to run a program automatically every time you switch on your computer. Second, you should only have to change the date and time since last time you set them, rather than November 25/85 each time. Finally, the time and date should be very easy to change.

On your "boot" disk (the disk you place in drive A when you switch on your computer), the ST always looks to see if there's a folder called AUTO. If there is such a folder, it will automatically run any programs found there. For that reason, if you don't have a folder called AUTO on your boot disk, create one (using the "make folder" option from the desktop). Copy the program BICLOCK.PRG into this folder, and it will run every time you start your ST.

The program displays three dates. The first is the "system date" (usually November 25/85) in the computer when you start up. The second is the "date when you last set the date" using BICLOCK.PRG, and the third is the date you're now setting (defaulting to the second date).

By using the up and down arrow keys, you can increase or decrease the day, and by using the left and right arrow, you can increase or decrease the month. Press the TAB key, and you can use the arrow keys to increase or decrease the hour and minute. When you're finished, simply press RETURN to set the computer's date and time to those you've selected, or press ESC to leave the program without changing the date and time at all. (All this is explained on the screen with the program). Next time you run the program (or next time you switch on your ST), you'll only have to advance the date and time from the setting last noted.

How will this help you? Most people's computer use takes place at a similar time each session, so the date need only be advanced since the last use. For example, let's say you're like me—I switch on my ST every morning at the same time. The first time I switch on, I set the time and date to the current ones. Thereafter, whenever I switch on my ST and BICLOCK.PRG comes up, I just press the down arrow to advance by one day and press RETURN. Let's say you use your ST less often, every few days—you only have to press the down arrow for a short while as it scrolls through the days. Of course, it automatically goes on to

the next month if you reach the last day of a month (except for February on a leap year). It's worth the few seconds to set the date and time, isn't it?

The inside scoop.

How does it work? Every file on the ST has a date and time associated with it (the ones you see when you choose "show info," or when you view the files in "text"). This date and time is known as the "timestamp." When you start BICLOCK, the program reads its own timestamp. This time is given to you as the default time, when you last used the program. When you set the date and time, the program does two things: it sets the internal date and time of the ST, and it changes the timestamp associated with BICLOCK.PRG to the new date and time—a simple, but very useful method! (One warning, because it writes the new date and time to your boot disk, you should make sure that disk isn't write protected.)

Sorry the program wasn't written to use the GEM interface (which would have been easier for us all), but the ST only loads in the GEM "engine" after running all files in the AUTO folder. You can use the program at any time after the machine is on, but *don't* move your mouse, or it will make a "hole" in the screen.

Enjoy!

```
                EASY CLOCK SETTER
By Mark Skapinker.     V1.0 1986.
A gift from Batteries Included ©
           30 Mural St, Richmond Hill
           Ontario, L4B 1B5 Canada.
           Tel: (416) 881-9941

System Date:      29/May/1985   17:33
Last Used:        29/May/1985   17:34
New Setting:      25/Jul/1986   12:31

Press:
LEFT ARROW    Decrease Month
RIGHT ARROW   Increase Month
DOWN ARROW    Decrease Day
UP ARROW      Increase Day
S             Use 'System Date'
L             Use 'Last Used Date'
TAB           Change Time
HELP          Help
RETURN        Use New Setting
ESC           Abort
```

Mark Skapinker is Director of Product Development for Batteries Included, Toronto, Canada. He's in charge of such software as ***DEGAS****, and is the author of* ***Thunder!***

For you technical types, the following page provides the program's principles, with examples of C code used in getting the ST date and time, and changing a file's timestamp. (Please note that the C binding to get/set the timestamp is exactly the opposite of that in most documentation.)

Readers should also realize that the "Easy Clock Setter" is a public domain program, available on some BBSs, Delphi and CompuServe. The listing which follows is not to be typed in, but for information only.

```
/*FILE DEFINITIONS:*/
#define ESC '\033'
#define CR '\015'
#define UPARROW 0x48
#define DOWNARROW 0x50
int hndl;                                   /* file handle */
unsigned int timeptr[2];                    /* long ptr */
unsigned int sdate,stime;                   /* system date and time*/
int day, month, year;                       /* date */
int hrs, mins,secs;                         /* time */
int uday,umonth,uyear,uhrs,umins,usecs;
long retc;                                  /* keycode from keyboard*/
char chr1,chr2;

/* Get the dates and convert them to integers: */
/* In order to get the timestamp, the program file must be "opened"
   First open the program file in the current directory/folder: */
 hndl = Fopen("biclock.prg",0); /* returns a file handle:hndl */
 if (hndl<0)              /* hndl less than 0 means that the file could not
                             be opened in this folder.
                             On bootup, even though your program is in the
                             AUTO directory, the default current directory
                             is still the root directory so try open the
                             program file in the auto folder:*/
  (hndl=Fopen("\\auto\\biclock.prg",0);  /* try in the auto folder*/
   if (hndl<0)                           /* still not open*/
    (Cconws("Cannot find biclock.prg. Press Any Key.");
     Cnecin();                           /* wait for a key*/
     exit();                             /* exit the program */
    )
  )                                      /* successful open:*/
 Fdatime(timeptr, hndl, 0);              /* get the timestamp 0=get*/
 sdate=Tgetdate();                       /* get the ST system date*/
 stime=Tgettime();                       /* get the ST system time*/
/* Now format the dates and times:*/
 day = sdate & 0x1F;                     /* put system day in integer*/
 month = (sdate & 0x1E0) >> 5;           /* put system month in int*/
 year = ((sdate & 0xFE00) >> 9)+1980;    /* put system year in int*/
 secs = stime & 0x1F;                    /* put system secs in int*/
 mins = (stime & 0x7E0) >> 5;            /* put system mins in int*/
 hrs = (stime & 0xF800) >> 11;           /* put system hrs in int*/
 uday = timeptr[1] & 0x1F;               /* put timestamp day in integer*/
 umonth = (timeptr[1] & 0x1E0) >> 5;     /* put timestamp month in int*/
 uyear = ((timeptr[1] & 0xFE00) >> 9)+1980;/* year*/
 usecs = timeptr[0] & 0x1F;               /* seconds */
 umins = (timeptr[0] & 0x7E0) >> 5;       /* minutes */
 uhrs = (timeptr[0] & 0xF800) >> 11;      /* hours */


/* We now have the date and time, We display it on the screen and allow
   the user to change it: */
        while(1)                 /* main loop waiting for input */
        (retc=Bconin(2);         /* wait for keycode from keyboard */
         chr1=retc;              /* keycodes from keyboard */
         chr2=(retc & 0xFF0000L) >> 16;
         if (chr1== ESC || chr1==CR) break;
                                 /* Return or ESC means END */
         else if (chr1==0 && chr2==UPARROW) day_up();
                                 /* move to next day and display */
         else if (chr1==0 && chr2==DOWNARROW) day_down();
                                 /* move to previous day and display */
                                 /* do the same for the others */
        )                        /* end loop */

if (chr1==ESC) exit();           /* ESC pressed. Exit the program*/

/* If the user wants to use the date and time we set thedate and time: */
 timeptr[0]= (hrs << 11) | (mins<<5) | (secs >>1); /* 1st int is time*/
 year=year-1980;                                   /* year - 1980*/
 timeptr[1]= (year<<9) | (month<<5) | day;         /* second int is date*/
 Tsetdate(timeptr[1]);                             /* Set system date*/
 Tsettime(timeptr[0]);                             /* Set system time*/
 Fdatime(timeptr, hndl, 1);                        /* Change timestamp 1=set*/
 exit();

/* the following is a little routine to set the month name given the
   month number. Please note that you should ensure than mon_num is 1
   to 12. The routine does not check this.
*/

BYTE monstr[3];     /* string for month name */

set_mon(mon_num)
int mon_num;        /* pass 1 to 12 Month number */
{
static char *mon_array[]={"Jan","Feb","Mar","Apr","May","Jun","Jul",
                          "Aug","Sep","Oct","Nov","Dec"};
                    /* a static array with month names */
strcpy(monstr,mon_array[mon_num -1]);
                    /* place correct string according to month number */
}
```

Thunder!

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by Arthur Leyenberger

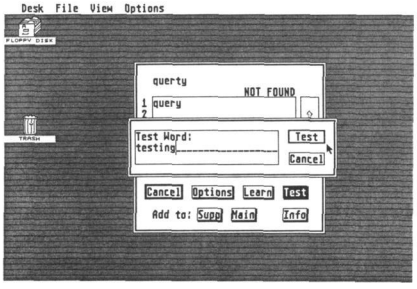
Thunder! is three programs in one: a real-time, 50,000-word spelling checker, a word expander and corrector, and a writing analysis tool. It was designed and programmed by Mark Skapinker and is published by the Canadian company Batteries Included, a long-time publisher of quality 8-bit (and now ST) Atari software.

Two versions of **Thunder!** are provided on the distribution disk. One is a desktop accessory. This version only works with GEM-based word processors. Actually, it will work with any GEM-based program—but may not be appropriate with some. For example, there's little need for a spelling checker in a graphic design program. In such cases, **Thunder!**'s "Autoproof" feature can be temporarily turned off, via the option command.

Here's how it works: once **Thunder!** has been loaded as an accessory, and when Autoproof is turned on, the program follows your keystrokes. Whenever the program detects an end-of-word, such as a carriage return or space, it checks in its memory-based dictionary to see if the previous word exists. If it doesn't, you're offered several suggestions, or given the opportunity to add the word to a supplemental dictionary. If you accept one of the suggested spellings, **Thunder!** will backspace over the word and automatically type the correct spelling.

The other version of **Thunder!** is a standalone program to use with any file. It's convenient for checking files created by non-GEM programs, as well as for examining an entire file created by a GEM program.

This second version of **Thunder!** runs from the desktop, and the possible word error is highlighted in context. The technique lets you see immediately whether you've made a mistake, or the word's correct but not yet in the dictionary. Adding new words is easy, and they can be saved to separate, supplemental dictionaries.



Thunder!

In addition to doing a spelling check, **Thunder!** provides you with a range of statistics, such as: character, syllable, word and sentence count, and two types of readability indices. Both the Fog and Flesch indexes are used. These widely used tests indicate how many years of schooling are required for the average reader to understand what you've written. (Incidentally, this review is written at the 10th-grade reading level.)

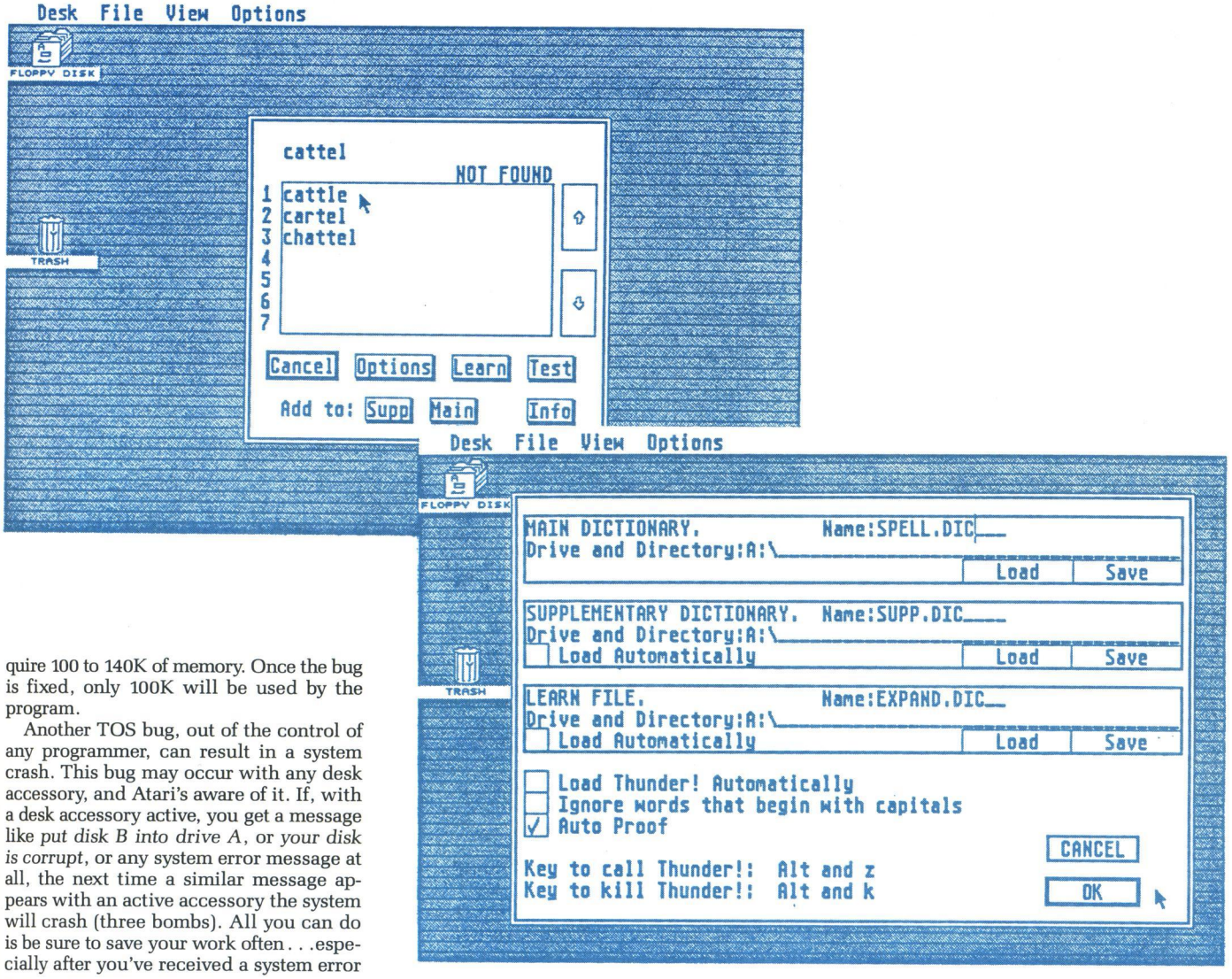
When **Thunder!** tries to find the correct spelling of a word, it displays alternatives, based on letters in different positions of the word originally typed. How? It looks at the first letter and substitutes various words spelled the same except for that letter. Then it looks at the second letter with the first letter, then, finally, at similar words. In this way, the list of alternatives is based on the type and frequency of errors most people make. Most of the time, **Thunder!** gets it right.

One of the unique features of the program is its ability to correctly check a word which contains a number. No other spelling checker currently on the market—for any computer—can handle this type of spelling error.

As mentioned earlier, **Thunder!** has 50,000 words in its dictionary. Other products may claim as many or even more words, but may be counting word *derivations* separately. For example, the words *walk*, *walks*, *walked* and *walking* could be counted as four separate words in some spelling checker programs. In **Thunder!**, these four derivations are considered as one word, just as in an English dictionary.

A note of caution should be given about the statistics segment. Since it's very difficult for a program to define a syllable, the statistics are not 100-percent accurate for short documents. For longer documents, though, **Thunder!**'s stats are quite accurate.

Another problem is that there are, unfortunately, still a few bugs in TOS. If the program opens a virtual workstation in a desk accessory, TOS is supposed to allocate 300 bytes. It doesn't do so correctly and, therefore, can waste from 40 to 60K. What this means is that **Thunder!** can re-



quire 100 to 140K of memory. Once the bug is fixed, only 100K will be used by the program.

Another TOS bug, out of the control of any programmer, can result in a system crash. This bug may occur with any desk accessory, and Atari's aware of it. If, with a desk accessory active, you get a message like *put disk B into drive A*, or *your disk is corrupt*, or any system error message at all, the next time a similar message appears with an active accessory the system will crash (three bombs). All you can do is be sure to save your work often. . .especially after you've received a system error message.

The dictionary is 80K, and the program itself about 40K. But, whenever the ST's booted, the program asks if you want to load the checker. In its desk accessory guise, **Thunder!** and its dictionary need 100K. Fortunately, should you need that extra memory at any time, you can simply call up **Thunder!** (the accessory) and disable it. You've immediately freed up 100K—and saved the hassle of rebooting. Thanks, BI, for a very handy feature.

In addition to a spelling checker desktop accessory, **Thunder!** provides a word expansion feature. For example, say I've defined *BI* as *Batteries Included*. Whenever I type *BI*, *Batteries Included* is typed in.

As many files as you want can be set on your disk, each containing up to 100 expansions. In addition, the expansion isn't limited to just one or two words. An entire paragraph or block of text can be defined.

Another use of the expansion feature is for automatic word correction. For example, I type fairly rapidly, but often mistakenly capitalize the first two characters of a word instead of just the first. This is because I don't let go of the SHIFT key fast enough. Therefore, I often spell *Atari* as *ATari*. With **Thunder!**'s expansion feature, I can tell the program ahead of time to correct the word *ATari* whenever it sees it.

Here's a little on **Thunder!**'s roots. It's an unusual program from an interesting company. Batteries Included is the type of small company that can bring a product from conception to market in less than three months. Take, for example, **Thunder**'s creation.

Back in early March, President Michael Reichmann and Product Development Director Mark Skapinker were having their usual morning coffee. They were discussing the Turbo Lightning spelling checker for the IBM PC and clones. Both agreed that BI could easily do a program like it—do it better and do it quickly. Less than three months later, **Thunder!** was shipping and being shown at Chicago's Summer CES.

The bottom line for me: **Thunder!** from Batteries Included represents the first serious desktop accessory for the Atari ST. Author Mark Skapinker has shown what can be done with a useful idea, good programming and a company willing to support the ST.

Thunder! *isn't* copy protected, so *please* don't give or receive unpurchased copies of the program. Doing so will only hurt you, the ST user, and the ST software market in general.

If you write, you need **Thunder!** I recommend it highly.

Atari ST best-sellers

The following is a list of the best-selling ST software titles, collated since the ST's introduction in the summer of 1985. Please note that these are not the current best-sellers, but those which have sold more copies over the entire period.

1. Sundog: The Frozen Legacy ..... (FTL Games)
2. DEGAS ..... (Batteries Included)
3. VIP Professional ..... (VIP Technologies)
4. Music Studio ..... (Activision)
5. PrintMaster ..... (Unison World)
6. Time Bandit ..... (MichTron)
7. King's Quest II ..... (Sierra)
8. Major Motion ..... (MichTron)
9. Typesetter ST ..... (XLent Software)
10. Brataccas ..... (Psygnosis Limited/Mindscape)

The following were the fastest up-and-coming titles at the time of publication (August 1986). They're listed in alphabetical order, not by rank.

Black Cauldron (Sierra)
dB Man (Versasoft/Atari)
Easy Draw (Migraph)
N-Vision (Audio Light)
Lattice C (Metacomco)
Leader Board (Access)
Mean 18 (Accolade)
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Personal Pascal (OSS)
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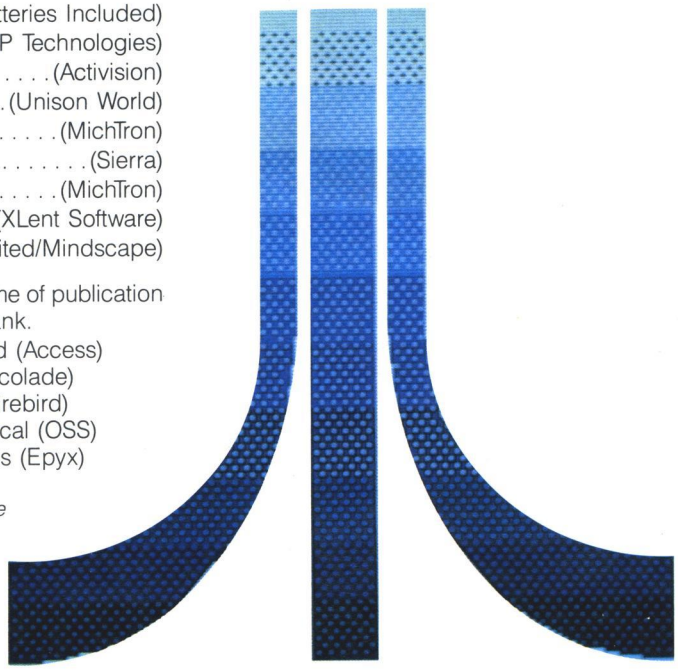

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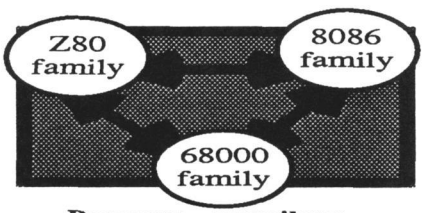

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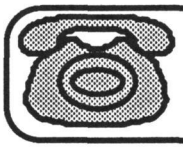
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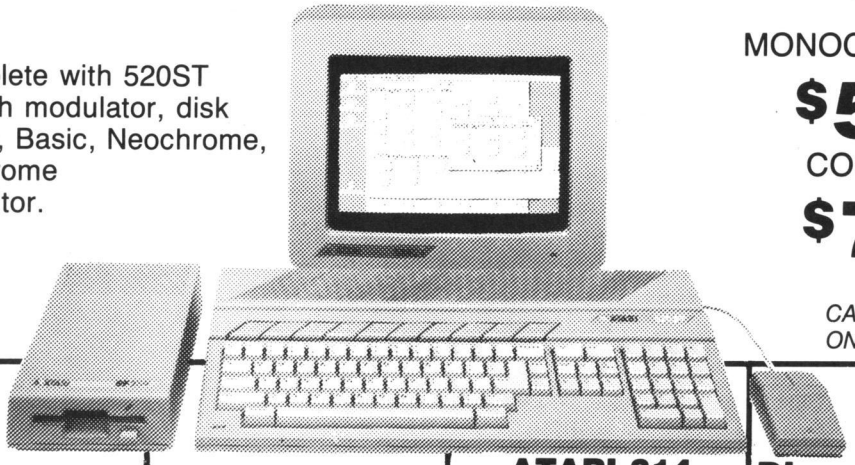

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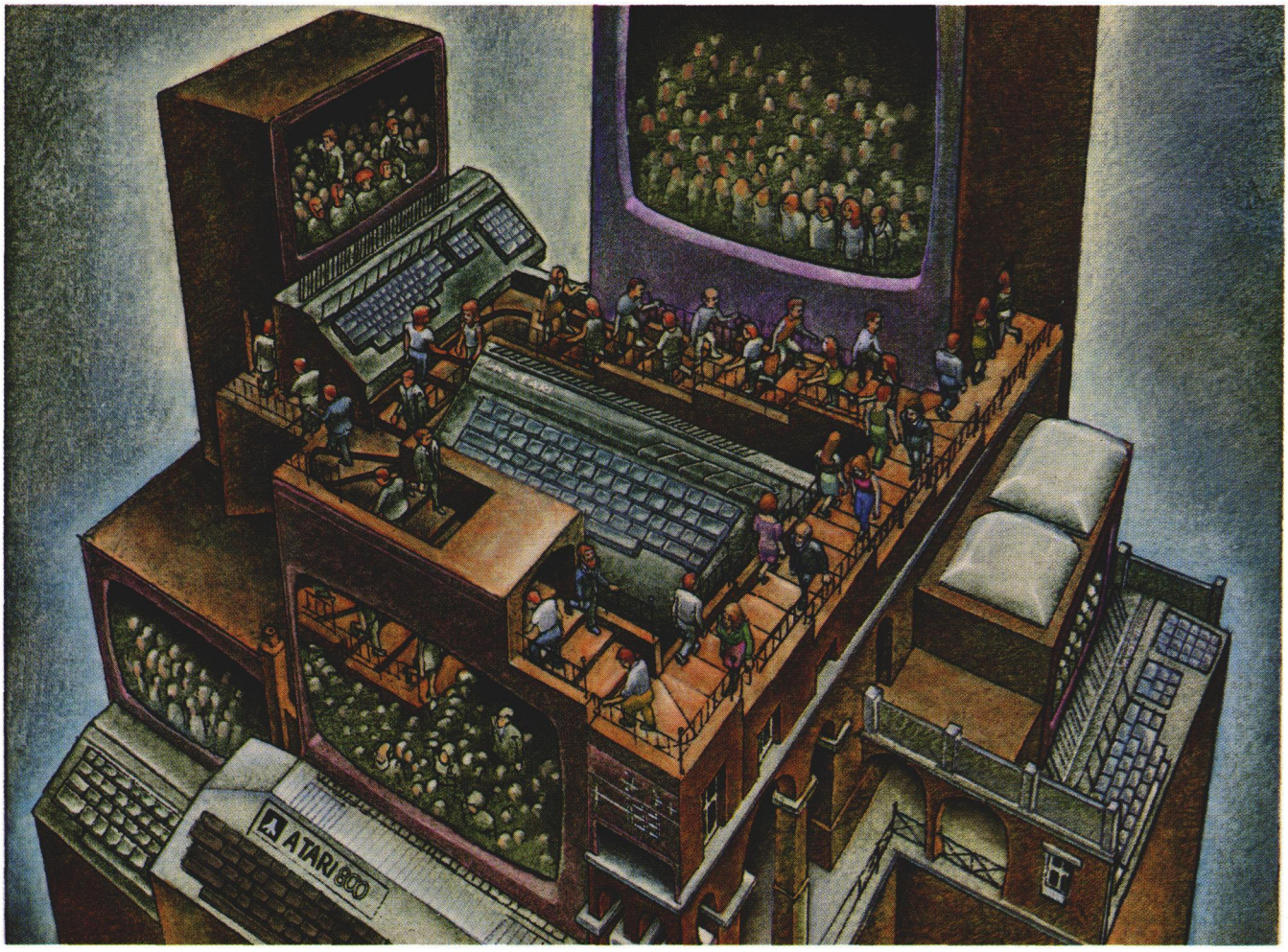

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An interview with Doug Neubauer

The designer of the POKEY chip and author of *Star Raiders* talks about games, the Atari spirit, and more.

by Lee H. Pappas

Doug Neubauer was with Atari for several years, having previously worked in National Semiconductor's video game/home computer division. His background was mostly in hardware, and, at Atari, he had charge of the VLSI design for the POKEY chip, before the days of automated design software.

While with Atari, in early 1979, he began designing ***Star Raiders****. He believes the lunch-hour playtesting done by fellow Atari employees contributed greatly to the game's quality.*

Soon after the completion of ***Star Raiders****, Doug went on to Hewlett-Packard. He's also done some contract work with 20th Century Fox video games. Today, he designs hardware at Imagen, a maker of image processors for laser printers.*

Just finished is a new game for the 2600, called ***Solaris****, with both similarities and contrasts to* ***Star Raiders****. It has sixteen charts and different types of "Zylons." He's interested to see if a new video game for the 2600 can still sell. We hope so.*

LP: *Can you give us a quick history of how the POKEY chip first came to be?*

DN: The Atari 800's architecture evolved as an upgrade of the 2600. Conceived primarily by Steve Mayer, Joe Decuir and Jay Miner before I arrived at Atari, the original plan for the POKEY chip called for keyboard interface, audio and paddle controllers.

After I did an initial estimate of the size of the chip, we found that it would be possible to add a serial port for communication with a tape cassette recorder. Also, I added some enhancements to the audio, which was originally planned to have the same audio as is on the 2600.

LP: *Were there any features you would have liked to include in the POKEY chip that were never implemented? If so, what were they, and why didn't they get in?*

DN: The main problem, I think, with the Atari 800 is that all I/O is serial. Originally, the POKEY's serial port was intended to talk only to the cassette recorder. Communication to floppies and printers was to be through a parallel port and extension box. Unfortunately, the parallel port was abandoned (there was a fear of RFI and the difficulty of getting FCC approval) and all I/O was fed through the serial port.

This is way it takes so long to load a program from floppy disks; it's all running through a 48K-baud serial port. With hindsight, we should have at least added a couple more serial ports and broken up some of the I/O functions.

LP: *Were there any custom chip (or other) features ever planned for the 400/800 that never made it to production?*

DN: Well, besides the parallel port and expansion box, there was the GTIA (George's TIA). The GTIA chip was made, but wasn't originally put into production. . . I don't have one. I think that later they started using the GTIA, but I'm not sure.

LP: *Can you describe the environment, the spirit of Atari during those early days when the 8-bits were first born?*

DN: I wasn't with the company back in the early Nolan Bushnell days. I started right after Atari was bought by Warner Communications. However, the atmosphere was still pretty laid back, compared to most companies in the valley.

Even though we were working pretty hard to get the 800 out, there was still time to try out the latest video games. I think this spirit was lost somewhat in later years, as Atari grew larger and the programming department became more isolated from the rest of the company.

LP: *What was the inspiration for* ***Star Raiders****?*

DN: Star Raiders was to be a 3-D version of the Star Trek game played on the mainframe computers of that time. The Star Trek game was all text and not played in real time, but it had the idea of ship damage and sector scanners and charts.

It also used names like "commander" or "super commander," which gave me the idea of a rating rather than a score. While

at National, I did up some demo screens of star backgrounds, and the whole thing seemed feasible—but I didn't get to implement it until a couple of years later.

> *"I was never really satisfied with the **(Star Raiders)** hyperwarp display."*

LP: *There were no games for the 400 and 800 written at the time you started on **Star Raiders**. In a sense, it was the first Atari computer game ever done, and is still regarded as the premier piece of entertainment for the 8-bits. What are your thoughts on this? (Many of our readers bought their 8-bits solely because of **SR**.)*

DN: It's pretty amazing, the way the game caught on. I think it was the first game to combine action with a strategy screen, and, luckily, the concept worked out pretty well.

I guess the part I liked best was the explosion; I never was really satisfied with the hyperwarp display. But, compared to today's technology, **Star Raiders** looks pretty primitive.

I just finished a game for the 2600 (!) which has better visuals than **Star Raiders** (except for the explosion). I think, with 64K of memory, it would be possible to do a pretty impressive job on the 800.

LP: *Can you please explain some of the routines in **Star Raiders**—how they came to be and how they function? I'd like to give our readers some insight into how it works, graphically and logistically.*

DN: The routines in **Star Raiders** are total hacks! It was the first game to use 3-D algorithms, and the ones I came up with were terrible. They worked, but were slow. That's why the game slows down when there's an explosion. The explosion consists of about sixty-four separate pieces, and moving them around in a 3-D space took a lot of computation time.

Today, of course, it's trivial, but back then it was state of the art. The game code is built up of modules: movement control, collision detection, audio, photon firing, Zylon brain and console monitor. Special modules for galactic charts (and enemy strategy on charts) were included, along with a module for the long-range scanner.

The audio module was pretty primitive. The sounds are generated by algorithms. Today, most sounds are generated out of tables. It's more efficient and takes fewer bytes—and sounds better.

LP: *What features—if any—would you have liked to include in **Star Raiders** that couldn't be added because the program had to fit on an 8K cartridge?*

DN: With more memory available, I could have added planet landings and a trench scene. However, at the time, all games had to fit in 8K of RAM memory, as well as in 8K of ROM. These restrictions limited a lot of options.

I had also envisioned more charts, or subcharts you could call up. With a disk drive for storage, you have more flexibility.

LP: *Were there any secret codes or messages put into the game, which, for instance, can be accessed through a series of keystrokes?*

DN: When I finished the first pass on the game, I was 900 bytes over the 8K limit. I didn't have room for any secret messages. Text (messages) take up a lot of bytes and can't be packed very well. With a limited amount of memory (such as in a ROM), I would rather add "game" features.

LP: *What's the highest score you've ever achieved playing **Star Raiders**?*

DN: When I was doing the final touch-up on **Star Raiders**, a lot of people at Atari were playing the game. This allowed me to fine tune the scoring algorithm. Every time someone got to be a Star Commander Class 1, I bumped up the scoring difficulty. Even a week before we made the ROMs, I was still increasing the difficulty. I think I was the second person to get Star Commander Class 1 on the final version.

LP: *Did you get any financial benefit from the overwhelming success of the game?*

DN: At the time, I was a chip design engineer and did **Star Raiders** more or less on the side. Unfortunately, that was back in the days when programmers weren't paid royalties for video games, so I didn't make any money from **Star Raiders**.

LP: *Were you approached for a sequel to **Star Raiders**, and was one ever done?*

DN: I don't believe I was asked to do a sequel. Atari is coming out with **Star Raiders** for the ST this year and, I think, **Star Raiders II** for the 8-bits, also for this year. Atari hasn't been in video games since 1984, and is just gearing back up, so we should expect to see some good new games shortly.

> *"It would be interesting to try... a planet landing sequence."*

LP: *Were you approached for **Star Raiders** for the ST? What do you think of that version, assuming that you've seen it?*

DN: No, I wasn't asked to do **Star Raiders** for the ST, either. I saw the game briefly and thought that the visuals were really good, although I didn't like the photon graphic as well as my own. Maybe I'm the only one who likes the sparkling photon effect; I've never seen anyone else use it.

I didn't actually play the game, so I can't comment on its play. I've heard that's pretty faithful to the original.

LP: *If you were to write **Star Raiders** today, with no constraints on memory, what would the game be like?*

DN: Everything could be improved. More and better graphics would be added, not just showing the front view. I would like to add a planet and a trench scene. It seems that it should be possible to add effects closer to those in the *Star Wars* movies.

It would be interesting to try and get a planet landing sequence, where you start from space and approach the planet; as it gets bigger more detail appears, and finally, you're on the surface.

*Having finished **Solaris** for the 2600, Doug does not plan to do software for the 800 or the ST. He is, however, in negotiations with Atari Corp. for another game for the 2600. We'll be waiting!*

What *is* a POKEY chip?

You may well ask...the POKEY chip is a 40-pin integrated circuit that's used in place of dozens of individual ICs and other components. It generates all the wonderful sounds and sound effects that you hear coming from your computer.

It also handles the generation of random numbers, the scanning of up to eight paddle controllers, as well as the keyboard. And it still has time left over to talk to such external devices as cassette recorders and disk drives.

Graphics Magician Picture Painter

by Mark Pelczarski and Jon Niedfeldt
PENGUIN SOFTWARE
830 4th Avenue
P.O. Box 311
Geneva, IL 60134
48K Disk $39.95

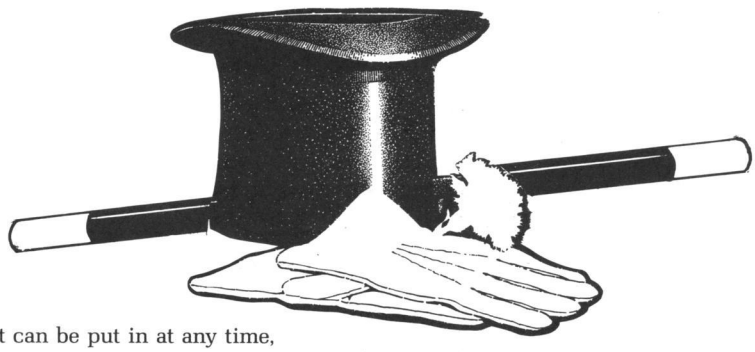
by Andy Eddy

When I was younger, I loved finger painting (secretly, I still do). Taking a glob of paint in my hands and slopping it on paper to create new colors and designs was easy and a lot of fun; I'm sure most of you will agree. Penguin Software's **Graphics Magician Picture Painter** is a program offering that same kind of satisfaction, but without the mess.

After booting up the program disk, the SPACE BAR toggles you between the picture editor screen (your canvas) and the command screen (your palette). On the command screen, you choose the drawing mode: whether you want to draw lines, draw with a particular brush, or fill with a color or pattern.

All the choices are available preprogrammed in four base colors, which can be changed at the touch of the joystick trigger. Also, these base colors can be set into the picture in horizontal bands (of any size). For example, with this feature you can quickly fill the top part of the picture with blue sky and the lower part with green grass.

The detail programmed into **Graphics Magician** supplies you with a great deal of versatility. When you're working in the picture editor, a window at the bottom shows you the x- and y-coordinates of the cursor, size of the picture in bytes and other information to help you along. Each step is made simple for the beginner, but doesn't hold back the experienced "painter." A help screen is also handy at the touch of a button, in case you need it. To add to a picture, text can be put in at any time, in any location.



In no time at all you'll have a mastery of the techniques involved in creating a picture. Lines are easily plotted between two points in the line mode. Press the trigger at a desired spot, move the cursor with the joystick to the place you intend to end the line, and push the trigger again. This simple method makes it easy to draw the framework of a picture.

When saving a picture, **Graphics Magician** recreates, with the assistance of its picture editor, the series of moves you made to create the picture. This results in a file as small as a few bytes. The more intricate the art, the more memory used to save it.

The edit mode offers a step-by-step "redrawing" of your picture. This facilitates the polishing of any detail you're unhappy with, and here's where the program really shines. Not only does the editor make it easy to draw a picture, it also gives you the power to change steps in midstream. As in using a word processor, you can move backward or forward through the drawing process, to take out or add instructions as you please.

And you're not limited to single pictures. You can take objects and overlay them on top of an existing background. Animation can also be done with this method, but it's time consuming and very rudimentary.

Graphic Magician's program disk is not copy protected. This lets you make copies of the program to back up the software and also permits the transfer of necessary subroutines, so that you can use your own pictures in programming.

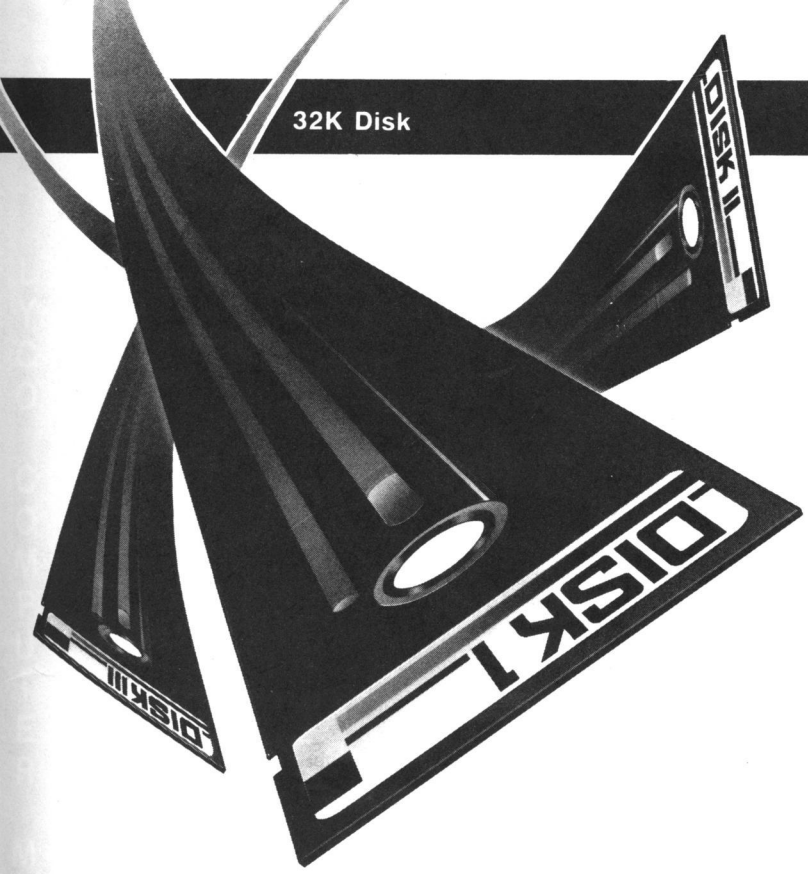
I want to reinforce the *caveat* that's appeared in **ANALOG Computing**'s pages for some time. Piracy of software not only hurts the programmer, but ultimately destroys the market for more titles. Applaud the risk-takers who leave their software unprotected. . .don't rip them off.

Included in the comprehensive guide that accompanies **Graphics Magician** are instructions on how to call picture programs from BASIC or machine language, how to overlay objects over other pictures and how to conserve memory, to cram as much art into one disk as possible.

If you connect various computers (Atari, Apple or Commodore) to each other with custom cables, **Graphics Magician** lets you send pictures from one to the other. Given the difference in operating systems, you'll find some color and coordinate variation, but a transfer process like this is an unusual feature.

While it's certainly no **DEGAS** in terms of picture quality, the limiting factor here is the computer, not the software. Admirably, Penguin has produced a top-notch utility that can be used by closet painters everywhere. Yes, Virginia, there are still companies who care about the 8-bit audience.

Andy Eddy works as a cable TV technician in Connecticut, but has been interested in computers since high school. While his family's Atari 800 is three years old, he's been avidly playing arcade game since ***Space Invaders*** *and is a former record holder on* ***Battlezone****.*



DiskFile

Helps 1050/DOS 2.5 owners access previously unavailable sectors for comments.

by Charles Steinman

When the Atari 1050 disk drive was introduced, it was designed to be used with DOS 3.0, to gain an enhanced density of 1040 sectors with 128 bytes each. This would have allowed 130K bytes of data storage per disk. But, because of some bugs and its noncompatibility with DOS 2.0, DOS 3.0 was discontinued. Early in 1985, DOS 2.5 was released, with both the enhanced format and DOS 2.0 compatibility. But version 2.5 would only allow direct access to 1024 of the 1040 sectors.

This waste of disk space always bothered me (it amounts to 2K of storage). And another problem with Atari DOSs is that the filename is limited to eleven characters. To correct both problems, I wrote a program that would access previously unavailable sectors above 1024. These sixteen sectors have just enough room to hold a 32-byte message for each of the sixty-four disk files.

This program, **DiskFile**, should be used as an AUTORUN.SYS file. It will show eight files at a time and, if one has been recorded, a comment for each. The program shows whether the file is locked or deleted, flags files that use sectors above 720, and lists the starting sector and the sector count for each file. After the last file's printed, the total unused sectors, DOS format and the maximum number of sectors are displayed. I use my own routine for the sector count, so it will print *FREE: $3F2*, not *999+*, for the count on a freshly formatted disk.

There's also a separate BASIC file that allows you to enter and edit the comment sectors. This uses the same technique as the machine language version and should prove helpful to users who don't fully understand the Central Input/Output and Serial Input/Output operating system utilities.

DiskFile uses only legal OS calls, compatible with all Ataris. It exits with the registers unchanged, so any user routine can call it, and has special entry points for BASIC, the Assembler/Editor and DOS. From BASIC, you can call the utility by using the USR command *A = USR(8192)*. The command (and address to use with the Assembler Editor cartridge in the debug mode) is *G2004*. If you want to call the routine from another machine language program, use an address of *$2008* (*8200* decimal).

Since the utility has a legal, clean exit as an "autorun" file, you can merge it with other autorun utilities—as long as they don't use memory in the $2000 to $2550 address range. The program protects itself from overwrite by moving the MEMLO pointer to the end of the program.

To generate the AUTORUN.SYS file, type in Listing 1 using the **M/L Editor** on page 11. Name the resultant file AUTORUN.SYS.

The program in Listing 2 allows you to edit and enter data to the sectors above 1024. Type this listing, using **Basic Editor II** (see page 31) to verify your work. The editor allows you to enter a comment with a maximum of thirty-two characters. When the editor reads a blank filename, it ends. Even if a file's been deleted, it can still be commented on. This allows you to record why and when the file was deleted.

You need this program only on one disk, because the only time you'll use it is when you add or delete files to DOS 2.5 disks in your library. The AUTORUN file could be on any disk you'd like a directory printed from when booted.

DiskFile uses both CIO and SIO routines directly, but legally. It shows more information than any other directory program I've seen, and it has the added 32-character comment text per file. If anyone has any comments or questions contact me in care of **ANALOG Computing**.

(continued on next page)

Charles Steinman, an Electrical Engineer, has owned Ataris since they first became available. He's worked with other computers, but always returns to an Atari for business, energy management, security alarms, and as an educational tool for his two children.

Listing 1.

```
1000 DATA 255,255,0,32,47,36,104,76,8,
32,32,8,32,0,8,72,6208
1010 DATA 138,72,152,72,162,64,32,196,
34,169,3,157,66,3,169,52,3202
1020 DATA 157,68,3,169,35,157,69,3,169
,8,157,74,3,169,0,157,2755
1030 DATA 75,3,32,86,228,16,3,76,143,3
4,169,105,141,55,35,169,3994
1040 DATA 1,141,56,35,141,240,2,141,57
,35,169,4,141,58,35,169,3562
1050 DATA 0,141,59,35,141,61,35,169,14
4,141,198,2,141,200,2,169,6592
1060 DATA 49,141,0,3,169,1,141,1,3,169
,82,141,2,3,173,55,1103
1070 DATA 35,141,10,3,173,56,35,141,11
,3,169,48,141,4,3,169,1205
1080 DATA 36,141,5,3,169,128,141,8,3,1
69,0,141,9,3,32,83,9465
1090 DATA 228,16,3,76,143,34,169,0,141
,60,35,162,64,169,9,157,3808
1100 DATA 66,3,169,189,157,68,3,169,35
,157,69,3,169,80,157,72,4505
1110 DATA 3,169,0,157,73,3,32,86,228,1
69,10,157,68,3,169,36,3147
1120 DATA 157,69,3,32,86,228,173,61,35
,208,3,32,236,34,160,80,5085
1130 DATA 169,32,153,48,37,136,16,250,
172,60,35,185,48,36,41,128,3671
1140 DATA 240,4,169,68,208,2,169,65,14
1,67,37,185,48,36,41,32,1743
1150 DATA 240,4,169,76,208,2,169,85,14
1,69,37,185,48,36,41,1,1469
1160 DATA 208,4,169,78,208,2,169,69,14
1,71,37,173,59,35,72,32,2293
1170 DATA 225,34,141,63,37,104,32,218,
34,141,64,37,173,59,35,24,1763
1180 DATA 105,1,141,59,35,185,52,36,32
,218,34,141,75,37,185,51,3501
1190 DATA 36,72,32,225,34,141,76,37,10
4,32,218,34,141,77,37,169,4442
1200 DATA 36,141,62,37,141,74,37,141,8
0,37,185,50,36,32,218,34,2843
1210 DATA 141,81,37,185,49,36,72,32,22
5,34,141,82,37,104,32,218,4390
1220 DATA 34,141,83,37,172,61,35,162,0
,185,176,36,208,2,169,95,5705
1230 DATA 157,90,37,200,232,224,32,208
,240,173,61,35,24,105,32,201,7329
1240 DATA 128,208,2,169,0,141,61,35,17
3,60,35,24,105,5,168,162,3396
1250 DATA 0,185,48,36,208,3,76,231,33,
157,48,37,200,232,224,8,7521
1260 DATA 208,1,232,224,12,208,234,162
,64,169,48,157,68,3,169,37,6035
1270 DATA 157,69,3,169,75,157,72,3,32,
86,228,173,60,35,24,105,3137
1280 DATA 16,141,60,35,201,128,240,3,7
6,192,32,173,55,35,24,105,3652
1290 DATA 1,141,55,35,201,113,240,21,1
62,64,169,78,157,68,3,169,6044
1300 DATA 35,157,69,3,32,86,228,32,205
,34,76,89,32,169,104,141,5083
1310 DATA 57,35,169,1,141,58,35,32,236
,34,173,176,36,32,218,34,4711
1320 DATA 9,128,141,159,35,173,178,36,
32,218,34,9,128,141,171,35,5104
1330 DATA 201,179,240,4,169,176,208,2,
169,181,141,161,35,173,177,36,8920
1340 DATA 72,32,225,34,9,128,141,172,3
5,104,32,218,34,9,128,141,4530
1350 DATA 173,35,173,180,36,141,183,35
,173,179,36,141,184,35,169,0,6271
1360 DATA 141,57,35,169,4,141,58,35,32
,236,34,192,0,16,8,169,2322
1370 DATA 0,141,42,37,141,43,37,173,42
,37,24,109,184,35,141,184,4793
1380 DATA 35,173,43,37,109,183,35,32,2
18,34,9,128,141,183,35,173,5807
1390 DATA 184,35,72,32,225,34,9,128,14
1,184,35,104,32,218,34,9,3268
1400 DATA 128,141,185,35,162,64,169,15
1,157,68,3,169,35,157,69,3,3980
1410 DATA 32,86,228,16,10,169,66,141,1
98,2,141,200,2,162,64,169,6727
1420 DATA 114,157,68,3,169,35,157,69,3
,32,86,228,32,205,34,32,3107
1430 DATA 196,34,169,0,141,240,2,133,8
,169,128,141,231,2,169,37,6444
1440 DATA 141,232,2,104,168,104,170,10
4,40,96,169,12,157,66,3,32,2798
1450 DATA 86,228,96,169,255,141,252,2,
173,252,2,201,255,240,249,96,5314
1460 DATA 41,15,170,189,62,35,96,74,74
,74,74,41,15,170,189,62,3695
1470 DATA 35,96,169,49,141,0,3,169,1,1
41,1,3,169,82,141,2,1436
1480 DATA 3,173,57,35,141,10,3,173,58,
35,141,11,3,169,176,141,4166
1490 DATA 4,3,169,36,141,5,3,169,128,1
41,8,3,169,0,141,9,1401
1500 DATA 3,32,83,228,173,57,35,24,105
,1,141,57,35,192,0,16,961
1510 DATA 8,169,155,141,176,36,141,177
,36,96,69,58,155,0,0,0,1138
1520 DATA 0,0,0,0,48,49,50,51,52,53,54
,55,56,57,65,66,8621
1530 DATA 67,68,69,70,29,32,32,32,153,
208,242,229,243,243,160,225,4465
1540 DATA 238,249,160,235,229,249,160,
230,239,242,160,237,239,242,229,160,96
0
1550 DATA 230,233,236,229,243,174,25,1
55,32,153,204,225,243,244,160,230,6961
1560 DATA 233,236,229,160,236,233,243,
244,229,228,172,160,160,208,242,229,26
2
1570 DATA 243,243,160,225,238,249,160,
235,229,249,174,25,155,29,32,153,1477
1580 DATA 160,196,239,243,186,176,174,
176,160,160,160,204,225,243,244,186,86
44
1590 DATA 164,176,176,176,160,160,160,
198,242,229,229,186,164,176,176,176,70
73
1600 DATA 160,25,155,125,160,160,160,1
96,233,243,235,236,233,243,244,160,981
8
1610 DATA 177,174,176,160,160,160,252,
225,252,236,252,244,252,228,233,243,28
06
1620 DATA 235,160,243,229,227,244,239,
242,25,32,160,146,146,146,146,146,2553
1630 DATA 146,146,146,146,146,146,146,
146,146,146,146,146,252,227,252,239,70
76
1640 DATA 252,249,252,146,146,146,146,
146,151,146,146,146,146,146,25,155,500
1650 DATA 230,233,236,229,238,225,237,
229,252,229,248,244,252,230,233,236,39
82
1660 DATA 229,163,252,244,252,235,252,
240,252,243,244,225,242,244,252,227,43
57
1670 DATA 239,245,238,244,25,155,224,2
,225,2,8,32,0,0,0,0,9245
1680 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
```

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CIRCLE #159 ON READER SERVICE CARD

```
0,0,1680
1690 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1690
1700 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1700
```

●

Listing 2.
BASIC listing.

```
QT 1000 REM .    SAVE "D:DISKFILE.BAS
HZ 1010 REM
XD 1020 REM ##################################
IX 1030 REM #                                #
BB 1040 REM #  BASIC Extended Sector  #
FC 1050 REM #     Access Utility     #
WU 1060 REM #  Version 1.0  09/30/85  #
JJ 1070 REM #                                #
KR 1080 REM #    by Chuck Steinman    #
JP 1090 REM #                                #
WZ 1100 REM ##################################
IB 1110 REM
XV 1120 REM ////////////////////////////
VE 1130 REM /          Variable init /
YB 1140 REM ////////////////////////////
IM 1150 REM
HU 1160 GRAPHICS 0:REM .     text mode 0
VG 1170 POKE 710,210:REM . bakgrnd color
SP 1180 POKE 712,210:REM .  border color
UM 1190 DIM A$(130),B$(32),C$(33)
UF 1200 DIM D$(130),V$(5),Z$(1)
ZA 1210 Z$=CHR$(125)
ZW 1220 POSITION 0,0:? "  Atari Extended
   Sector Access Utility  "
IJ 1230 REM
GA 1240 REM .   the next line will clear
IA 1250 REM .   screen except the header
IS 1260 REM
DX 1270 GOSUB 2930
IY 1280 REM
GI 1290 REM .        these are the common
PA 1300 REM .             variables used
IF 1310 REM
GA 1320 DUNIT=769:REM .  dcb device type
PW 1330 DCOMM=770:REM . dcb command type
JL 1340 DBUFL=772:REM . dcb bufr address
JE 1350 DBUFH=773
AO 1360 DLENL=776:REM .  dcb bufr length
MC 1370 DLENH=777
PN 1380 DAUX1=778:REM .   sector pointer
KJ 1390 DAUX2=779
TL 1400 DSKIN=58451:REM . dcb entry addr
KY 1410 DDOUT=87:REM .  data out command
PY 1420 DDINP=82:REM .   data in command
AB 1430 DDEVC=49:REM .     disk drive #1
NG 1440 DIOVL=83
M5 1450 DIOVH=228
QK 1460 DEVIO=768
HG 1470 SECLO=1
FB 1480 SECHI=4
KG 1490 DIRLO=105
FB 1500 DIRHI=1
TS 1510 FN=0
IM 1520 REM
XU 1530 REM .  open iocb 0 to the
QD 1540 REM .  disk directory
IV 1550 REM
FQ 1560 CLOSE #1:OPEN #1,6,0,"D:*.*"
JB 1570 REM
CU 1580 REM .  "L5" is the short sector
MY 1590 REM .  flag.
II 1600 REM
IV 1610 L5=0:TRAP 2150
IO 1620 REM
HD 1630 REM \\\\\\\\\\\\\\\\\\\\\\\\\\\\
AC 1640 REM \              Sector I/O \
HJ 1650 REM \\\\\\\\\\\\\\\\\\\\\\\\\\\\
JA 1660 REM
BL 1670 GOSUB 2930:REM .    clear screen
TE 1680 F1=6:P=0
JO 1690 GOSUB 2860:REM .       clear A$
HW 1700 POKE DCOMM,DDINP
HM 1710 POKE DAUX1,DIRLO
AH 1720 POKE DAUX2,DIRHI
NT 1730 GOSUB 2240:REM .     get sector
WD 1740 D$=A$:REM .       transfer to d$
FE 1750 GOSUB 2860
IO 1760 POKE DCOMM,DDINP
EH 1770 POKE DAUX1,SECLO
XB 1780 POKE DAUX2,SECHI
GO 1790 GOSUB 2240:REM . get the comment
KW 1800 GOSUB 2400:REM .       print it
FJ 1810 GOSUB 1970
FT 1820 SECLO=SECLO+1:REM .  next sector
IV 1830 REM
KN 1840 REM since there are 8 files per
XV 1850 REM sector and only 4 comments
ID 1860 REM P controls diectory sector
AP 1870 REM loading. P =0 =load sector
JK 1880 REM
PK 1890 IF P=1 THEN GOSUB 2860:GOTO 1760
PV 1900 DIRLO=DIRLO+1:REM next dir.sect.
XR 1910 IF DIRLO<114 THEN 1670:REM last
IU 1920 REM
MD 1930 REM |||||||||||||||||||||||||||
YH 1940 REM |          Comment Entry |
MJ 1950 REM |||||||||||||||||||||||||||
JG 1960 REM
MD 1970 IF MAX<0 THEN 2150
KW 1980 FOR W=0 TO MAX:REM ? MAX # files
LQ 1990 V=W+FN:REM .          file number
ND 2000 GOSUB 2680:REM .  # to hex$ conv
NK 2010 POSITION 2,16:? "Enter comment fo
   r file ";V$(1,3);" or  RETURN  ";
CY 2020 POSITION 3,17:? A$(W*32+1,W*32+32
   )
VO 2030 POSITION 3,18:? "▙▙▙▙▙▙▙▙▙▙▙▙▙▙▙▙
   ▙▙▙▙▙▙▙▙▙▙▙▙▙▙▙▙"
AT 2040 POSITION 35,17:? ".":REM guess wh
   y this is here?
QK 2050 POKE 764,255:POSITION 2,17
GG 2060 INPUT C$:REM .       get comment
ND 2070 A$(W*32+1,W*32+32)=C$
LM 2080 NEXT W
WC 2090 FN=FN+4
RJ 2100 POKE DCOMM,DDOUT:REM now output
BY 2110 POKE DAUX1,SECLO:REM same sector
GN 2120 POKE DAUX2,SECHI:REM as before
AL 2130 GOSUB 2240
MR 2140 IF L5=0 THEN RETURN
PR 2150 POSITION 2,13:? "All legal DOS 2.
   5 files have been     listed. Press an
   y key to exit.";
HJ 2160 POKE 764,255:REM wait for key
II 2170 CLOSE #1:OPEN #1,4,0,"K:"
HP 2180 GET #1,K
EK 2190 GRAPHICS 0:END
AE 2200 REM ____________________________
WH 2210 REM _             SIO routines _
AK 2220 REM ____________________________
IK 2230 REM
XD 2240 POKE DEVIO,DDEVC:REM .  device
DQ 2250 POKE DUNIT,1:REM .      number
R5 2260 AL=ADR(A$):REM .        find A$
XC 2270 AH=INT(AL/256):REM .    location
YE 2280 AL=AL-AH*256
YX 2290 POKE DBUFL,AL:REM .     tell dcb
II 2300 POKE DBUFH,AH
AI 2310 POKE DLENL,128:REM .  sector 128
LQ 2320 POKE DLENH,0:REM .    bytes long
FM 2330 A=USR(ADR("hL5d")):REM call dcb
A5 2340 RETURN
IS 2350 REM
CZ 2360 REM >>>>>>>>>>>>>>>>>>>>>>>>>>>>>
RY 2370 REM >                 Print Data >
```

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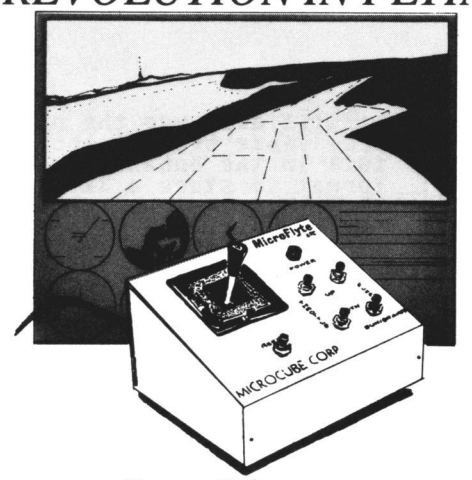

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CIRCLE #161 ON READER SERVICE CARD

```
DF 2380 REM >>>>>>>>>>>>>>>>>>>>>>>>>>>>
JE 2390 REM
DH 2400 GOSUB 2930
KF 2410 POKE 82,2:? "   No  filename e
   xt comments                "
PN 2420 FOR W=1 TO 97 STEP 32
LG 2430 IF A$(W,W)=CHR$(0) THEN A$(W,W+31
   )="_____________________________"
FQ 2440 NEXT W:REM . check 4 blank comnt
TM 2450 P=P+1:REM .  comnt sector countr
QS 2460 IF P=2 THEN P=0
MI 2470 F5=1:REM .        buffer pointer
MU 2480 GOSUB 2630:REM . set up pointers
YY 2490 FOR V=FN TO FN+3
NQ 2500 GOSUB 2680:REM . convert numbers
SB 2510 GOSUB 2550:REM .      print data
OJ 2520 IF L5=1 THEN MAX=V-FN-1:RETURN
DE 2530 MAX=V-FN:REM .   number of files
MH 2540 NEXT V:RETURN
PR 2550 IF D$(F1,F1)=CHR$(0) THEN L5=1:RE
   TURN :REM .  check for blank filename
SI 2560 PRINT V$;:REM .       file number
PD 2570 PRINT D$(F1,F2);" ";:REM filenam
TL 2580 PRINT D$(F3,F4):REM .  extension
YQ 2590 PRINT "    ";
ID 2600 PRINT A$(F5,F5+31):REM .comments
HB 2610 F1=F1+16:REM .  filename pointer
NC 2620 F5=F5+32:REM . extension pointer
KH 2630 F2=F1+7:REM .    buffer pointers
CO 2640 F3=F2+1
DU 2650 F4=F3+2
BE 2660 RETURN
JE 2670 REM
EV 2680 REM <<<<<<<<<<<<<<<<<<<<<<<<<<<
JO 2690 REM <        number conversion <
DZ 2700 REM <<<<<<<<<<<<<<<<<<<<<<<<<<<
IO 2710 REM
XU 2720 V1=INT(V/16):REM . number to hex
LI 2730 V2=V-V1*16:REM .      $ converter
GZ 2740 V1=V1+48+7*(V1>9)
IM 2750 V2=V2+48+7*(V2>9)
WI 2760 V$(1)="$"
NJ 2770 V$(2)=CHR$(V1)
ON 2780 V$(3)=CHR$(V2)
OG 2790 V$(4)="  "
AQ 2800 RETURN
IQ 2810 REM
UX 2820 REM $$$$$$$$$$$$$$$$$$$$$$$$$$$
KE 2830 REM $   this routine clears A$ $
VD 2840 REM $$$$$$$$$$$$$$$$$$$$$$$$$$$
JC 2850 REM
YF 2860 A$=" ":A$(130)=A$:A$(2)=A$
BL 2870 RETURN
JL 2880 REM
VA 2890 REM %%%%%%%%%%%%%%%%%%%%%%%%%%%
AG 2900 REM %     clear screen routine %
UE 2910 REM %%%%%%%%%%%%%%%%%%%%%%%%%%%
IV 2920 REM
VE 2930 POKE 88,PEEK(88)+40:REM protect
AE 2940 PRINT CHR$(125):REM clear bottom
SH 2950 POKE 88,PEEK(88)-40:REM unprotct
BK 2960 RETURN
```

Listing 3.
Assembly listing.

```
1000 ;  DISK DIRECTORY ENHANCEMENT
1010 ;
1020 ;   Version 1.0   09/29/1985
1030 ;  Created by: Chuck Steinman
1040 ;
1050 ;        .OPT NOLIST
1060 ;
1070 ;  This utility will read the
1080 ;  disk directory and format it
1090 ;  in a more readable manner
1100 ;  than the FMS utility does.
1110 ;  It will also use the non
1120 ;  accessible sectors above
1130 ;  1024 in the enhanced disk
1140 ;  format to store a 32 letter
1150 ;  description for each file
1160 ;  this utility can be accessed
1170 ;  from any language that does
1180 ;  not interfere with its
1190 ;  autorun file or the memory
1200 ;  that it uses from $2000 to
1210 ;  $2600.  This is above the
1220 ;  FMS utility, so it will be
1230 ;  erased if you call the
1240 ;  DUP.SYS utility.  This
1250 ;  utility is used as an
1260 ;  autorun.sys file, but it
1270 ;  returns with all registers
1280 ;  unchanged.  This will allow
1290 ;  most other autorun files to
1300 ;  be merged using the "C"
1310 ;  option from DUP.SYS  The
1320 ;  utility can be called up
1330 ;  by jumping to the "ENTRY"
1340 ;  address from the DEBUGger
1350 ;  which is $2004. or use the
1360 ;  address for "BENTRY" in a
1370 ;  call from BASIC such as
1380 ;  X=USR(8192). the program
1390 ;  will protect itself by
1400 ;  changing memlo.
1410 ;
1420 ;  LIST #D:DISKFILE.SRC
1430 ;  ASM,,#D:DISKFILE.OBJ
1440 ;
1450 ;
1460 DEVIC1 = $01     ;disk drive #
1470 ICOPEN = $03     ;iocb open
1480 ICREAD = $04     ;iocb read comnd
1490 ICWRIT = $08     ;iocb write comnd
1500 WARMST = $08     ;warmst flag
1510 ICGREC = $09     ;iocb get record
1520 ICLOSE = $0C     ;iocb close
1530 IOCB =  $40      ;iocb to use
1540 DISK01 = $31     ;disk driv.device
1550 DDREAD = $52     ;dcb read
1560 DDWRIT = $57     ;dcb write
1570 COLOR2 = $02C6   ;background color
1580 COLOR4 = $02C8   ;border color
1590 MEMLO = $02E7    ;memory low limit
1600 CRSINH = $02F0   ;cursor inhibit
1610 CHARIN = $02FC   ;keyboard input
1620 DDEVIC = $0300   ;dcb device type
1630 DUNIT = $0301    ;dcb device no.
1640 DCOMND = $0302   ;dcb command
1650 DSTATS = $0303   ;dcb status
1660 DBUFLO = $0304   ;dcb buffer addr
1670 DBUFHI = $0305
1680 DBYTLO = $0308   ;dcb byte count
1690 DBYTHI = $0309
1700 DAUX1 = $030A    ;sector pointer
1710 DAUX2 = $030B
1720 ICCOM = $0342    ;iocb command
1730 ICBAL = $0344    ;iocb buf addr
1740 ICBAH = $0345
1750 ICBLL = $0348    ;iocb buf length
1760 ICBLH = $0349
1770 ICAX1 = $034A    ;aux commands
1780 ICAX2 = $034B
1790 DSKINV = $E453   ;disk handler
1800 CIOV =  $E456    ;cio entry point
1810 SIOV =  $E459    ;sio entry point
1820 ;
1830 ;        .OPT LIST
1840 ;
1850     *=  $2000    ;starting place
1860 ;
1870 BENTRY PLA       ;pop basic's
1880     JMP INIT     ;argument count
```

```
1890 ;                    then go init
1900 ENTRY JSR INIT   ;jump to init
1910       BRK        ;exit to debug
1920 ;
1930 INIT PHP         ;save status
1940       PHA        ;and reg A
1950       TXA        ;and reg X
1960       PHA
1970       TYA        ;and reg Y
1980       PHA        ;on the stack
1990 ;
2000 START LDX #IOCB  ;just in case
2010       JSR ECLOSE ;close iocb
2020       LDA #ICOPEN ;open editor
2030       STA ICCOM,X ;buf address
2040       LDA #EDITOR&255
2050       STA ICBAL,X
2060       LDA #EDITOR/256
2070       STA ICBAH,X
2080       LDA #ICWRIT ;open as out
2090       STA ICAX1,X
2100       LDA #$00    ;no options
2110       STA ICAX2,X
2120       JSR CIOV    ;central i/o
2130       BPL SECLOD
2140       JMP BADEXIT ;error?
2150 SECLOD LDA #$69
2160       STA SECNLO  ;dir. sector
2170       LDA #$01    ;pointers
2180       STA SECNHI
2190       STA CRSINH  ;cursor off
2200       STA COMMLO
2210       LDA #$04    ;comnt sectr
2220       STA COMMHI  ;pointers
2230       LDA #$00
2240       STA COUNTR  ;file count
2250       STA SECNT   ;comnt count
2260       LDA #144    ;dark blue
2270       STA COLOR2  ;background
2280       STA COLOR4  ;border
2290 ;
2300 GETSEC LDA #DISK01 ;disk device
2310       STA DDEVIC
2320       LDA #$01    ;drive one
2330       STA DUNIT
2340       LDA #DDREAD ;read comnd
2350       STA DCOMND
2360       LDA SECNLO  ;lo sector #
2370       STA DAUX1
2380       LDA SECNHI  ;hi sector #
2390       STA DAUX2
2400       LDA #INBUF&255
2410       STA DBUFLO  ;buffer addr
2420       LDA #INBUF/256
2430       STA DBUFHI
2440       LDA #$80    ;# of bytes
2450       STA DBYTLO  ;from sector
2460       LDA #$00
2470       STA DBYTHI
2480       JSR DSKINV  ;jump to i/o
2490       BPL SFILL
2500       JMP BADEXIT ;error!
2510 SFILL LDA #$00
2520       STA FILOFF  ;file offset
2530 ;
2540 PRNHDR LDX #IOCB ;iocb 1
2550       LDA #ICGREC ;get record
2560       STA ICCOM,X
2570       LDA #HEAD1&255
2580       STA ICBAL,X ;get header
2590       LDA #HEAD1/256
2600       STA ICBAH,X ;buf address
2610       LDA #80     ;buf length
2620       STA ICBLL,X
2630       LDA #$00
2640       STA ICBLH,X
2650       JSR CIOV    ;call cio
2660       LDA #HEAD2&255
2670       STA ICBAL,X ;second 1/2
2680       LDA #HEAD2/256
2690       STA ICBAH,X
2700       JSR CIOV    ;print it
2710 ;
2720 CLRBUF LDA SECNT ;check more
2730       BNE CERBUF  ;comment
2740       JSR COMGET  ;need more?
2750 CERBUF LDY #80
2760       LDA #$20
2770 CSTORE STA OUTBUF,Y ;clear buf
2780       DEY
2790       BPL CSTORE
2800       LDY FILOFF  ;get offset
2810       LDA INBUF,Y
2820 CKDEL AND #$80   ;check del.
2830       BEQ NODEL   ;files
2840 ISDEL LDA #$44   ;D=deleted
2850       BNE DSTORE
2860 NODEL LDA #$41   ;A=active
2870 DSTORE STA DELETE
2880       LDA INBUF,Y
2890 CKLOK AND #$20   ;check lock
2900       BEQ NOLOK
2910 ISLOK LDA #$4C   ;L=locked
2920       BNE LSTORE
2930 NOLOK LDA #$55   ;U=unlocked
2940 LSTORE STA LOCKER
2950       LDA INBUF,Y
2960 CKFOR AND #$01   ;check for
2970       BNE FORENH  ;sector>720
2980 FORNOR LDA #$4E ;N=normal
2990       BNE FSTORE
3000 FORENH LDA #$45 ;E=extended
3010 FSTORE STA FORMAT
3020 ;
3030 FILPRN LDA COUNTR ;calculate
3040       PHA         ;the file
3050       JSR HIBITE  ;number
3060       STA FIL1
3070       PLA
3080       JSR LOBITE
3090       STA FIL2
3100       LDA COUNTR
3110       CLC
3120       ADC #$01
3130       STA COUNTR
3140 ;
3150 SECPRN LDA INBUF+4,Y
3160       JSR LOBITE  ;get the
3170       STA SEC1    ;starting
3180       LDA INBUF+3,Y ;sector
3190       PHA         ;number
3200       JSR HIBITE
3210       STA SEC2
3220       PLA
3230       JSR LOBITE
3240       STA SEC3
3250       LDA #$24    ;hex number
3260       STA FIL0    ;indicator
3270       STA SEC0    ;"$"
3280       STA LEN0    ;to buffer
3290 ;
3300 LENPRN LDA INBUF+2,Y
3310       JSR LOBITE  ;get the
3320       STA LEN1    ;file
3330       LDA INBUF+1,Y ;sector
3340       PHA         ;count
3350       JSR HIBITE
3360       STA LEN2
3370       PLA
3380       JSR LOBITE
3390       STA LEN3
3400 ;
3410 COMXFR LDY SECNT ;move the
3420       LDX #$00    ;comments
3430 LXCR LDA COMBUF,Y ;to buffer
3440       BNE CMS
```

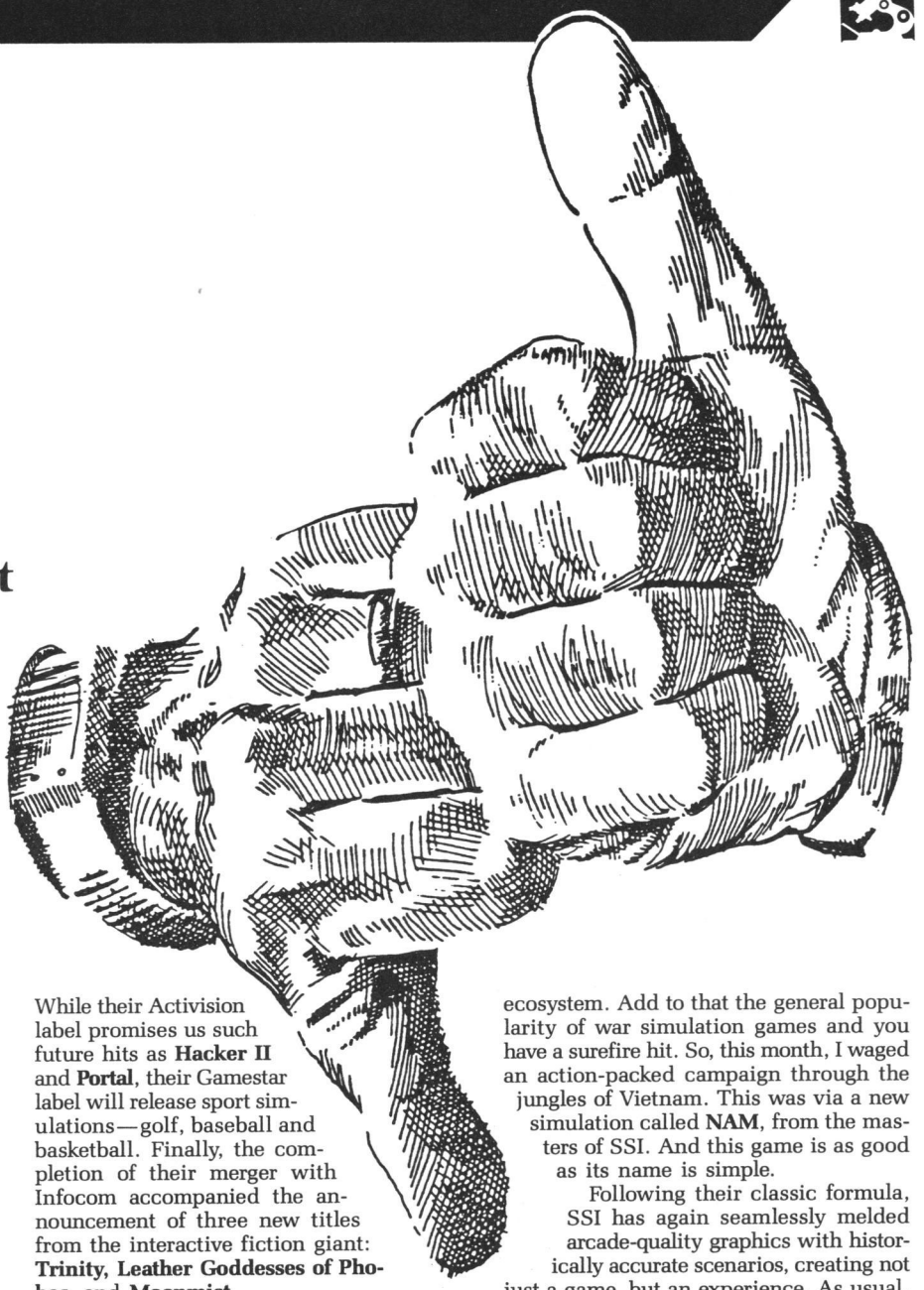
```
3450      LDA #$5F     ;if none
3460 CMS  STA CBUFF,X  ;then clr
3470      INY
3480      INX
3490      CPX #$20     ;last?
3500      BNE LXCR     ;get more
3510      LDA SECNT    ;comment
3520      CLC          ;counter
3530      ADC #$20     ;4 comnts
3540      CMP #$80     ;per sect.
3550      BNE SSOR
3560      LDA #$00
3570 SSOR STA SECNT
3580 ;
3590 FILXFR LDA FILOFF ;get file
3600      CLC          ;offset &
3610      ADC #$05     ;increment
3620      TAY          ;to point
3630      LDX #$00     ;to name
3640 LXFR LDA INBUF,Y
3650      BNE FNS      ;if char=0
3660      JMP ENDIT    ;no file
3670 FNS  STA FILNAM,X
3680      INY          ;transfer
3690      INX          ;to buffer
3700      CPX #$08     ;8 chr/fil
3710      BNE CKLAST
3720      INX          ;then skip 1
3730 CKLAST CPX #$0C   ;3 for ext
3740      BNE LXFR     ;12 total
3750 ;
3760 PRNSEC LDX #IOCB  ;print out
3770      LDA #OUTBUF&255
3780      STA ICBAL,X  ;file info
3790      LDA #OUTBUF/256
3800      STA ICBAH,X  ;and the
3810      LDA #75      ;comment
3820      STA ICBLL,X
3830      JSR CIOV     ;call cio
3840 ;
3850 NXTFIL LDA FILOFF
3860      CLC
3870      ADC #$10     ;increment
3880      STA FILOFF   ;offset
3890      CMP #$80     ;if=80=last
3900      BEQ SECINC   ;of sector
3910      JMP CLRBUF   ;get anothr
3920 ;
3930 SECINC LDA SECNLO ;increment
3940      CLC          ;sector
3950      ADC #$01     ;pointer
3960      STA SECNLO
3970      CMP #$71     ;sector 170
3980      BEQ ENDIT    ;last o'dir
3990      LDX #IOCB    ;next sectr
4000      LDA #MESG1&255
4010      STA ICBAL,X
4020      LDA #MESG1/256
4030      STA ICBAH,X
4040      JSR CIOV
4050      JSR KEWAIT   ;wait 4 key
4060      JMP GETSEC   ;get more
4070 ;
4080 ENDIT LDA #$68    ;load VTOC1
```

```
4090      STA COMMLO  ;at sector
4100      LDA #$01    ;$168
4110      STA COMMHI
4120      JSR COMGET  ;call dio
4130      LDA COMBUF
4140      JSR LOBITE  ;DOS type
4150      ORA #$80    ;2.0/other
4160      STA DTYPE
4170      LDA COMBUF+2
4180      JSR LOBITE
4190      ORA #$80    ;inverse
4200      STA MSECT   ;max sector
4210      CMP #$B3    ;DOS 2.5?
4220      BEQ G1
4230      LDA #$B0    ;if DOS 2.0
4240      BNE G2
4250 G1   LDA #$B5    ;if DOS 2.5
4260 G2   STA DTYPE+2
4270      LDA COMBUF+1 ;hi maximum
4280      PHA          ;sector
4290      JSR HIBITE   ;count
4300      ORA #$80
4310      STA MSECT+1 ;2.0=$02C2
4320      PLA          ;2.5=$03F2
4330      JSR LOBITE
4340      ORA #$80    ;inverse
4350      STA MSECT+2 ;video
4360      LDA COMBUF+4
4370      STA FSECT   ;sect left
4380      LDA COMBUF+3 ;VTOC 1
4390      STA FSECT+1
4400      LDA #$00    ;point to
4410      STA COMMLO  ;VTOC #2
4420      LDA #$04    ;at sector
4430      STA COMMHI  ;$0400
4440      JSR COMGET
4450      CPY #$00    ;error if
4460      BPL VTOC2   ;<>DOS 2.5
4470      LDA #$00
4480      STA COMBUF+$7A ;clear
4490      STA COMBUF+$7B ;if not
4500 VTOC2 LDA COMBUF+$7A ;DOS 2.5
4510      CLC          ;get free
4520      ADC FSECT+1 ;sect.& add
4530      STA FSECT+1 ;VTOC #1 to
4540      LDA COMBUF+$7B
4550      ADC FSECT   ;it for the
4560      JSR LOBITE  ;total free
4570      ORA #$80    ;sectors
4580      STA FSECT   ;(not 999+
4590      LDA FSECT+1 ;as in DOS)
4600      PHA
4610      JSR HIBITE  ;transfer
4620      ORA #$80    ;to buffer
4630      STA FSECT+1
4640      PLA
4650      JSR LOBITE
4660      ORA #$80
4670      STA FSECT+2
4680      LDX #IOCB
4690      LDA #MESG3&255
4700      STA ICBAL,X
4710      LDA #MESG3/256
4720      STA ICBAH,X ;print disk
4730      JSR CIOV    ;data out
4740      BPL ENDMSG  ;error?
4750 BADEXIT LDA #66 ;dark red
4760      STA COLOR2  ;printed
4770      STA COLOR4  ;as a flag
4780      LDX #IOCB   ;to user
4790 ;
4800 ENDMSG LDA #MESG2&255
4810      STA ICBAL,X
4820      LDA #MESG2/256
4830      STA ICBAH,X
4840      JSR CIOV    ;last file
4850      JSR KEWAIT  ;get key
4860      JSR ECLOSE  ;close iocb
4870      LDA #$00
4880      STA CRSINH  ;cursor on
4890      STA WARMST  ;reset flag
4900      LDA #FINAL&255
4910      STA MEMLO   ;memlo pntr
4920      LDA #FINAL/256
4930      STA MEMLO+1
4940 ;
4950 POPOFF PLA       ;pop back off
4960      TAY         ;all registers
4970      PLA
4980      TAX
4990      PLA
5000      PLP
5010      RTS         ;exit routine
5020 ;
5030 ECLOSE LDA #ICLOSE ;close
5040      STA ICCOM,X ;routine
5050      JSR CIOV
5060      RTS
5070 ;
5080 KEWAIT LDA #$FF
5090      STA CHARIN  ;keyboard
5100 CHLOOP LDA CHARIN ;routine
5110      CMP #$FF
5120      BEQ CHLOOP
5130      RTS
5140 ;
5150 LOBITE AND #$0F ;nibble to
5160      TAX         ;hex digit
5170      LDA TABLE,X ;routine
5180      RTS
5190 HIBITE LSR A     ;shift
5200      LSR A       ;upper
5210      LSR A       ;nibble
5220      LSR A       ;to lower
5230      AND #$0F    ;then load
5240      TAX         ;value
5250      LDA TABLE,X
5260      RTS
5270 ;
5280 COMGET LDA #DISK01
5290      STA DDEVIC  ;comnt load
5300      LDA #$01    ;same as
5310      STA DUNIT   ;directory
5320      LDA #DDREAD ;except
5330      STA DCOMND  ;sectors
5340      LDA COMMLO  ;above 1024
5350      STA DAUX1
5360      LDA COMMHI
5370      STA DAUX2
5380      LDA #COMBUF&255
5390      STA DBUFLO
5400      LDA #COMBUF/256
5410      STA DBUFHI
5420      LDA #$80
5430      STA DBYTLO
5440      LDA #$00
5450      STA DBYTHI
5460      JSR DSKINV
5470      LDA COMMLO  ;increment
5480      CLC         ;comment
5490      ADC #$01    ;sector
5500      STA COMMLO  ;pointer
5510      CPY #$00
5520      BPL COMRT
5530      LDA #$9B    ;if error
5540      STA COMBUF  ;then mark
5550      STA COMBUF+1 ;no buffer
5560 COMRT RTS
5570 ;
5580 EDITOR .BYTE "E:",$9B
5590 SECNLO .BYTE 0  ;lower directory
5600 SECNHI .BYTE 0  ;sector pointer
5610 COMMLO .BYTE 0  ;comment sector
5620 COMMHI .BYTE 0  ;pointers
5630 COUNTR .BYTE 0  ;file counter
5640 FILOFF .BYTE 0  ;filename offset
```

```
5650 SECNT .BYTE 0    ;comment flag
5660 ;
5670 TABLE .BYTE "0123456789ABCDEF"
5680 MESG1 .BYTE "↓    Press any key "
5685       .BYTE "for more files. ",$9B
5690 MESG2 .BYTE "   Last file listed."
5695       .BYTE "  Press any key. ",$9B
5700 MESG3 .BYTE "↓   Dos:"
5710 DTYPE .BYTE "0.0   Last:$"
5720 MSECT .BYTE "000   Free:$"
5730 FSECT .BYTE "000  ",$9B
5740 HEAD1 .BYTE "↖   Disklist 1.0    "
5742       .BYTE "|a|l|t|disk sector   "
5744       .BYTE "                   c|"
5745       .BYTE "o|y|"
5746       .BYTE "                  ",$9B
5750 HEAD2 .BYTE "filename|ext|file#|"
5752       .BYTE "t|k|p|start|count ",$9
B
5760 ;
5770 INBUF *= *+$80  ;directory buff
5780 COMBUF *= *+$80 ;comment buffer
5790 ;
5800 OUTBUF = *      ;print buffer
5810 FILNAM = *      ;file offset
5820 FIL0 =  *+14
5830 FIL1 =  *+15    ;file number
5840 FIL2 =  *+16    ;offset
5850 DELETE = *+19   ;deleted flag
5860 LOCKER = *+21   ;locked flag
5870 FORMAT = *+23   ;DOS type flag
5880 SEC0 =  *+26
5890 SEC1 =  *+27    ;first sector
5900 SEC2 =  *+28    ;number used
5910 SEC3 =  *+29
5920 LEN0 =  *+32
5930 LEN1 =  *+33    ;file sector
5940 LEN2 =  *+34    ;length
5950 LEN3 =  *+35
5960 CBUFF = *+42    ;comment offset
5970 FINAL = *+80    ;last byte used
5980 ;
5990     *=  $02E0   ;init address
6000 ;
6010     .WORD INIT  ;for DOS init
6020 ;
6030     .END        ;goodby
```

Panak strikes!

Reviews of the latest software



by Steve Panak

It is only with great effort that I produce this report of my frenzied day at the Summer CES. But the tale must be told, so I proceed to the games of CES. . .or, more specifically, to the Atari games of CES.

Many major manufacturers were out in force, plus some I'd never heard of. Mastertronic, which claims to have the world's fastest selling computer software, washed up on our shores from Mother England (where, it tells us, it has a 23 percent share of the market). Although most of their games are for the Commodore Amiga, a number of games (at $9.99 a shot) are available for both the 8-bit and ST machines. Having begun to scarf up some of this software, I hope soon to have reports for you on its worth.

Polarware was touting their new line of **COMPREHEND** interactive novels with graphics. Promising a strong parser, large vocabulary, and over 100 graphics per game, these products could be, as my favorite Vulcan would say, "interesting." Also, for the XL/XE, the company's releasing a number of $8.95 "oldies." Time will tell whether these are good buys, or outdated rip-offs.

SSI was showing off **Phantasie**, their newest multiple-character role-playing game. Currently available on the ST, an XL/XE version is promised for late September. **Wizards Crown** and **Gettysburg: The Turning Point** are also forthcoming.

The big news on the block was Activision. Their recent mergers have made them a software force to be reckoned with. While their Activision label promises us such future hits as **Hacker II** and **Portal**, their Gamestar label will release sport simulations—golf, baseball and basketball. Finally, the completion of their merger with Infocom accompanied the announcement of three new titles from the interactive fiction giant: **Trinity, Leather Goddesses of Phobos**, and **Moonmist**.

The massive crowds quashed any hopes I had of getting my hands on the new Atari products, much less any of the other new games various manufacturers were demonstrating in the Atari display area. Atari was alive and well at the June CES, with plenty of new entertainment software. In future issues, I'll let you know what I think of some. Until then, browse through my latest assembly of games.

NAM

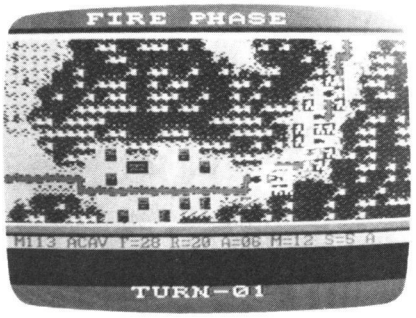
by Roger Damon
SSI
883 Stierlin Road, Building A-200
Mountain View, CA 94043-1983
48K Disk $39.95

It was inevitable, given the popularity of Vietnam-related entertainment. *Rambo, Commando*, etc. flood the mass media's ecosystem. Add to that the general popularity of war simulation games and you have a surefire hit. So, this month, I waged an action-packed campaign through the jungles of Vietnam. This was via a new simulation called **NAM**, from the masters of SSI. And this game is as good as its name is simple.

Following their classic formula, SSI has again seamlessly melded arcade-quality graphics with historically accurate scenarios, creating not just a game, but an experience. As usual, play progresses in phases, each of which have particular events, plus functions you can perform.

In these phases you attack, move and observe, as well as implement other, more subtle strategy. Only the movement phase proved to be complex, fraught with rules about when you could and couldn't advance or retreat. The other phases are effortlessly initiated and controlled. Although the phase method negates real-time action, it does simplify play greatly, allowing you to carefully plan strategy.

The joystick controls all the action, with the START button signifying the end of a phase. This makes for easy playing as you lean back, the proverbial armchair general. Program execution is smooth, the scrolling map especially so. The expected "save game" feature is present and accounted for.



NAM, for armchair guerillas.

Also present are six scenarios. These are anywhere from ten to forty turns (a turn being one rotation through the phases, which last, on the average, four minutes). From tank encounters (although, in **NAM**, the tanks can't move too efficiently through jungles), to choppers clearing out areas, to the infantry entering and overtaking the infamous Vietnamese caves and tunnels, you experience a full range of battle environments. The *Tuy Hoa* scenario was my favorite—trying to root the treacherous Viet Cong from their deadly underground mazes.

Equally enjoyable was the *Ia Drang: Death from the Air* scenario, in which you try to eliminate all local enemy troops, using those angels of death, the Air Cavalry's choppers. Any enemy left alive reduces the mission to a questionable victory. The point to all this is points, awarded for each enemy unit destroyed, followed by a victory level, telling how well you did.

The screen is highly detailed and easy on the eyes. Although, as with all simulations, it takes a while to get used to the icons, once you learn the symbols' meanings, they're easily recognized. Sound effects add to the realism. From the crack-crack-cracking of rifle fire, to the swish-boom of the mortars—just close your eyes, and the battle unfolds in your mind.

As is usual with SSI, the documentation is great. Although there's no reference card in **NAM**, the three-color manual describes game play very simply, then goes on to the various scenarios. Printed maps and drawings supplement the on-screen icons, allowing the player to visualize what the true battle might be like.

So, although I'm a hard-core dove, I really enjoyed this easy-to-learn and fun SSI simulation. **NAM** allows you to quickly and effortlessly experience a diluted, sanitized taste of the vicious jungle war waged so recently in our past.

Star Raiders II

by Gary Stark and Bruce Poelhman
ATARI CORP.
Sunnyvale, CA 94086
48K Disk $19.99

For quite a while now, Atari has forsaken software development, preferring instead to concentrate on hardware. Mind you, I'm not complaining. This shrewd strategy spawned the 130XE and the 520ST, machines that are enough ahead of their time to pull Atari out of the tailspin the industry's caught in. And there's more to come. But we software aficionados have been waiting for a new one from our leader.

And the wait is finally over.

I never played **Star Raiders**. Oh, I've seen it in the stores, pulsating on the screen. I just never *played* it. . . but I know many consider it one of the all-time best. And **Star Raiders II**, an offshoot of the movie and never-released game *The Last Starfighter*, continues the tradition.

The object of this game is to rid the galaxy of the blight that is the Zylon Empire. After being crushed in the original **Star Raiders**, the Zylon warriors promised good behavior, in exchange for being allowed to settle on their barren home planet. But the evil and vengeful Chut has rallied them, and they're again at your throat.

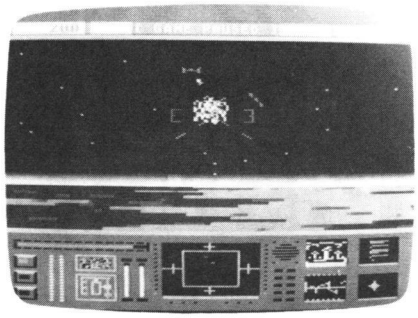
To be successful, you must defend your star system, while at the same time attacking the enemy's, in an attempt to wipe out the Zylon Master Force. The game operates in two modes, one for battle and one for travel. Surprisingly, a fair amount of strategy is needed to successfully complete the game.

This is because energy units determine your fate. You use up the units by hyperspacing to another region, by firing, or by being hit. Additional fuel is obtained at the starbases. Needless to say, you'll want to defend the bases. But what about defending your system? And, until you knock them out of commission, the dreaded Zylon Attack Bases are forever producing additional fighter ships. As often occurs in life, there's simply not enough time to do everything you'd like to. . .or need to.

Play is rapid, smooth and takes place on a highly detailed screen. The enemy crafts explode uniquely—direct hits are instantly vaporized, while near hits simply ignite the ship, which then sizzles to its fiery doom. In addition to displaying the action, your monitor holds a representation of the viewscreen of your battleship, The *Liberty Star*. The borders display information from your main computer (weapon damage or shield damage, or the calming "game paused" message), plus numerous dials and readouts to keep you constantly apprised of energy level or cannon temperature.

A certain amount of realism is achieved via the interrelationships of these various factors. For example, as your cannon begins to overheat, it starts to misfire. And, of course, when energy falls to zero, be prepared for a few millennia of deep space flotation.

The documentation is good. It offers complete instruction, along with strategy and survival tactics. Also included is a



Fly the deadly skies of Star Raiders II.

brief story background, which attempts to set the scene. This, I guess, was intended to offer justification for a game which needs none, other than that it's *fun*.

After a long absence from the entertainment software scene, Atari is back—with a game I can recommend, regardless of whether you did or didn't like the original. **Star Raiders II** is a nonstop action fix, an arcade addict's delight. Welcome back, Atari, and don't be a stranger.

Star Fleet I

by Trevor Sorensen
CYGNUS
P.O. Box 57825
Webster, TX 77598
48K Disk $49.95

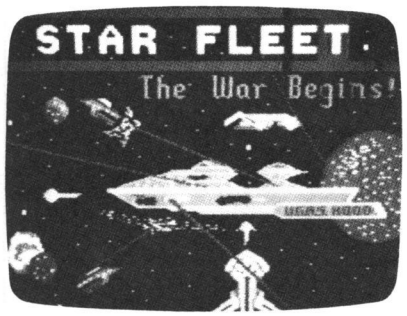
My first impression of **Star Fleet I** was one of shock. This was due to the vast documentation I realized I'd have to pore over. I dread vast manuals, preferring instead short, concise statements of the program's inner workings. Fortunately, not all *had* to be read to start play, and I quickly discovered that **Star Fleet I** wasn't worth reading the rest.

Although not officially so, **Star Fleet I** has just enough similarities (as you'll soon see) to qualify as a "Star Trek" rip-off. Even if the show hadn't been one of my all-time favorites, I'd be angry.

Basically, the goal in the game is to progress through the ranks, from Cadet to Admiral Emeritus. You can also earn various medals and commendations. And, in one really nice feature, you compete against an infinite number of other players. The program (which is not copy protected) keeps each player's files separately.

Thus, though only one (per computer) may play at any time, vast numbers may compete on a galactic basis. These files can be viewed and modified, an option that might make the game attractive to science fiction clubs. But, before anyone gets their pirating hopes up, you need to enter a code from the manual to start a game.

Moving on to program execution, my first disk didn't. It simply wouldn't load. After a call to the manufacturer, a replacement was rapidly sent, and I finally got into the game. It really takes a lot of work



Star Fleet I
Manuals galore, but no goal.

to play—you have many commands to learn. Still, the game is fast paced and well designed, although it did have a nasty tendency to crash on occasion.

The screen display is designed thoughtfully, with all necessary readouts logically placed. Emergency messages appear centered at the top of the screen, along with the elapsed time and your ship's condition. Other displays keep you apprised as to shield condition, tactical position, long range scanners and, of course, the command prompt. A large central area is reserved for messages indicating the success of your mission.

But this is where the game falls flat. There *is* no mission, no goal. Oh sure, promotion through the ranks, the occasional medal or commendation, but no true goal. The enemy encounters seem randomly placed, and there's no ultimate antagonist to be destroyed. The game lasts a lot longer this way, but I simply lose interest. Virtually all games last a given period, to be replaced by new ones. I usually consider it better that the game terminate itself, or reach a conclusion on its own, before you conclude you don't want to play it any more.

As I mentioned before, the documentation is vast. An officer's manual contains the explanations of the basic commands. These vary from weapon and sensor control to damage reports, to self destruct. Phasers and torpedoes can be fired, tractor beams engaged, shields raised or lowered, and transporters energized.

Selections are made from three nested menus via the joystick. The menu structure is rational, with the most important commands on the primary menu, utility commands on the secondary menu and information retrieval commands on the computer menu.

A training manual contains advanced strategies and techniques. It also includes background on the Federation. A supplement to the manual adds new items to the instructions and gives machine-specific information. The need to look back and forth between the two was annoying.

As you can tell, I wasn't impressed with **Star Fleet I**. I hoped it might give me a fling at intergalactic war, but, at $49.95, it simply fired on my defenseless wallet.

Super BoulderDash

by Peter Liepa
ELECTRONIC ARTS
1820 Gateway Drive
San Mateo, CA 94404
48K Disk $22.95

Okay, the cover of **Super BoulderDash** is another imitation of the mega-popular **Raiders of the Lost Ark**. But, once I got over my distaste at that, I booted what might be one of the better games of this year. Did I say might be? Strike that . . . *is* the best arcade game I've played so far this year.

This game is the sequel to **BoulderDash**, released two years ago. According to the back cover, the critics loved it. Until now, I'd never played it. I say "until now," because the outfit contains both the original and the sequel—a double play you'll soon realize would be a bargain at half the price.

A derivative of **DigDug**, which itself was a product of **Pac-Man**, the basic concept is not new. Still, the hidden subtleties, which will keep you entertained for hours, are a welcome change from typical offerings of the vast video wasteland.

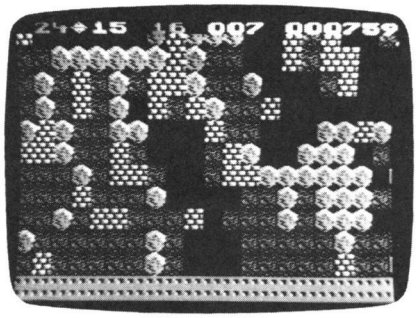
As Rockford, an electronic explorer in tennis shoes, you move through caverns, searching for diamonds and avoiding falling boulders. When you have enough diamonds, the exit's revealed, and you escape from this close call into another one. To further complicate your life, fireflies and butterflies explode Rockford on contact.

The boulders prove to be, by far, your deadliest enemies. Singly, they're enough to crush you and end your game. An avalanche is simply overkill. And you needn't walk underneath one to precipitate a fall; just brushing against a delicately balanced boulder is enough to end your spelunking days. Fortunately, they're just as deadly to your antagonists, and dropping one on them just might be the key to blowing out that wall and gaining access to that nest of diamonds.

Diamonds, as you may remember, are necessary to move from one level to the next. I cringe at the number of times I found myself short one diamond, trapped, with Rockford's precious time ticking away. Yet you only need a few of the gems to escape, not all of them. Confucius say, "It better to exit the cave with a few points less than not at all."

The graphics are superb and quick. Little extras—Rockford tapping his foot as he waits for you to make your next move—enhance the display. Although there aren't a lot of colors on-screen, all images are highly detailed. Even a large number of boulders falling at once doesn't slow play appreciably.

Two can play, using one or two joysticks;



The boulders are killers
in Super BoulderDash

however, the high score is not saved. There are sixteen different screens in each game, and the program allows you to start on approximately every fourth screen. Even those who can't complete the game can probably, with a little effort, at least see every screen. Strategies on the various screens are diverse, ranging from simple patterns to complex mazes to elaborate traps. Most important—none are boring.

I've always said Electronic Arts packaging is among the best in the industry. In fact, its recordlike appearance is often copied by others. I'm bringing it up because they've improved it, by rotating the slot that holds the disk 90 degrees. With it facing toward the inside spine, you'll never lose that disk again.

The manual is straightforward and gets you quickly into the game. There are few rules, although numerous strategies are given, as well as tips on completing each screen. You'll soon find that these tips are necessary, but do try each screen before consulting them. You might not even need them, but I doubt it.

As you might have discerned by now, I love this game. So has everyone I've had play it. **Super BoulderDash** is a gem—a worthwhile addition to anyone's library.

That's it for this month. If you need an arcade fix, I have to recommend **Super BoulderDash** and **Star Raiders II**, while **NAM** is a must for simulation fans. **Star Fleet I** probably won't be enjoyed as a game so much as for sentimentality. A

The author wishes to express his appreciation to The Magic One Computer Shop of Barberton, Ohio for their constant support in the creation of this series.

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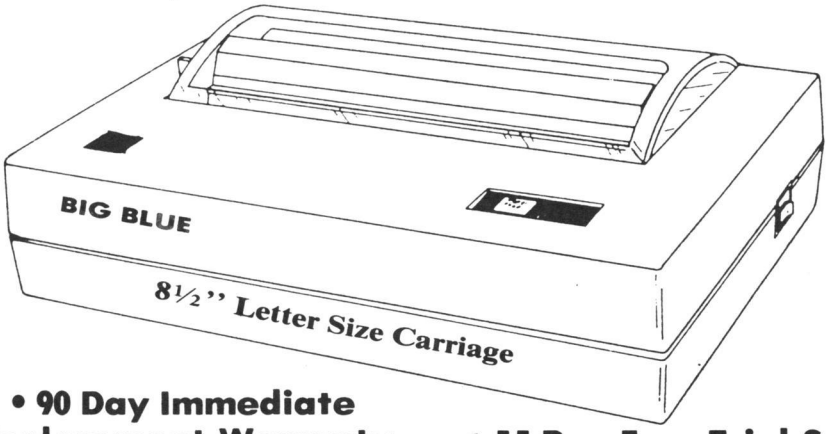

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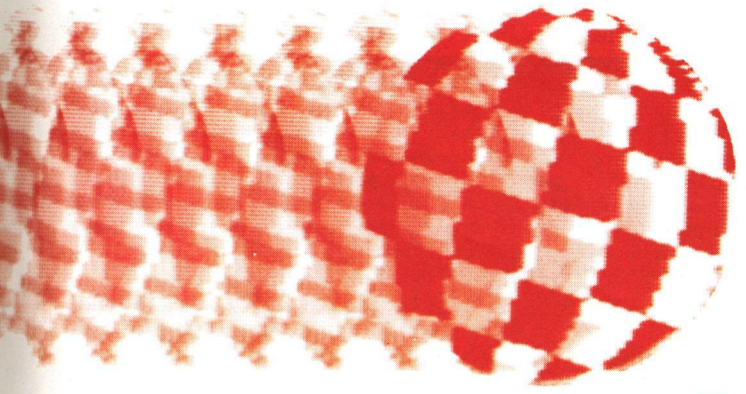


The Xanth 8-bit demos

Everything I ever wanted to tell*

(*But was afraid you didn't want to know)

by Xanth Park

Welcome to the Xanth xone, the origin of those xany 8-bit demo programs, *Boink!*, *Swan* (honest!) and *FujiBoink!* I wrote those programs; they, like me, look absolutely *mahvelous*, but (also, like me) perform no useful function whatsoever. The good folks at **ANALOG Computing** have given me this opportunity to redeem myself, by explaining how the demos work.

I'll give it a shot, but I'm not promising anything. I mean, have you ever looked back at your old code and asked yourself, "Who the hell wrote that?" or "What was I on?" That's what I'm wondering right now. . .

Boink!

After seeing a real live, ball-bouncing Amiga, I said to myself, "Hey, my 8-bitter can do that!" For once, I was correct. But one problem had to be worked out first: creating the spinning illusion and moving the ball around the screen. Two problems. And casting a "transparent" shadow on the background. Three. Three problems.

I wrote a BASIC program to generate four views of the ball, at four stages in its spin. The views are played back in sequence repeatedly, and the ball appears to spin.

You'll notice the Amiga and ST bouncing balls are polyhedra (flat sides), while mine's actually a sphere. This was caused by the lack of a "fill polygon" command in BASIC. Rather than write one, I found it easier just to work out the formulas for a checkered sphere. Of course, each view took 45 minutes to generate, but it only happened once—because the images were saved to disk and are now permanently embedded in Boink! (Actually, it happened twice, but that was an accident.)

The ball is moved by. . .er, it's kinda hard to explain. You see, I was going to be really clever with this program and work my 800's superior graphics hardware to the max. I threw everything in: player/missile graphics for the vertical grid lines, display list interrupts for the horizontal lines, fine scrolling, color register indirection, the whole bouncing ball of wax.

The *Boink!* program spends most of its time writing display lists for ANTIC. Each time the ball moves, a new display list is created, incorporating blanking instructions above and below the ball, 96 mode $E lines for the ball image, a Load Memory Scan to define which image to show and at what horizontal offset, and regularly-spaced (in terms of scan lines, not in memory) DLIs. Sounds impressive ("it's writing a program in real time for the video co-processor. . ."), but it's a very dumb way to do it (it gets worse, so stay tuned).

At this point, I had a bouncing, spinning ball with a shadow the same color as the background grid. This version got shown at a meeting of the Bellevue/Redmond Atari Computer Enthusiasts (BRACE). Personally, I was satisfied with it, but my friend (a C64 owner, no less) kept razzing me about the nontransparent shadow. I told him I liked it that way; people could distinguish between my program and the Amiga's—but he wasn't buying it.

So I made the shadow "transparent," by causing the grid lines to be visible "through" the shadow. The vertical lines were player/missiles; all they needed was the proper priority setting. The horizontal lines were DLIs; I had to exclusive-or a mask against the appropriate parts of the shadow, which was *not* fun.

About that time, I got a second look at the Amiga demo, and I noticed a few things I'd gotten wrong. For instance, the Amiga ball spun in the opposite direction, and its bounce was not symmetrical. The ball's spin was easy to change, but the bounce?

My ball followed a "hard-wired" bounce path, and I had taken care to make it symmetrical, because that was the way I thought it should be. Now I had to make a decision: put in a little more work for a more accurate emulation, or take the cowardly, lazy way out and leave it alone. No contest.

Anyway, the program worked, and people seemed to like it. Inside, it was a complete mess, but only I knew that. I thought. Then I started hearing from people who were looking at the code.

By that time, I'd come up with the way I *should* have done it, and I was feeling pretty stupid, telling myself, "You did it all wrong." Then came the calls: "You did it all wrong." To all those people, let me just say, "Well, excuuuuuuuse me!"

It's a swan (honest).

This demo started out as an entry in the BRACE graphics contest. I wanted to see what a spinning 3-D fuji symbol would look like, so I wrote a BASIC program to draw sixteen views of one doing a one-eighty, plus a machine language program to play the pictures back, with shading and a rainbow cascading down one face. I wanted the fuji to be authentic, so I pulled the data for it out of the CES '85 *Robot/Rocket* demo. The spinning fuji looked good, but not quite good enough for Xanth. Something was missing.

I'd seen the Amiga eagle and the ST cockatiel, so the next step was obvious: off to the library to look for bird pictures. Several libraries later, a disturbing trend was becoming evident. Photo sequences of birds in flight are rather rare (as in *non-existent*).

The contest was drawing near, but even more pressing, I was leaving for Mexico. Things didn't look good for the home team. On a whim, I leafed through our *Encyclopaedia Britannica*. There, under "flight," were swans in flight. This was an unbelievable stroke of luck. The photos were small and none too sharp, true, but they were the best available.

They were "digitized" by me, using a very cheap paint program (I wrote it in Action! in about 15 minutes). Unfortunately, something must have gotten lost in the translation, because the bird in the photographs is a swan, but what I drew apparently isn't.

The bird was animated using all four players combined, to provide 16-pixel width and two colors, not including the background.

With the spinning fuji, the flying bird, the Atari logo (also pulled from *Robot/Rocket*) and the message "8-BIT POWER," my program was ready for BRACE. It ended up winning, but I was in Mazatlan at the time.

Much later, the demo was expanded to rotate "ATARI" and "130XE" (and "XANTH," if you know how). Again, a BASIC program prerotated the words.

The xen of Xanth demos.

You've probably noticed the demo programs themselves do very little work. All number-crunching is done beforehand in BASIC; the demos just play back the results. I hope you aren't too disillusioned by all this. Maybe, with a lot of effort, all those calculations could be done on the fly, but my programs and I are extremely lazy.

Now back to...

FujiBoink!

...sunny Mazatlan, where, instead of relaxing, I was all charged up by the mind-boggling idea that had just struck me: combine the spinning fuji with the bouncing motif! What a concept! Call it *FujiBoink!* What a name! I didn't have a computer! What was I going to do?

When I finally returned to civilization, I had my work cut out for me. Winter CES was just around the corner, and I hoped to be finished in time for it, but I wasn't sure the concept was even feasible.

My biggest fear turned out to be unfounded. I'd been afraid that the fuji data would not convert to mode 4 as required by *FujiBoink!* because of possible conflicts in color register usage. Surprisingly, to me at least, only 1 pixel out of the sixteen images caused a problem, and it was easily corrected.

The shadow was drawn with the fuji. It's geometrically correct (to the resolution of the screen), assuming a light source at infinity, 11.25 degrees to the left. If you watch closely, you'll see that "light" passes between the fuji sections to the background only when the fuji faces 11.25 degrees left.

Atari in motion, from Xanth.

Displaying and moving the fuji were quite straightforward, after *Boink!* A minor challenge was determining when to bounce off a side. Unlike the ball, the fuji's width varies, depending on its rotation. If you play with the SELECT key, you can change the fuji's spin. Notice that it always bounces when it hits the edge of the screen.

The rainbow color effect was somewhat more difficult to achieve for this demo. Usually, there's plenty of time during a scan line to stuff color registers and perform a little housekeeping. In this case, however, using mode 4 with horizontal scrolling enabled every eighth scan line left the CPU very few cycles. I ended up having to unroll the color-stuffing loop, to treat those scan lines as special cases.

By this time, CES was almost at hand. I had basically given up the idea of a transparent shadow for this demo. Instead, I decided to use a background of something completely different. I chose a red and white checkerboard to allude to the Amiga, symbolically placed behind the Atari logo (heh, heh).

So *FujiBoink!* got shown at CES. Unfortunately, there's a little bug in it that occasionally fouls it up—specifically, an uninitialized variable. How embarrassing—the bug didn't show up while I was working on it.

And there's something else. You know how you compare two numbers in 6502, then do a BCC or BCS? I always get them mixed up, or forget which one contains the equal case. Anyway, I have this feeling that I messed up a range test with a value that's one off...but I'm not sure. Because, if I did, I can't explain why the program works most of the time. Maybe I should take a closer look.

Thanx.

I'd like to thank all of you who called or wrote to say nice things about my programs.

Some people asked for source code. I'm sorry, but the source is unavailable. There are just too many little files, from image-generating programs to data files, to conversion programs, to who knows what else. Besides, the assembly language stuff is written for my own home-brewed assembler, written in Action!, and its syntax is rather embarrassing.

What's next?

Currently, nothing. In a recent hardware experiment, I managed to fry a 130XE and, even worse, the Action! cartridge that was in it. Now, not only am I deprived of the wonderful Action! programming environment (which makes any ST compiler look sick), but I no longer have an assembler.

So, if you want more 8-bit demos, send money. This offer must end soon, so act now! Operators are waiting. Just kidding; there are no operators.

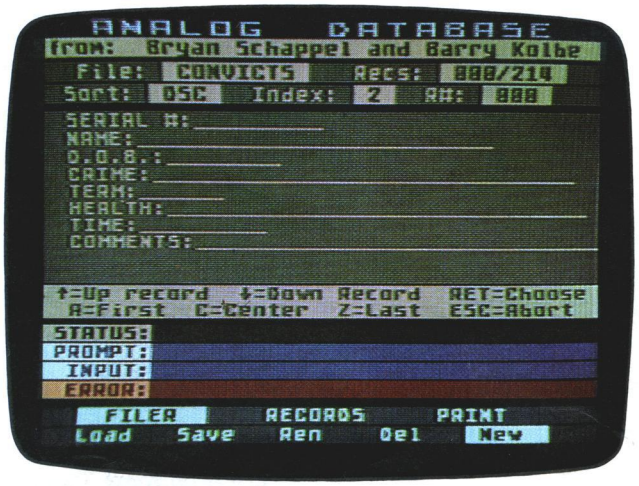
And now, Xanth talks about Xanth.

Xanth Computer Systems began as an itty-bitty, teeny-weeny BBS in our beloved founder's basement. After much hard work and many two-hour coffee breaks, Xanth grew into a huge multinational conglomerate.

At this point, two things happened... (1) we started doing demos; and (2) coffee breaks grew to four and five hours. Since then, things have deteriorated at an alarming rate. We now have a beautiful store in sunny (ha ha! splash, slosh) downtown Seattle and are back to two-hour coffee breaks.

Seriously, we are a large ST retailer. Our F/X division (i.e., Park) churns out demos for the betterment of Atari, and we're always looking for new talent and ideas. We'd like to hear your comments and suggestions.

Park is an on-again, off-again part-time pseudo-programmer, looking for his first name in the dip. His favorite punctuation mark is ! He can be reached at: Xanth Computer Systems F/X Division, 600 First Avenue, Seattle, WA 98104; or via BBS: (206) 682-8039.



The ANALOG Database

Menu driven, with English error messages, this system could make your day.

by Bryan Schappel and Barry Kolbe

There are quite a few database systems currently available for the 8-bit Atari, ranging from fantastic packages like **SynFile+** and LJK's **DataPerfect** to simple packages like **HomeFind**. Somewhere in the realm between these lies **The ANALOG Database** (**ADB**, for short).

ADB allows you to have from one to eight fields, up to thirty characters per field, with a maximum of 255 records. It has fully formatted printed output options and allows you to sort files in either ascending or descending order. Do I have your attention yet?

ADB is menu driven, allowing easy selection of options at the touch of a key. You're constantly informed of your data status and of any errors that may occur during operation. All errors are handled in English, for your benefit.

Typing it in.

Listing 1 consists of the BASIC data statements used to create the DB.COM file on your disk. Refer to **M/L Editor** (on page 11) for typing instructions. Once the DB.COM file's been created, you're ready to use **ADB**.

Please refer to your DOS manual for instructions on loading a binary file, then perform a binary load of the DB.COM file. If you wish to have **ADB** load and run automatically upon booting your system, simply rename the DB.COM file as AUTORUN.SYS.

Once **ADB** loads in, you're presented with the BBK intro screen, then, in a second or two, the **ADB** work screen. At this point, you're ready to use **ADB**.

Using it.

You'll notice, at the bottom of the screen, a line with the words *FILER RECORDS PRINT*. This is the main menu. There's a large cursor on the word *FILER*. This cursor can be moved to RECORDS or PRINT by pressing the + to move the cursor left, or * to move right. When the cursor's on the option you want, just press RETURN. Once you press RETURN, the line under the main menu displays another menu. Move the cursor around here just as you did on the main menu, making a selection by pressing RETURN, or leaving this submenu by pressing ESCape. You may only enter the submenu's RECORDS and PRINT if a file is in memory.

Now, we'll look at the submenus and all the functions available from each.

The FILER submenu.

The FILER menu consists of the following five options: *LOAD, SAVE, RENAME, DELETE* and *NEW.*

The LOAD option.

Using this command will allow you to load a previously created or edited **ADB** file. If a file exists in memory, **ADB** will ask if you wish to save it; if so, the file is saved, then the directory of **ADB** files will appear on-screen. Only the first thirty files will be displayed. Once this happens, you're prompted for a filename. Type the first eight characters only (**ADB** won't let you type more) and press RETURN. The load process will begin.

If the load was successful, you're put back into the main menu. If not, an error message will be displayed on the red ERROR line, and you're deposited back in the main menu.

The SAVE option.

This will simply save the data in memory to the disk file that you specified in the file creation process (more on this later). After a file is saved, it's erased from the com-

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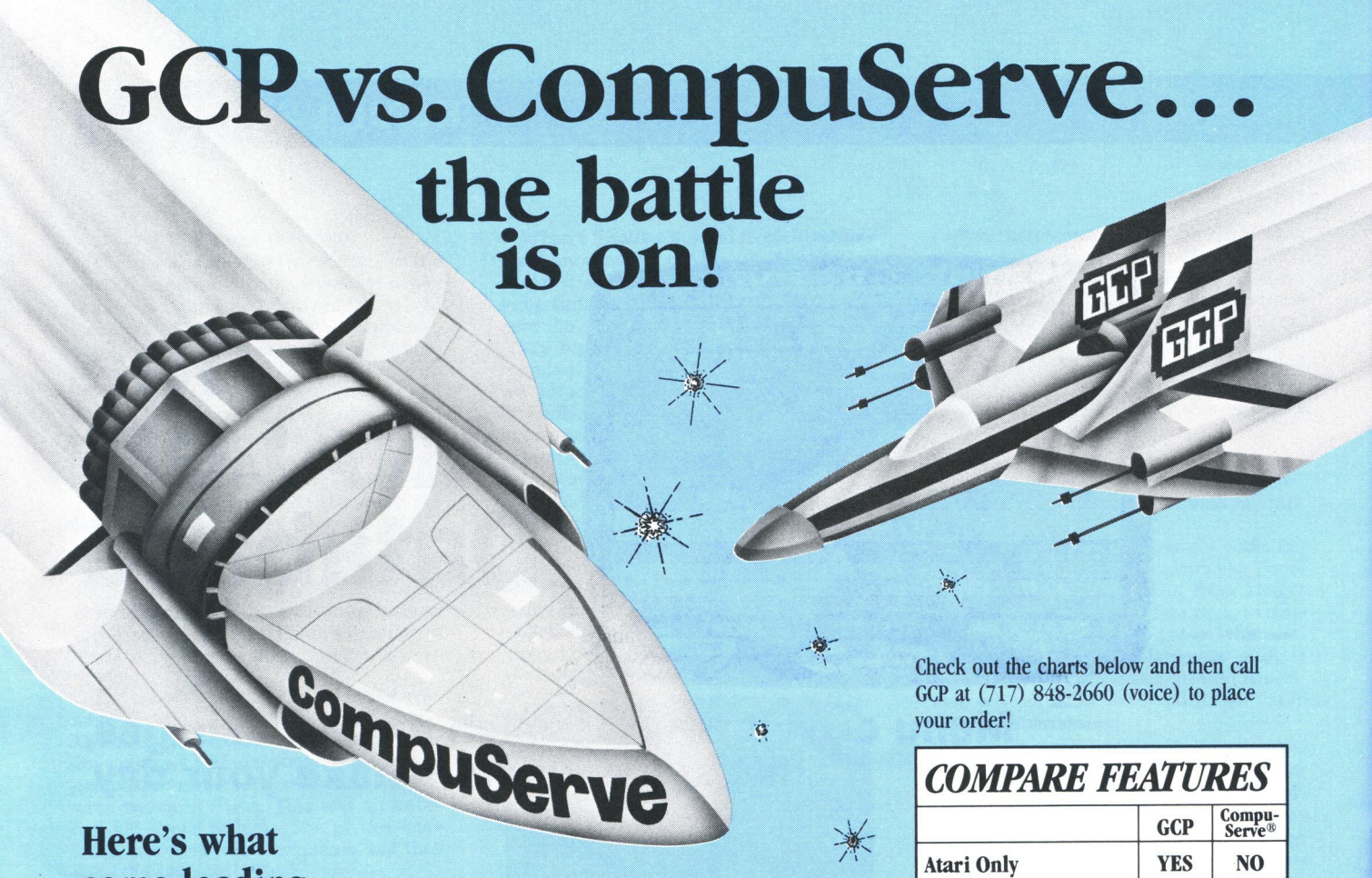
the battle is on!



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CIRCLE #170 ON READER SERVICE CARD

puter's memory. To continue to edit your data, you must reload the file. After the save is completed, you're again returned to the main menu.

If the save was no good, an error is generated and you're sent back to the main menu. Your data is *not* erased if an error occurs. You may continue to edit your file.

The RENAME option.

This allows you to change the name of the data file in memory. You're prompted for a new name, then the file's renamed. Make sure you have your data disk in the drive at this time, since **ADB** also renames the disk file.

The DELETE option.

Selecting DELETE allows you to erase data files from your disk. You're asked for a filename to delete, then the file is removed from the disk. Once you delete a data file, it's lost forever—please be careful. **ADB** does ask if you're sure before it will delete anything. After the file's been deleted, the directory is redisplayed on the screen to show its absence.

The NEW option.

This is the first option you should select when first running **ADB**. It allows you to set up a data file format. The creation process is fully prompted from **ADB** itself, so we'll only briefly cover the process.

First you're asked a filename, then the number of fields each record will have, then the names and lengths of each field. Fields names are, at most, ten characters in length. Once this process finishes, you're asked for the sort order. Respond by typing *A* for ascending (A,B,C. . .), or *D* for descending (Z,Y,X. . .). Now you're asked for the SORT FIELD. This is a very important number to enter, so do it right. The SORT FIELD is the field all your records will be sorted on—please choose carefully. After this, you're finished with the creation process. Not so bad, was it?

Please make sure your choices are made correctly, since, one entered, they're set in stone. You may not alter anything about the record structure after it's created, so plan ahead.

The RECORDS submenu.

This submenu contains all the record manipulation options. The menu reads, *READ, EDIT, ADD, DELETE* and *SEARCH*.

The READ option.

This command allows you to view on-screen the records in memory. When you enter the READ mode, you begin at record one. Table 1 shows the keys and the functions they serve during record reading.

Table 1.

Key	Function
–	Move up 1 record
=	Move down 1 record
A	Jump to first record
Z	Jump to last record
C	Jump to center record
RET	Choose record
ESC	Abort READ

The EDIT option.

This option allows you to modify records entered at an earlier date. The first thing you must do is select a record to edit, by going through the READ process and pressing RETURN when the record you wish to modify is on-screen. You're then asked which field you wish to change; enter the number. Now you're asked for the new field data. Respond with a new string of characters. Once you enter your new data, **ADB** asks if you're certain of the new data, then inserts it into the record. You're then asked if you wish to edit the record any more. If you answer yes, the process will repeat; if not, you're allowed to select another record to edit. To exit the EDITOR, press ESC at any time.

If you alter the field your records are sorted on, the record must be deleted and then reinserted to keep the order of the file. During this process, there may be a half-second pause, so don't worry.

The ADD option.

The ADD routine allows you to enter new records into your file, assuming room exists for them. You'll be prompted to enter data for each of your fields. After this, **ADB** asks if the record is correct. If it is, **ADB** adds it to memory. If the record was in error, you're asked to enter it again from the beginning.

As you add records to your file, **ADB** automatically sorts them in memory. If your file is nearing the maximum number of records allowed, there may be a slight delay during the insert. After a record is inserted into memory, you may enter another.

If you say a record is *not* to be inserted—or you make a mistake and respond with *no*—the words *CORRECTING RECORD* are displayed on the status line, as a reminder that you're correcting a mistake. Under normal circumstances, the status line remains blank.

The DELETE option.

Selecting this allows you to delete records from memory. You choose the records you wish to delete through the READ process, pressing RETURN when the record you wish to delete is on-screen. Then **ADB** asks if you're certain about the delete. If you are, the record is removed from your file. If you don't wish to delete the record, **ADB** allows you to choose another record to delete.

The SEARCH option.

Using SEARCH lets you find all the records in memory that contain some string you wish to find. You're asked what field you wish the search to be on, then what to look for. After you enter these, **ADB** will display each record on the screen and ask if you want to continue searching. If you choose to continue searching, the next record containing your search criterion is displayed. When the end of your file is reached, you're returned to the main menu.

When you enter a search string, you can think of it as being bracketed by wild cards. So, if you want to search for *ET*, it would be found in words like: *PETe, CrikET, ET - the Movie* and *streET*.

The PRINT submenu.

This is the part you've all been waiting for, the output section. **ADB** has two ways to print out data. They are *ALL* and *FIELDS*.

The ALL option.

Selecting ALL from the PRINT submenu allows you to print out all records in your file, as they appear on the **ADB** work screen. Each record is printed to the printer with one field per line, with a blank line printed between records.

Output looks like this:

```
Name:Doug Green
Street:1224 Rose Lane
City:San Francisco
Zip:01239
```

The FIELDS option.

This output option allows you the most freedom in printing out your data. FIELDS produces formatted columns of data, in an order you specify. When you enter FIELDS, you're asked which fields you wish to print out. Simply type the numbers of the fields you want printed and press RETURN. **ADB** now takes control and makes you a beautiful listing. To clarify this option, here are examples.

EXAMPLE 1 — Let's say we defined a record with four fields, *Name, Street, City* and *Zip*. The fields have lengths: 20, 15, 10 and 5, respectively. If you answered *1234* to the *WHAT FIELDS TO PRINT?* prompt, you'd get a listing like this:

Name	Street	City	Zip
John Smith	123 First St.	Miami	00987
Jane Smith	453 Lake St.	Tucson	12456

EXAMPLE 2 — If you typed *213*, you would get this:

Street	Name	City
123 First St.	John Smith	Miami
453 Lake St.	Jane Smith	Tucson

The FIELDS option allows you a great deal of flexibility. You don't have to print each field, and you may repeat fields. However, you can only print as many columns as you have fields in each record. Meaning, if there are six fields per record, the maximum number of columns you can print is six.

There are things the PRINT functions won't do. They won't do page breaks. If you want to skip over the perforation, simply send out the proper control codes to your printer. They won't perform word wraps, either. This isn't a problem when using the ALL option, since each line is less than 42 characters. However, the FIELDS option can generate lines up to 254 characters in length. If your printer can be set for compressed print, it's recommended that you do so before using the FIELDS option.

Program notes.

Here are some tips to help you use **ADB**. First, to exit or abort *any* submenu or command, simply press ESC. You'll be returned to the main menu, to make another selection.

Pressing SYSTEM RESET will return you to DOS—and *destroy* any data in memory.

ADB is compatible with most DOSs with a LOMEM above $2000 (i.e., DOS 2.0, SpartaDOS V2.3 and OSS A+). **ADB** saves your data as a standard DOS file, thus allowing you to manipulate it with your DOS.

ADB doesn't require that the BASIC cartridge be removed to run, however, having the extra 8K around is nice. If you make a file with maximum record length (240 characters) you get 97 records with the cartridge and 131 without it!

If you use a command processor DOS (SpartaDOS, DOS-XL, etc.), you may re-enter **ADB** by typing *RUN 3DA5* from the command processor.

When you're asked *ARE YOU SURE [Y/N]?*, the *Y* key and RETURN indicate a positive response, and the *N* key plus a RETURN indicates a negative response. Only these three keys are accepted responses.

ADB thinks upper- and lowercase characters are the same. This means that the word *HELLO* is the same as *Hello* and *hElLo*. This was done to make record sorting more natural to the user.

Technical notes.

The intro screen was done with graphics modes 8, 2 and 1. The *BBK* was produced using Broderbund's **Print Shop** program. The letters were made using the "screen magic" program, saved to disk, then converted to a DOS file with the **Print Shop File Converter** (from issue 38). From there, the screen data was compacted and added into **ADB**.

The beautifully shaded letters on the screen were done by using the DLI created for **The Clash of Kings** (issue 40). Still looks good, too.

The "twinkles" or small starbursts that appear on the corners of the BBK are simply a player. The player's definition is altered every two jiffies, to produce a stunning effect. I first saw this used on **Seven Cities of Gold** and later on the LucasFilm games. Twinkles seem to be the current rage among intro writers.

ADB also uses a redefined character set, a custom screen and a brand new screen handler written just for this program. All this combines to make **ADB** an attractive, very fast database.

The project was over three years in the making, from simple BASIC versions to the final machine language product. We hope you get a great deal of use from it.

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. This is their second major project for us, as a team.

Listing 1.

```
1000 DATA 255,255,0,36,174,67,0,0,0,0,
0,0,0,0,0,56,4077
1010 DATA 56,56,56,0,56,0,0,102,102,0,
0,0,0,0,0,102,4992
1020 DATA 255,102,102,255,102,0,24,126
,96,126,6,126,24,0,0,102,137
1030 DATA 108,24,48,102,70,0,28,54,28,
56,111,102,59,0,0,28,7188
1040 DATA 28,56,0,0,0,0,0,14,28,24,24,
28,14,0,0,112,4358
1050 DATA 56,24,24,56,112,0,0,102,60,2
```

```
55,60,102,0,0,0,24,8184
1060 DATA 24,126,24,24,0,0,0,0,0,0,0,2
8,28,56,0,0,2988
1070 DATA 0,126,0,0,0,0,0,0,0,0,0,56,5
6,0,0,6,2818
1080 DATA 12,24,48,96,64,0,0,126,102,1
10,118,102,126,0,0,56,70
1090 DATA 120,24,24,24,126,0,0,126,102
,12,24,112,126,0,0,126,9364
1100 DATA 14,24,14,102,126,0,0,108,108
,108,108,126,12,0,0,126,30
1110 DATA 96,124,6,102,124,0,0,124,96,
126,102,102,126,0,0,126,1616
1120 DATA 6,6,6,6,6,0,0,126,102,60,102
,102,126,0,0,126,9736
1130 DATA 102,126,6,6,62,0,0,0,56,56,0
,56,56,0,0,0,4300
1140 DATA 56,56,0,56,56,112,6,12,24,48
,24,12,6,0,0,0,3804
1150 DATA 126,0,0,126,0,0,96,48,24,12,
24,48,96,0,0,126,7276
1160 DATA 102,12,24,0,24,0,0,126,102,1
10,110,96,126,0,0,126,520
1170 DATA 102,102,126,102,102,0,0,126,
102,124,102,102,126,0,0,126,1938
1180 DATA 102,96,96,102,126,0,0,124,10
8,102,102,108,124,0,0,126,1830
1190 DATA 96,124,96,96,126,0,0,126,96,
124,96,96,96,0,0,126,1420
1200 DATA 96,96,110,102,126,0,0,102,10
2,126,102,102,102,0,0,126,1538
1210 DATA 24,24,24,24,126,0,0,6,6,6,6,
102,126,0,0,102,6802
1220 DATA 108,120,120,108,102,0,0,96,9
6,96,96,96,126,0,0,99,892
1230 DATA 119,127,107,99,99,0,0,102,11
8,126,126,110,102,0,0,126,2001
1240 DATA 102,102,102,102,126,0,0,126,
102,102,126,96,96,0,0,126,1638
1250 DATA 102,102,102,108,118,0,0,126,
102,102,126,108,102,0,0,124,1822
1260 DATA 96,126,6,6,126,0,0,126,24,24
,24,24,24,0,0,102,6240
1270 DATA 102,102,102,102,126,0,0,102,
102,102,102,60,24,0,0,99,9412
1280 DATA 99,107,127,119,99,0,0,102,10
2,60,60,102,102,0,0,102,121
1290 DATA 102,126,24,24,24,0,0,126,12,
24,48,96,126,0,0,30,7086
1300 DATA 24,24,24,24,30,0,0,64,96,48,
24,12,6,0,0,120,5952
1310 DATA 24,24,24,24,120,0,0,8,28,54,
99,0,0,0,0,0,4095
1320 DATA 0,0,0,0,0,255,0,0,0,0,0,0,0,
0,0,0,2850
1330 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1330
1340 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
127,96,4781
1350 DATA 96,127,112,112,127,0,0,0,0,0
,0,0,0,0,0,0,3119
1360 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
12,12,1732
1370 DATA 12,60,60,60,60,0,0,0,0,0,0,0
,0,0,0,0,2222
1380 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1380
1390 DATA 0,0,0,0,0,0,0,103,119,127,111,
103,103,103,0,0,0,9024
1400 DATA 0,0,0,0,0,0,0,127,99,99,127,11
2,112,112,0,0,0,9274
1410 DATA 0,0,0,0,0,0,0,126,102,102,127,
115,115,115,0,127,99,2925
1420 DATA 96,127,3,115,127,0,127,28,28
```

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 2
▝ --- ESC CTRL BACK S
▗ --- ESC CTRL INSERT

```
,28,28,28,28,0,0,0,5527
1430 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1430
1440 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1440
1450 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
120,96,4786
1460 DATA 120,96,126,24,30,0,0,24,60,1
26,24,24,24,0,0,24,5636
1470 DATA 24,24,126,60,24,0,0,24,48,12
6,48,24,0,0,0,24,5364
1480 DATA 12,126,12,24,0,0,0,0,0,0,0,0
,0,0,0,0,1876
1490 DATA 62,6,126,102,126,0,0,96,96,1
26,102,102,126,0,0,0,9856
1500 DATA 124,96,96,96,124,0,0,6,6,126
,102,102,126,0,0,0,8454
1510 DATA 126,102,126,96,124,0,0,30,24
,62,24,24,24,0,0,0,5162
1520 DATA 126,102,102,126,6,126,0,96,9
6,126,102,102,102,0,0,24,394
1530 DATA 0,56,24,24,60,0,0,6,0,6,6,6,
6,62,0,96,4838
1540 DATA 96,108,120,108,102,0,0,56,24
,24,24,24,60,0,0,0,5390
1550 DATA 102,127,127,107,99,0,0,0,126
,102,102,102,102,0,0,0,9036
1560 DATA 126,102,102,102,126,0,0,0,12
6,102,102,126,96,96,0,0,614
1570 DATA 126,102,102,102,126,6,6,0,0,126,
102,96,96,96,0,0,0,8386
1580 DATA 126,96,126,6,126,0,0,24,126,
24,24,24,30,0,0,0,5438
1590 DATA 102,102,102,102,102,126,0,0,0,10
2,102,102,60,24,0,0,0,7332
1600 DATA 99,107,127,62,54,0,0,0,102,6
0,24,60,102,0,0,0,6640
1610 DATA 102,102,102,102,126,14,126,0,0,1
26,12,24,48,126,0,0,0,7284
1620 DATA 0,0,0,0,0,0,0,24,24,24,24,24,2
4,24,24,0,0,3636
1630 DATA 0,24,24,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,1750
1640 DATA 0,0,0,0,0,0,0,112,112,32,70,99
,40,2,16,2,0,6157
1650 DATA 2,32,66,0,32,2,2,2,2,2,2,2,2,2
,2,0,2,2286
1660 DATA 2,160,66,239,40,128,2,0,130,
0,130,48,2,0,2,65,8390
1670 DATA 0,40,112,112,112,112,112,112,112
,79,0,96,15,15,15,15,15,8263
1680 DATA 15,15,15,15,15,15,15,15,15,15
,15,15,15,15,15,15,3720
1690 DATA 15,15,15,15,15,15,15,15,15,15
,15,112,240,87,43,42,9679
1700 DATA 112,112,112,70,63,42,65,44,4
0,0,0,33,46,33,44,47,7254
1710 DATA 39,0,0,0,36,33,52,33,34,33,51,
37,0,0,128,230,242,3201
1720 DATA 239,237,154,128,128,162,242,
249,225,238,128,179,227,232,225,240,80
1730 DATA 240,229,236,128,225,238,228,
128,162,225,242,242,249,128,171,239,95
13
1740 DATA 236,226,229,128,128,0,0,0,38
,105,108,101,26,0,128,0,317
1750 DATA 0,0,0,0,0,0,0,128,0,0,0,50,1
01,99,115,26,8214
1760 DATA 0,128,144,144,144,143,144,14
4,144,128,0,0,0,0,0,51,154
1770 DATA 111,114,116,26,0,128,159,179
,163,128,0,0,41,110,100,101,3810
1780 DATA 120,26,0,128,128,128,0,0,50,
3,26,0,128,144,144,144,2782
1790 DATA 128,0,0,0,0,128,179,180,161,
180,181,179,154,0,0,0,4769
1800 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1800
1810 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,12
8,176,178,9090
1820 DATA 175,173,176,180,154,0,0,0,0,
0,0,0,0,0,0,0,4359
1830 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1830
1840 DATA 0,0,0,0,0,128,128,169,174,17
6,181,180,154,0,0,0,4335
1850 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1850
1860 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,12
8,128,165,8212
1870 DATA 178,178,175,178,154,0,0,0,0,
0,0,0,0,0,0,0,4411
1880 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0.
0,0,1880
1890 DATA 0,0,0,0,0,0,0,0,0,128,128,166,
169,172,165,178,128,7440
1900 DATA 128,0,0,0,0,50,37,35,47,50,3
6,51,0,0,0,0,4798
1910 DATA 0,48,50,41,46,52,0,0,0,0,0,0
,0,0,0,0,2862
1920 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1920
1930 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1930
1940 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,1940
1950 DATA 0,0,8,0,0,0,0,0,0,0,8,28,8,0
,0,0,2502
1960 DATA 0,0,8,28,62,28,8,0,0,0,8,8,2
8,62,28,8,4594
1970 DATA 8,0,8,8,8,28,62,28,8,8,8,223
,41,232,41,241,4068
1980 DATA 41,250,41,3,42,12,42,147,126
,110,109,126,80,51,80,52,3139
1990 DATA 80,0,0,0,0,0,0,69,78,84,69,8
2,80,82,73,83,518
2000 DATA 69,83,0,0,0,0,0,0,0,0,0,240,
242,229,243,229,8776
2010 DATA 238,244,243,0,0,0,0,0,0,127,
255,224,0,31,255,248,8455
2020 DATA 0,7,254,7,192,127,255,240,0,
31,255,252,0,7,254,31,8794
2030 DATA 240,63,255,248,0,15,255,254,
0,3,252,60,56,15,3,248,6533
2040 DATA 0,3,192,254,0,0,240,112,24,1
5,1,248,0,3,192,126,4505
2050 DATA 0,0,240,227,24,15,1,248,0,3,
192,126,0,0,240,231,6829
2060 DATA 152,15,1,240,0,3,192,124,0,0
,241,198,24,15,1,224,4707
2070 DATA 0,3,192,120,0,0,241,198,24,1
5,1,192,0,3,192,112,3798
2080 DATA 0,0,255,199,240,15,255,224,0
,3,255,248,0,0,255,243,2032
2090 DATA 224,15,255,240,0,3,255,252,0
,0,255,240,0,15,1,248,7766
2100 DATA 0,3,192,126,0,0,252,240,0,15
,0,252,0,3,192,63,3974
2110 DATA 0,0,248,120,0,15,0,254,0,3,1
92,63,128,0,240,120,5538
2120 DATA 0,15,1,126,0,3,192,95,128,0,
240,188,0,15,2,127,3099
2130 DATA 0,3,192,159,192,0,241,60,0,1
5,4,191,0,3,193,47,2650
2140 DATA 192,0,242,94,0,15,9,63,0,3,1
94,79,192,0,244,158,5887
2150 DATA 0,15,18,63,0,3,196,143,192,0
,249,15,0,15,36,63,1425
2160 DATA 0,3,201,15,192,0,242,15,0,15
,72,63,0,3,210,15,733
2170 DATA 192,0,244,7,128,15,144,63,0,
3,228,15,192,0,248,7,4410
2180 DATA 128,15,32,63,0,3,200,15,192,
0,240,3,192,15,76,63,3482
2190 DATA 0,3,211,15,192,0,240,3,192,1
5,158,62,0,3,231,143,5708
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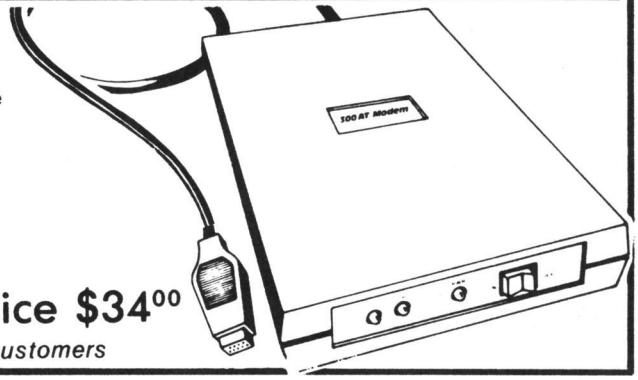

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2200 DATA 128,0,240,1,224,15,24,124,0,
3,198,31,0,3,252,1,1840
2210 DATA 252,15,24,124,0,3,198,31,0,7
,254,1,254,15,31,248,5533
2220 DATA 0,3,199,254,0,7,254,1,254,15
,15,240,0,3,195,252,8147
2230 DATA 0,0,0,0,0,15,3,192,0,3,192,2
40,0,0,0,0,8899
2240 DATA 0,31,0,0,0,7,192,0,0,0,0,0,0
,127,0,0,5466
2250 DATA 0,31,192,0,0,0,0,0,0,62,0,0,
0,15,128,0,5638
2260 DATA 0,0,0,0,0,72,134,201,166,200
,189,60,64,141,10,212,7879
2270 DATA 141,24,208,232,224,4,144,2,1
62,0,134,200,166,201,104,64,9067
2280 DATA 169,0,133,200,133,77,165,66,
208,89,165,128,208,32,173,43,9006
2290 DATA 2,240,8,169,63,133,135,169,6
0,133,136,165,135,198,136,208,2123
2300 DATA 8,160,30,132,136,73,63,133,1
35,164,129,153,72,41,160,7,6001
2310 DATA 169,128,153,169,40,136,16,25
0,160,0,165,142,240,37,185,144,674
2320 DATA 64,201,46,240,9,24,105,96,15
3,169,40,200,208,240,169,161,2658
2330 DATA 172,37,69,240,2,169,164,141,
208,40,173,38,69,24,105,144,6786
2340 DATA 141,222,40,160,3,185,196,2,1
53,22,208,136,16,247,76,95,8041
2350 DATA 228,160,7,185,167,0,72,136,1
6,249,165,142,240,69,169,0,8860
2360 DATA 133,172,165,181,133,171,32,5
1,50,160,2,185,64,64,24,105,4439
2370 DATA 96,153,231,40,136,16,244,173
,187,68,133,171,32,51,50,160,7811
2380 DATA 2,185,64,64,24,105,96,153,18
8,40,136,16,244,173,188,68,9128
2390 DATA 133,171,32,51,50,160,2,185,6
4,64,24,105,96,153,192,40,5519
2400 DATA 136,16,244,160,0,104,153,167
,0,200,192,8,208,247,76,98,49
2410 DATA 228,134,145,132,146,96,132,1
46,160,0,132,145,96,133,143,132,9266
2420 DATA 144,165,146,10,168,185,180,6
6,24,101,145,133,147,185,181,66,9799
2430 DATA 105,0,133,148,169,40,56,229,
145,133,137,166,145,160,0,177,9926
2440 DATA 143,240,19,201,155,240,15,32
,89,46,145,147,232,224,40,240,1712
2450 DATA 5,200,196,137,208,233,230,14
6,96,185,180,66,133,147,185,181,4151
2460 DATA 66,133,148,192,24,144,4,160,
30,208,2,160,39,169,0,145,5781
2470 DATA 147,136,16,251,96,132,137,16
9,0,133,129,133,128,32,78,46,5887
2480 DATA 32,67,46,32,218,45,201,27,20
8,7,230,128,32,78,46,56,4997
2490 DATA 96,160,3,217,67,64,240,21,13
6,16,248,201,123,176,228,201,3573
2500 DATA 97,176,10,201,32,144,220,201
,96,144,2,176,214,201,126,208,3207
2510 DATA 33,198,129,16,4,169,0,133,12
9,32,196,45,165,129,240,195,336
2520 DATA 164,129,196,137,208,1,136,16
9,0,153,72,41,153,73,41,76,5084
2530 DATA 61,45,201,156,240,161,164,12
9,153,0,6,201,155,240,26,32,8386
2540 DATA 89,46,196,137,208,1,136,153,
72,41,196,137,144,2,136,136,8053
2550 DATA 200,132,129,32,196,45,76,61,
45,173,0,6,201,155,208,3,5957
2560 DATA 76,49,45,230,128,32,78,46,24
,96,165,129,208,6,141,72,6129
2570 DATA 41,141,73,41,96,201,97,144,6
,201,123,176,2,41,223,96,7803
2580 DATA 173,252,2,201,255,240,249,16
2,255,142,252,2,133,130,168,192,5473
2590 DATA 192,144,2,160,154,177,121,13
3,131,160,127,140,31,208,162,8,9188
2600 DATA 202,208,253,136,16,245,201,1
28,240,214,201,129,240,210,201,130,771
6
2610 DATA 208,9,165,132,73,64,133,132,
76,218,45,201,131,208,6,169,9775
2620 DATA 64,133,132,208,187,201,132,2
40,183,201,133,240,179,165,130,201,696
6
2630 DATA 64,176,19,165,131,201,97,144
,13,201,123,176,9,165,132,240,1294
2640 DATA 5,5,130,76,232,45,165,131,96
,169,32,160,0,153,0,6,4046
2650 DATA 200,208,250,96,169,0,160,30,
153,72,41,136,16,250,96,32,6445
2660 DATA 107,46,29,81,64,166,138,96,3
2,107,46,29,85,64,166,138,5231
2670 DATA 96,72,42,42,42,42,41,3,134,1
38,170,104,41,159,96,160,6440
2680 DATA 0,152,153,0,32,153,0,33,200,
208,247,160,79,185,81,66,9190
2690 DATA 153,144,33,136,16,247,96,165
,142,208,3,76,212,47,32,102,7157
2700 DATA 48,48,9,32,185,50,169,0,133,
142,240,3,32,61,48,32,3202
2710 DATA 51,48,76,41,62,165,142,240,4
6,160,12,32,208,44,160,24,6097
2720 DATA 32,19,45,169,61,160,66,32,21
5,44,32,167,47,240,8,198,7574
2730 DATA 142,32,185,50,76,225,46,160,
24,32,19,45,32,102,48,16,1128
2740 DATA 6,32,61,48,76,41,62,160,24,3
2,19,45,32,82,49,32,9621
2750 DATA 227,47,176,25,32,35,48,32,11
8,48,48,10,169,1,133,142,3329
2760 DATA 32,207,52,76,7,47,32,61,48,1
69,0,133,142,32,51,48,2240
2770 DATA 76,41,62,32,82,49,32,227,47,
176,40,32,167,47,208,35,5502
2780 DATA 160,0,185,0,6,153,130,6,201,
155,240,3,200,208,243,169,3297
2790 DATA 68,141,128,6,169,58,141,129,
6,169,33,32,138,47,16,6,2039
2800 DATA 32,61,48,76,41,62,32,82,49,7
6,41,62,165,142,208,3,4556
2810 DATA 76,212,47,32,167,47,208,53,3
2,227,47,144,3,76,41,62,4089
2820 DATA 160,0,185,142,64,201,155,240
,6,153,128,6,200,208,243,169,3559
2830 DATA 44,153,128,6,200,162,0,189,0
,6,153,128,6,157,144,64,5811
2840 DATA 201,155,240,4,200,232,208,23
9,169,32,32,138,47,76,41,62,6978
2850 DATA 72,32,51,48,104,162,16,157,6
6,3,169,128,157,68,3,169,5952
2860 DATA 6,157,69,3,32,86,228,16,3,32
,61,48,96,160,26,32,1783
2870 DATA 19,45,160,13,32,208,44,169,1
57,160,64,32,215,44,32,218,8059
2880 DATA 45,32,207,45,201,155,240,10,
201,89,240,6,201,78,208,238,3529
2890 DATA 201,0,8,160,26,32,19,45,40,9
6,160,12,32,208,44,169,4486
2900 DATA 178,160,64,32,215,44,76,41,6
2,160,26,32,19,45,160,13,2230
2910 DATA 32,208,44,169,124,160,67,32,
215,44,160,8,32,47,45,144,4755
2920 DATA 1,96,160,255,200,185,0,6,201
,46,240,4,201,155,208,14,9855
2930 DATA 162,4,189,129,64,153,0,6,200
,202,16,246,48,9,32,207,6959
2940 DATA 45,153,0,6,76,254,47,24,96,1
60,0,185,0,6,153,144,5107
2950 DATA 64,201,155,240,3,200,208,243
,96,162,16,169,12,157,66,3,7536
2960 DATA 76,86,228,132,149,32,51,48,1
60,11,165,149,217,220,66,240,1982
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2970 DATA 4,136,16,248,96,152,10,168,1
85,232,66,72,185,233,66,168,2012
2980 DATA 104,162,0,134,145,162,14,134
,146,76,215,44,160,12,32,208,7834
2990 DATA 44,169,228,160,64,32,215,44,
160,1,208,14,160,12,32,208,7027
3000 DATA 44,169,243,160,64,32,215,44,
160,0,132,149,32,51,48,164,6274
3010 DATA 149,185,125,64,162,16,157,74
,3,169,0,157,75,3,169,3,3958
3020 DATA 157,66,3,169,142,157,68,3,16
9,64,157,69,3,32,86,228,6287
3030 DATA 16,1,96,162,16,164,149,185,1
27,64,157,66,3,169,184,157,9550
3040 DATA 68,3,169,68,157,69,3,169,113
,157,72,3,169,0,157,73,5600
3050 DATA 3,32,86,228,16,1,96,32,251,4
8,162,16,165,150,157,72,7766
3060 DATA 3,165,151,157,73,3,169,41,15
7,68,3,169,69,157,69,3,4700
3070 DATA 32,86,228,16,1,96,32,51,48,8
,160,24,32,19,45,40,9792
3080 DATA 96,169,0,133,150,133,151,172
,187,68,240,15,165,150,24,109,9559
3090 DATA 186,68,133,150,144,2,230,151
,136,208,241,96,173,0,6,56,8303
3100 DATA 233,48,201,0,144,40,201,10,1
76,36,168,173,1,6,201,155,7939
3110 DATA 240,30,185,210,66,133,159,17
3,1,6,56,233,48,201,0,144,7653
3120 DATA 13,201,10,176,9,24,101,159,1
33,159,240,2,24,96,56,96,5920
3130 DATA 192,0,240,250,132,159,24,96,
32,51,48,169,0,133,188,133,7756
3140 DATA 149,169,1,133,185,169,32,133
,186,32,121,46,162,16,169,3,6179
3150 DATA 157,66,3,169,6,157,74,3,169,
134,157,68,3,169,64,157,6919
3160 DATA 69,3,169,0,157,75,3,32,86,22
8,16,6,32,61,48,76,1762
3170 DATA 41,62,162,16,169,5,157,66,3,
169,20,157,72,3,169,0,3721
3180 DATA 157,73,3,169,0,157,68,3,169,
6,157,69,3,162,16,32,2805
3190 DATA 86,228,48,216,173,0,6,201,48
,144,7,201,58,176,3,76,6095
3200 DATA 51,48,160,0,185,2,6,201,32,2
40,5,200,192,8,208,244,1189
3210 DATA 169,155,153,2,6,160,0,185,2,
6,201,155,240,8,32,89,5911
3220 DATA 46,145,185,200,208,241,165,1
85,24,105,13,133,185,165,186,105,2222
3230 DATA 0,133,186,230,188,230,149,16
5,149,201,3,208,10,169,0,133,161
3240 DATA 149,230,185,208,2,230,186,16
5,188,201,30,208,160,76,51,48,453
3250 DATA 169,0,133,167,133,168,133,16
9,133,170,165,171,133,173,165,172,4584
3260 DATA 133,174,248,160,16,6,173,38,
174,162,3,181,167,117,167,149,845
3270 DATA 167,202,208,247,136,208,238,
216,96,32,10,50,165,169,41,15,8035
3280 DATA 141,64,64,165,170,72,41,15,1
41,66,64,104,41,240,74,74,6158
3290 DATA 74,74,141,65,64,160,2,185,64
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3300 DATA 136,16,244,96,169,1,133,178,
165,178,24,105,48,141,205,64,9276
3310 DATA 160,26,32,19,45,160,13,32,20
8,44,169,3,160,65,32,215,6343
3320 DATA 44,198,146,169,15,133,145,16
9,196,160,64,32,215,44,164,178,1285
3330 DATA 185,188,68,72,185,196,68,133
,145,230,145,104,168,32,47,45,8529
3340 DATA 144,1,96,165,178,32,159,53,1
64,178,136,132,146,169,0,160,213
3350 DATA 6,32,215,44,230,178,165,178,
205,185,68,144,171,24,96,165,1848
3360 DATA 161,133,185,165,162,133,186,
165,106,56,229,162,170,169,0,168,2473
3370 DATA 145,185,200,208,251,230,186,
202,208,246,145,185,96,32,51,48,2246
3380 DATA 162,16,169,3,157,66,3,169,16
1,157,68,3,169,66,157,69,7030
3390 DATA 3,169,8,157,74,3,169,0,157,7
5,3,32,86,228,16,6,3180
3400 DATA 32,61,48,76,41,62,96,162,16,
169,9,157,66,3,169,184,6743
3410 DATA 157,68,3,169,67,157,69,3,169
,0,157,72,3,169,1,157,5216
3420 DATA 73,3,32,86,228,48,217,96,169
,205,133,155,169,68,133,156,2188
3430 DATA 165,142,240,15,32,102,48,16,
6,32,61,48,76,41,62,169,2712
3440 DATA 0,133,142,32,227,47,176,114,
32,35,48,160,13,32,208,44,5348
3450 DATA 169,209,160,64,32,215,44,169
,0,141,184,68,141,185,68,141,9832
3460 DATA 29,69,141,187,68,141,188,68,
141,186,68,141,37,69,141,39,7599
3470 DATA 69,160,1,32,47,45,144,3,76,4
1,62,173,0,6,141,78,2826
3480 DATA 65,56,233,48,240,197,201,9,1
76,193,133,154,160,13,32,208,1304
3490 DATA 44,160,26,32,19,45,173,184,6
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3500 DATA 28,160,65,32,215,44,198,146,
169,8,133,145,169,196,160,64,1233
3510 DATA 32,215,44,160,10,32,47,45,14
4,3,76,41,62,160,24,32,2247
3520 DATA 19,45,160,12,32,208,44,169,0
,160,6,32,215,44,32,167,5838
3530 DATA 47,208,185,160,9,185,0,6,145
,155,136,16,248,172,184,68,414
3540 DATA 165,129,153,197,68,160,26,32
,19,45,160,13,32,208,44,169,6177
3550 DATA 18,160,65,32,215,44,198,146,
169,10,133,145,169,196,160,64,1293
3560 DATA 32,215,44,160,2,32,47,45,176
,176,32,22,49,176,244,165,9046
3570 DATA 159,201,31,176,238,172,184,6
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3580 DATA 32,19,45,32,207,52,165,155,2
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3590 DATA 0,133,156,173,184,68,197,154
,240,3,76,134,51,168,136,185,1604
3600 DATA 189,68,24,109,186,68,141,186
,68,136,16,243,160,13,32,208,9380
3610 DATA 44,169,36,160,65,32,215,44,3
2,218,45,41,223,41,127,201,9163
3620 DATA 68,208,5,238,37,69,208,4,201
,65,208,236,160,26,32,19,7965
3630 DATA 45,173,76,65,205,78,65,240,3
6,160,13,32,208,44,169,63,7691
3640 DATA 160,65,32,215,44,160,1,32,47
,45,176,249,173,0,6,205,7745
3650 DATA 76,65,144,241,205,78,65,144,
4,240,2,208,232,56,233,48,1369
3660 DATA 141,38,69,169,1,133,142,32,1
20,53,174,184,68,232,142,185,1767
3670 DATA 68,173,186,68,172,184,68,136
,56,249,189,68,153,29,69,136,9937
3680 DATA 16,246,172,38,69,185,28,69,1
41,39,69,24,121,188,68,141,7246
3690 DATA 40,69,76,41,62,32,121,46,169
,0,133,145,133,146,133,160,9029
3700 DATA 169,205,133,157,169,68,133,1
58,32,67,46,160,49,169,95,153,9014
3710 DATA 0,6,136,16,250,200,177,157,2
01,155,240,10,9,128,153,0,9462
3720 DATA 6,200,192,10,208,240,169,58,
153,0,6,164,160,185,197,68,993
3730 DATA 24,121,189,68,168,169,155,15
3,1,6,169,0,160,6,32,215,7010
3740 DATA 44,165,157,24,105,10,133,157
,144,2,230,158,230,160,165,160,3460
3750 DATA 205,184,68,208,179,96,160,0,
152,72,132,146,185,197,68,170,2145
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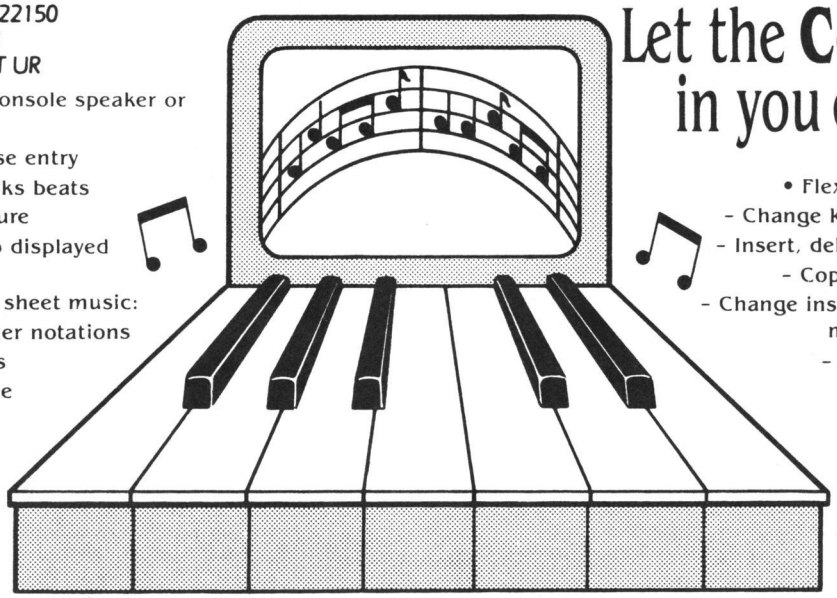

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3760 DATA 232,134,145,169,0,24,121,29,
69,133,165,169,34,105,0,133,6428
3770 DATA 166,185,189,68,133,199,32,37
,59,160,0,177,165,201,155,240,2903
3780 DATA 8,153,184,67,200,196,199,208
,242,169,155,153,185,67,169,184,6378
3790 DATA 160,67,32,215,44,104,168,200
,204,184,68,208,187,96,169,0,1890
3800 DATA 170,56,229,161,133,152,165,1
06,229,162,133,153,165,152,56,237,4878
3810 DATA 186,68,133,152,165,153,233,0
,133,153,48,5,232,224,255,208,5133
3820 DATA 235,142,188,68,96,72,201,1,2
08,9,160,0,152,153,0,34,5886
3830 DATA 200,208,250,104,168,185,188,
68,72,185,28,69,168,104,133,165,1331
3840 DATA 162,0,189,0,6,201,155,240,9,
153,0,34,200,232,228,165,2737
3850 DATA 208,240,96,169,0,133,184,165
,161,133,182,165,162,133,183,230,6062
3860 DATA 184,165,184,197,181,240,14,1
65,182,24,109,186,68,133,182,144,2566
3870 DATA 238,230,183,208,234,160,0,17
7,182,153,0,34,200,204,186,68,2405
3880 DATA 208,245,96,32,69,54,162,1,17
3,187,68,133,163,208,1,96,9158
3890 DATA 172,39,69,173,37,69,208,9,32
,78,54,144,26,240,11,176,7235
3900 DATA 15,32,78,54,144,10,240,2,176
,13,200,204,40,69,208,227,1505
3910 DATA 232,228,163,240,3,144,1,96,3
2,56,54,76,10,54,165,185,6376
3920 DATA 24,109,186,68,133,185,144,2,
230,186,96,165,161,133,185,165,4127
3930 DATA 162,133,186,96,177,185,32,20
7,45,133,188,185,0,34,32,207,9466
3940 DATA 45,197,188,96,32,253,53,134,
164,134,196,165,181,133,149,160,4410
3950 DATA 0,185,0,34,153,0,35,200,208,
247,32,69,54,173,187,68,9605
3960 DATA 208,6,238,187,68,76,207,54,1
33,181,32,205,53,165,182,133,1995
3970 DATA 185,165,183,133,186,173,187,
68,56,229,164,133,189,230,189,238,7901
3980 DATA 187,68,165,164,205,187,68,14
4,6,32,56,54,76,207,54,165,8203
3990 DATA 185,24,109,186,68,133,190,16
5,186,105,0,133,191,32,225,54,572
4000 DATA 198,189,240,17,165,185,56,23
7,186,68,133,185,165,186,233,0,3868
4010 DATA 133,186,76,169,54,160,0,185,
0,35,145,185,200,204,186,68,1628
4020 DATA 208,245,165,149,133,181,96,1
60,0,177,185,145,190,200,204,186,6363
4030 DATA 68,208,246,96,166,181,173,18
7,68,240,6,134,188,197,188,176,5783
4040 DATA 1,96,165,182,133,190,165,183
,133,191,173,187,68,197,181,208,6819
4050 DATA 18,166,190,134,185,166,191,1
34,186,201,1,240,32,32,56,54,8979
4060 DATA 76,55,55,24,165,190,109,186,
68,133,185,165,191,105,0,133,761
4070 DATA 186,32,225,54,230,188,166,18
8,236,187,68,208,15,169,0,168,2642
4080 DATA 145,185,200,204,186,68,208,2
48,206,187,68,96,165,185,133,190,6183
4090 DATA 165,186,133,191,76,29,55,32,
176,55,76,41,62,160,24,32,4365
4100 DATA 19,45,173,187,68,205,188,68,
208,25,160,24,32,19,45,160,6993
4110 DATA 12,32,208,44,169,82,160,65,3
2,215,44,160,24,32,19,45,4570
4120 DATA 76,41,62,32,207,52,32,94,50,
176,240,160,12,32,208,44,8113
4130 DATA 169,108,160,65,32,215,44,32,
167,47,240,15,160,12,32,208,8118
4140 DATA 44,169,43,160,66,32,215,44,7
6,125,55,160,24,32,19,45,3894
4150 DATA 32,94,54,76,87,55,169,1,133,
175,173,187,68,240,76,165,1910
4160 DATA 175,133,181,32,205,53,32,210
,52,32,48,53,162,255,142,252,2309
4170 DATA 2,173,252,2,201,255,240,249,
201,12,208,7,162,255,142,252,7628
4180 DATA 2,24,96,201,15,208,11,198,17
5,208,25,173,187,68,133,175,2490
4190 DATA 208,18,201,14,208,17,230,175
,165,175,205,187,68,144,192,240,6599
4200 DATA 190,76,176,55,76,185,55,201,
28,208,7,162,255,142,252,2,2241
4210 DATA 56,96,201,63,208,3,76,176,55
,201,23,208,10,173,187,68,10
4220 DATA 240,148,133,175,76,185,55,20
1,18,208,161,173,187,68,74,240,3760
4230 DATA 133,133,175,208,138,160,24,3
2,19,45,32,176,55,176,22,160,7214
4240 DATA 12,32,208,44,160,24,32,19,45
,169,94,160,65,32,215,44,6707
4250 DATA 32,167,47,240,8,160,24,32,19
,45,76,41,62,32,238,54,4778
4260 DATA 173,187,68,240,240,208,206,1
73,187,68,240,36,160,26,32,19,9908
4270 DATA 45,32,207,52,173,184,68,24,1
05,48,141,142,65,160,13,32,6317
4280 DATA 208,44,169,123,160,65,32,215
,44,160,1,32,47,45,144,13,4709
4290 DATA 160,24,32,19,45,160,26,32,19
,45,76,41,62,173,0,6,1566
4300 DATA 205,142,65,240,6,176,192,201
,48,240,188,56,233,48,133,192,4322
4310 DATA 160,26,32,19,45,160,13,32,20
8,44,169,146,160,65,32,215,9059
4320 DATA 44,164,192,185,188,68,168,32
,47,45,176,196,160,0,132,181,905
4330 DATA 185,0,6,201,155,240,9,32,207
,45,153,0,35,200,208,240,2082
4340 DATA 132,193,164,192,185,28,69,13
3,194,204,184,68,208,7,173,186,3757
4350 DATA 68,133,195,208,5,185,29,69,1
33,195,164,181,200,204,187,68,4463
4360 DATA 240,5,144,3,76,138,56,132,18
1,32,205,53,32,52,57,176,7365
4370 DATA 233,32,210,52,32,48,53,160,1
2,32,208,44,169,163,160,65,8767
4380 DATA 32,215,44,169,176,160,65,32,
215,44,32,184,47,208,8,160,9339
4390 DATA 24,32,19,45,76,244,56,76,138
,56,169,255,24,101,194,133,1044
4400 DATA 143,169,33,105,0,133,144,166
,194,202,232,228,195,240,25,230,7538
4410 DATA 143,208,2,230,144,160,0,177,
143,32,207,45,217,0,35,208,89
4420 DATA 233,200,196,193,208,241,24,9
6,56,96,173,184,68,24,105,48,8973
4430 DATA 141,219,65,32,176,55,144,3,7
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4440 DATA 183,133,198,160,26,32,19,45,
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4450 DATA 65,32,215,44,160,1,32,47,45,
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4460 DATA 240,217,56,233,48,205,185,68
,176,209,133,192,168,185,28,69,3282
4470 DATA 133,194,192,8,208,5,173,186,
68,208,3,185,29,69,133,195,771
4480 DATA 160,26,32,19,45,165,192,168,
24,105,48,141,205,64,160,13,8422
4490 DATA 32,208,44,169,3,160,65,32,21
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4500 DATA 169,196,160,64,32,215,44,164
,192,185,188,68,168,32,47,45,9386
4510 DATA 176,134,160,24,32,19,45,160,
12,32,208,44,169,0,160,6,5336
4520 DATA 32,215,44,160,26,32,19,45,16
9,223,160,65,32,215,44,32,7458
4530 DATA 184,47,208,172,165,192,205,3
8,69,208,34,165,197,133,182,165,4684
4540 DATA 198,133,183,32,238,54,32,110
,58,32,94,54,165,196,133,181,603
```

```
4550 DATA 160,0,185,0,35,153,0,34,200,
208,247,240,16,32,110,58,9341
4560 DATA 160,0,185,0,34,145,197,200,2
04,186,68,208,245,32,207,52,3804
4570 DATA 32,48,53,160,24,32,19,45,160
,26,32,19,45,160,13,32,2114
4580 DATA 208,44,169,247,160,65,32,215
,44,32,184,47,208,3,76,117,8567
4590 DATA 57,76,109,57,164,194,169,0,1
53,0,34,200,196,195,208,248,5038
4600 DATA 170,164,194,189,0,6,201,155,
240,9,153,0,34,232,200,196,2878
4610 DATA 195,208,240,96,173,184,68,24
,105,48,141,39,66,160,26,32,6406
4620 DATA 19,45,160,13,32,208,44,169,2
0,160,66,32,215,44,172,184,154
4630 DATA 68,32,47,45,144,11,160,26,32
,19,45,32,51,48,76,41,1685
4640 DATA 62,162,0,142,175,67,189,0,6,
201,155,240,38,56,233,49,400
4650 DATA 48,228,205,184,68,176,223,15
7,0,6,168,185,189,68,217,197,4662
4660 DATA 68,176,3,185,197,68,24,125,1
75,67,24,105,2,157,176,67,8095
4670 DATA 232,208,211,32,215,50,32,48,
59,169,0,133,181,164,181,200,2443
4680 DATA 240,180,204,187,68,240,2,176
,173,132,181,32,205,53,32,37,9573
4690 DATA 59,160,0,132,188,32,133,59,1
64,188,200,185,0,6,201,155,1487
4700 DATA 208,241,32,176,59,32,1,51,76
,247,58,169,32,160,0,153,8016
4710 DATA 184,67,200,208,250,96,32,37,
59,160,0,185,175,67,170,185,1880
4720 DATA 0,6,201,155,240,36,132,188,1
0,168,185,164,66,133,143,185,3397
4730 DATA 165,66,133,144,160,0,177,143
,201,155,240,9,157,184,67,232,4626
4740 DATA 200,192,10,208,241,164,188,2
00,208,209,32,176,59,32,1,51,9763
4750 DATA 160,0,185,184,67,201,155,240
,12,201,32,240,5,169,45,153,1651
4760 DATA 184,67,200,208,237,32,1,51,7
6,69,60,185,175,67,170,185,1279
4770 DATA 0,6,168,185,189,68,133,195,1
85,29,69,24,105,0,133,143,8520
4780 DATA 169,34,105,0,133,144,160,0,1
77,143,240,9,157,184,67,232,3086
4790 DATA 200,196,195,208,243,96,160,2
55,185,184,67,201,32,208,3,136,3953
4800 DATA 208,246,169,155,153,185,67,9
6,32,215,50,169,0,133,181,164,1956
4810 DATA 181,200,192,0,240,7,204,187,
68,240,8,144,6,32,51,48,7020
4820 DATA 76,41,62,132,181,32,205,53,1
60,0,204,184,68,240,86,132,2186
4830 DATA 188,152,10,170,189,164,66,13
3,143,189,165,66,133,144,32,37,88
4840 DATA 59,160,0,177,143,201,155,240
,8,153,184,67,200,192,10,208,4049
4850 DATA 242,169,58,153,184,67,152,17
0,232,164,188,185,30,69,192,8,2342
4860 DATA 208,3,173,186,68,133,195,185
,29,69,168,185,0,34,240,9,9559
4870 DATA 157,184,67,232,200,196,195,2
08,242,32,176,59,32,1,51,164,690
4880 DATA 188,200,76,228,59,32,69,60,7
6,201,59,169,155,141,184,67,1250
4890 DATA 76,1,51,169,44,141,48,2,169,
40,141,49,2,169,90,141,7273
4900 DATA 0,2,169,61,141,1,2,169,38,14
1,244,2,169,4,141,4,6624
4910 DATA 212,169,0,141,7,212,141,47,2
,32,137,61,141,198,2,141,8162
4920 DATA 200,2,133,152,141,10,208,169
,3,141,29,208,169,1,141,111,58
4930 DATA 2,169,15,141,194,2,141,197,2
,169,100,141,199,2,169,192,2146
4940 DATA 141,14,212,169,83,133,182,16
9,42,133,183,169,14,133,147,169,2962
4950 DATA 96,133,148,162,0,160,0,177,1
82,145,147,200,192,12,208,247,5621
4960 DATA 165,182,24,105,12,133,182,16
5,183,105,0,133,183,165,147,24,1004
4970 DATA 105,40,133,147,144,2,230,148
,232,224,33,208,216,169,62,141,5215
4980 DATA 47,2,169,0,133,188,133,149,1
66,188,189,33,42,141,2,208,1181
4990 DATA 189,38,42,133,184,32,46,61,2
30,149,165,149,201,6,208,245,4735
5000 DATA 198,149,32,46,61,198,149,16,
249,169,0,133,149,230,188,165,4584
5010 DATA 188,201,5,208,211,230,152,16
5,152,201,2,208,197,169,0,141,4345
5020 DATA 2,208,141,29,208,162,65,32,7
6,61,202,16,250,169,64,141,1240
5030 DATA 14,212,208,91,165,149,10,170
,189,21,42,141,67,61,189,22,8582
5040 DATA 42,141,68,61,162,8,164,184,1
89,255,255,153,0,6,200,202,4498
5050 DATA 16,246,160,2,169,0,133,20,16
5,20,240,252,136,16,245,96,2534
5060 DATA 72,138,72,169,144,133,139,16
2,7,165,139,141,23,208,141,10,507
5070 DATA 212,24,105,2,133,139,202,16,
240,162,7,165,139,56,233,2,649
5080 DATA 141,10,212,141,23,208,133,13
9,202,16,240,104,170,104,64,160,2899
5090 DATA 0,152,153,0,96,153,0,97,153,
0,98,153,0,99,153,0,5999
5100 DATA 100,153,0,101,153,0,6,200,20
8,232,96,32,77,60,32,121,8206
5110 DATA 46,169,10,141,197,2,169,36,1
41,244,2,169,0,141,48,2,7041
5120 DATA 169,40,141,49,2,169,63,133,1
35,169,1,133,128,169,0,133,9187
5130 DATA 181,141,200,2,133,134,133,14
2,133,133,133,202,133,203,133,204,5981
5140 DATA 133,132,162,112,157,184,68,2
02,16,250,169,4,141,198,2,169,2342
5150 DATA 134,141,196,2,169,223,141,0,
2,169,43,141,1,2,169,6,5877
5160 DATA 160,250,162,43,32,92,228,169
,7,160,107,162,44,32,92,228,970
5170 DATA 169,192,141,14,212,169,41,13
3,161,169,69,133,162,32,185,50,1250
5180 DATA 165,121,5,122,208,6,169,254,
133,121,133,122,76,96,62,162,1569
5190 DATA 255,154,162,39,169,0,157,183
,41,202,16,250,160,26,32,19,8596
5200 DATA 45,32,218,45,201,155,240,66,
201,43,208,10,198,134,16,22,9975
5210 DATA 169,2,133,134,208,16,201,42,
208,213,230,134,165,134,201,3,4421
5220 DATA 144,4,169,0,133,134,164,134,
185,71,64,168,162,39,189,143,2438
5230 DATA 41,41,127,157,143,41,202,16,
245,162,8,185,143,41,9,128,9614
5240 DATA 153,143,41,200,202,16,244,76
,41,62,165,134,10,168,185,89,1117
5250 DATA 64,133,139,185,90,64,133,140
,185,95,64,141,198,62,185,96,2386
5260 DATA 64,141,199,62,165,134,240,15
,165,142,240,219,165,134,201,2,5121
5270 DATA 208,5,173,187,68,240,208,160
,39,177,139,153,183,41,136,16,2006
5280 DATA 248,160,24,32,19,45,160,28,3
2,19,45,76,255,255,32,189,31
5290 DATA 63,76,254,62,32,218,45,201,1
55,208,7,32,182,63,10,133,9368
5300 DATA 141,96,201,27,240,55,201,43,
208,10,198,141,16,22,169,4,8582
5310 DATA 133,141,208,16,201,42,208,22
0,230,141,165,141,201,5,144,4,2780
5320 DATA 169,0,133,141,164,141,185,74
,64,168,32,29,63,162,5,185,9083
```

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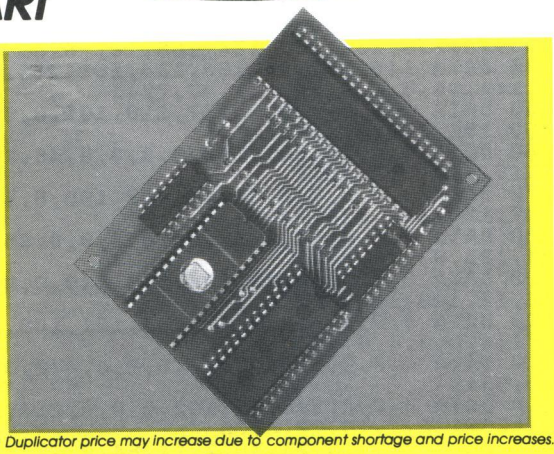

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CIRCLE #143 ON READER SERVICE CARD

```
5330 DATA 183,41,9,128,153,183,41,200,
202,16,244,48,183,32,182,63,1687
5340 DATA 76,41,62,162,39,189,183,41,4
1,127,157,183,41,202,16,245,2353
5350 DATA 96,32,200,62,164,141,185,101
,64,141,61,63,185,102,64,141,589
5360 DATA 62,63,76,255,255,32,200,62,1
64,141,185,111,64,141,81,63,1441
5370 DATA 185,112,64,141,82,63,76,255,
255,32,189,63,76,130,63,32,9610
5380 DATA 218,45,201,155,240,65,201,27
,240,55,201,43,208,10,198,141,3631
5390 DATA 16,22,169,1,133,141,208,16,2
01,42,208,227,230,141,165,141,5992
5400 DATA 201,2,144,4,169,0,133,141,32
,29,63,164,141,185,79,64,8828
5410 DATA 168,162,7,185,183,41,9,128,1
53,183,41,200,202,16,244,48,2247
5420 DATA 190,32,182,63,76,41,62,165,1
41,133,204,10,168,185,121,64,1428
5430 DATA 141,180,63,185,122,64,141,18
1,63,76,255,255,166,134,165,141,6246
5440 DATA 149,202,96,166,134,181,202,1
33,141,96,0,0,0,44,111,97,7241
5450 DATA 100,0,0,0,51,97,118,101,0,0,
0,50,101,110,0,0,1474
5460 DATA 0,0,36,101,108,0,0,0,0,46,10
1,119,0,0,0,0,9511
5470 DATA 0,0,0,0,0,50,101,97,100,0,0,
0,37,100,105,116,3465
5480 DATA 0,0,0,33,100,100,0,0,0,0,36,
101,108,0,0,0,9724
5490 DATA 0,51,114,99,104,0,0,0,0,0,0,
0,0,33,108,108,660
5500 DATA 0,0,0,0,0,0,38,105,101,108,1
00,115,0,0,0,0,1075
5510 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,5510
5520 DATA 0,0,2,146,68,162,0,0,0,124,1
55,156,126,3,15,27,4576
5530 DATA 2,9,16,23,30,2,11,64,0,32,96
,32,64,0,96,196,3609
5540 DATA 63,236,63,20,64,43,63,63,63,
83,63,175,46,145,46,70,6495
5550 DATA 47,13,47,34,51,81,55,100,57,
87,55,47,56,97,56,194,6408
5560 DATA 59,142,58,4,8,7,11,155,66,68
,65,46,68,58,42,46,3095
5570 DATA 65,68,66,155,68,58,32,32,32,
32,32,32,32,46,32,1167
5580 DATA 32,32,155,65,114,101,32,121,
111,117,32,115,117,114,101,32,7814
5590 DATA 91,89,47,78,93,63,32,155,78,
111,32,102,105,108,101,32,6911
5600 DATA 105,110,32,109,101,109,111,1
14,121,155,70,73,69,76,68,32,7083
5610 DATA 35,32,91,110,93,63,155,35,32
,111,102,32,70,73,69,76,5717
5620 DATA 68,83,32,91,49,45,56,93,63,1
55,83,97,118,105,110,103,8461
5630 DATA 32,102,105,108,101,46,46,46,
155,76,111,97,100,105,110,103,8692
5640 DATA 32,102,105,108,101,46,46,46,
155,69,78,84,69,82,32,68,5658
5650 DATA 65,84,65,32,70,79,82,155,76,
69,78,71,84,72,32,79,5772
5660 DATA 70,155,78,65,77,69,32,79,70,
155,91,65,93,115,99,101,8070
5670 DATA 110,100,105,110,103,44,32,91
,68,93,101,115,99,101,110,100,8450
5680 DATA 105,110,103,63,155,73,110,10
0,101,120,32,70,105,101,108,100,8649
5690 DATA 32,91,49,45,110,93,63,155,77
,101,109,111,114,121,32,102,8542
5700 DATA 117,108,108,155,82,69,67,79,
82,68,32,68,69,76,69,84,5828
5710 DATA 69,155,82,69,67,79,82,68,32,
67,79,82,82,69,67,84,5730
5720 DATA 155,83,69,65,82,67,72,32,79,
78,32,70,73,69,76,68,4906
5730 DATA 32,91,49,45,88,93,63,155,83,
69,65,82,67,72,32,70,5565
5740 DATA 79,82,32,87,72,65,84,63,155,
82,69,67,79,82,68,32,5754
5750 DATA 70,79,85,78,68,155,67,79,78,
84,73,78,85,69,32,83,6076
5760 DATA 69,65,82,67,72,32,91,89,47,7
8,93,63,155,69,68,73,6525
5770 DATA 84,32,87,72,73,67,72,32,70,7
3,69,76,68,32,91,49,4506
5780 DATA 45,88,93,63,155,78,69,87,32,
68,65,84,65,32,67,79,5207
5790 DATA 82,82,69,67,84,32,91,89,47,7
8,93,63,155,69,68,73,6623
5800 DATA 84,32,84,72,73,83,32,82,69,6
7,79,82,68,32,77,79,5126
5810 DATA 82,69,32,91,89,47,78,93,63,1
55,70,73,69,76,68,83,6579
5820 DATA 32,84,79,32,80,82,73,78,84,3
2,91,49,45,88,93,63,5297
5830 DATA 155,67,79,82,82,69,67,84,73,
78,71,32,82,69,67,79,5552
5840 DATA 82,68,155,83,65,86,69,32,70,
73,76,69,32,73,78,32,4579
5850 DATA 77,69,77,79,82,89,155,128,22
0,157,181,240,128,242,229,227,205
5860 DATA 239,242,228,128,128,221,157,
164,239,247,238,128,178,229,227,239,36
80
5870 DATA 242,228,128,128,178,165,180,
157,163,232,239,239,243,229,128,128,14
77
5880 DATA 128,161,157,166,233,242,243,
244,128,128,163,157,163,229,238,244,26
43
5890 DATA 229,242,128,128,186,157,172,
225,243,244,128,128,165,179,163,157,95
54
5900 DATA 161,226,239,242,244,128,128,
80,58,155,205,68,215,68,225,68,5075
5910 DATA 235,68,245,68,255,68,9,69,19
,69,0,32,40,32,80,32,3511
5920 DATA 120,32,160,32,200,32,240,32,
24,33,64,33,104,33,144,33,5988
5930 DATA 184,33,248,40,32,41,112,41,0
,10,20,30,40,50,60,70,2522
5940 DATA 80,90,138,139,140,144,146,16
2,163,164,165,167,169,170,0,67,3627
5950 DATA 15,67,26,67,45,67,61,67,79,6
7,89,67,104,67,120,67,6361
5960 DATA 133,67,145,67,160,67,68,69,8
6,73,67,69,32,84,73,77,6148
5970 DATA 69,79,85,84,155,68,69,86,73,
67,69,32,78,65,75,155,7141
5980 DATA 83,69,82,73,65,76,32,70,82,6
5,77,69,32,69,82,82,5291
5990 DATA 79,82,155,87,82,73,84,69,32,
80,82,79,84,69,67,84,6379
6000 DATA 69,68,155,70,85,78,67,84,73,
79,78,32,78,79,84,32,5565
6010 DATA 68,79,78,69,155,68,73,83,75,
32,70,85,76,76,155,70,7386
6020 DATA 65,84,65,76,32,68,65,84,65,3
2,73,47,79,155,70,73,6134
6030 DATA 76,69,32,35,32,77,73,83,77,6
5,84,67,72,155,66,65,6484
6040 DATA 68,32,70,73,76,69,78,65,77,6
9,155,70,73,76,69,32,6022
6050 DATA 76,79,67,75,69,68,155,68,73,
82,69,67,84,79,82,89,7059
6060 DATA 32,70,85,76,76,155,70,73,76,
69,32,78,79,84,32,70,5640
6070 DATA 79,85,78,68,155,224,2,225,2,
165,61,0,0,0,0,0,3097
```

Parrot

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by Bryan Figler

No, **ANALOG Computing** is *not* starting a special column for pet owners. The **Parrot** is a sound digitization hardware/software combo from Alpha Systems. It claims to allow your 8-bit Atari computer to reproduce sounds with quality comparable to synthesizers costing "thousands of dollars." Intrigued by its claims and its cost of a mere $39.95, I sent off for one.

My feelings for the **Parrot** are mixed. I did *want* to love this hardware and its programs, but, nevertheless, the system does have some faults. First, its good points. . .

A demo on the back of the double-sided program disk contains an incredible reproduction of 12 seconds of Michael Jackson's "Thriller." There's also a simple BASIC guess-a-number game that incorporates speech (and shows you how to use the **Parrot**'s supplied subroutines, to read and play saved digitized sounds).

The front side contains copy-protected programs (my Indus GT alerted me to this immediately), which allow you to sample sounds through the **Parrot**'s "digital audio interface." It also has digital sequencing software to let you turn your keyboard into a musical instrument—using up to nine digitized sounds, instead of plain old POKEY beeps.

The sequencer and the sampler, for that matter, are well written and of high quality. Both are as feature laden as memory could allow. Obviously, it takes a lot of 1s and 0s to reproduce sound realistically. This is why the **Parrot** is so memory hungry. At the highest sample rate (about 8000 samples/second), you have about 12 seconds of recording time (which fills a buffer of 30K on a 48K machine). You can decrease the number of samples per second, thereby increasing your record time, but quality drops off considerably. So, all of this sounds pretty good, right? Right?

As I said, the **Parrot** is not without its faults. First, the special "digital audio interface" that I assumed accounted for a major part of the **Parrot**'s cost is nothing more than a modified Atari paddle.

A phono jack on the "interface" allows you to connect practically any sound source into your Atari, from tape recorders to CDs to a plain old microphone. The **Parrot** also comes with a phono-to-phono jumper cable to allow you to connect it to a female plug (nice touch, since few people have such cords lying around).

After fooling around with the sampler for a while, I feared my **Parrot** hardware was DOA. I then discovered that my Radio Shack mike was not picking up enough for the **Parrot** to notice. By talking loudly or cupping my hand around the mike, I was able to get *some* things to record, but the quality was far from that of "Thriller." I blamed this on my cheap mike and borrowed a friend's $40.00 microphone, to try for better results. The $40.00 model simply wouldn't pick up anything!

Interfacing with a plain old cassette player (portable) wasn't much easier. The player constantly caused static which was unremovable, even with the fine control knob. I even tried the **Parrot** with a $200.00 Sony player, with no noticeable improvement. The overall quality I observed: sounds that were identifiable, but far from the expectations derived from the demo.

After I'd booted the "Thriller" demo for my mom, she was impressed (at first, she thought it was a joke and searched for a hidden tape player), but then asked the eternal question: "But what can you *do* with this thing?"

Good point. I had dreams of using the **Parrot** as a cheap peripheral that would let me sit back and read off the data for **ANALOG Computing**'s excellent machine language, without having to touch the keyboard. Although I wouldn't write off the idea as impossible, such a task would be very difficult—maybe more trouble than it would be worth. At any rate, what I had was a $40.00 thrill-and-amaze-your-friends deal. Not much practical use, but nice at showing off some qualities of my computer.

I would rather have spent $10.00 or $20.00 more and had a professional looking "interface" that tackled more adequately the problems of static and low-power inputs. However, the programs that come as part of the **Parrot** package are worth the money.

The sampler and sequencer are copy protected (perhaps because a homemade **Parrot** is so simple a project), but the player and demos are not, and are actually public domain. As far as quality goes, with a lot of fine tuning and experimenting, you might get better results than I did. The digitized speech is better, though, than what I've heard of **SAM**, from Don't Ask Software. And, if I recall correctly, **SAM** retails for at least as much as the whole **Parrot** package. If you just look at it as if you're paying $39.95 for software, with a **Parrot** interface thrown in, the package is worth looking into.

Just a few more miscellaneous com-

ments. . .The screen blanks out during samples and playbacks, for obvious DMA reasons, as does **SAM** (this really can't be avoided if you want reliable timing). Also, a 130XE version is sorely needed. With a program so heavily dependent on memory, I hate seeing my extra 64K sit idle. *Please*, Alpha Systems, get a 130XE version out!

Also, no real technical information is given as to how the **Parrot** reads information from the interface, not even something as simple as the file structure.

All things considered, if you're a sound fanatic and simply *must* push your Atari's sound capabilities to the limit, the **Parrot** is for you. For the rest of you, before you buy, ask yourself: "Just what can I do with this thing?"

Bryan Figler, a junior at Norwalk High School, is the librarian/treasurer of the new Northcoast Atari Computer Enthusiasts users group based in Sandusky, Ohio.

The End User

THIS MONTH:

A look at some classic examples of "software that educates" in various ways, with some on-line philosophy.

by Arthur Leyenberger

The cover date of this month's **ANALOG Computing** says October. However, the magazine goes on sale at the newsstand on or about September 1st, and subscribers get it a week or so earlier. What's the point? School! That's what's news this month.

With the beginning of the school year comes a focus on educational software—or, rather, software that educates. These are two entirely different concepts. Traditionally, educational software performs a specific function for the user. Be it learning subtraction, reading or programming, there's usually one purpose: get the user to learn a skill.

The technique often used for this is rote training or repetition. For example, a program that teaches subtraction will provide the user with practice problems to solve. There'll be answers given for incorrect responses. And, when a certain percentage of correct answers are given, the user will progress to the next higher level, with still more problems to solve.

The above description applies to "educational software." The other category is what I call "software that educates", or STE. STE doesn't necessarily teach skills *per se*. Sure, some skills may be taught this way, but, usually, this type of software teaches concepts. And the learning is usually not direct, but secondary learning.

A concept like the difference between right and wrong can be explained to a user, demonstrated by a specific example (such as: "robbing banks is wrong"), or learned indirectly (when, for example, a story with an ambiguous ending is told—the user must deduce from the story what's right and wrong, by thinking about the consequences of each action).

This second example best demonstrates the notion of STE. It's also more difficult to create, because reality must be simulated to such an extent that the mechanics of the story don't interfere with what should be learned from it.

The following are several examples of both kinds of software for the 8-bit Atari, the kind most Atarians have and the type most used in schools. Also, I'll be mentioning more examples of STE than skill development software, because I think it represents more of a challenge to the user. By the way, any educators reading this are encouraged to drop me a note with your comments, criticisms and suggestions.

Seven Cities of Gold.

Role-playing with an Atari is one of the many ways in which a computer can be put to good use in the home or classroom. Simulations and adventures permit the user to experiment with different kinds of behavior, by assuming a new (albeit temporary) identity. This type of positive learning experience can be accomplished within the framework of a historical, futuristic or present-day experience.

One of the all-time best examples of a first-person simulation is **The Seven Cities of Gold** by Ozark Softscape, published by Electronic Arts. **Seven Cities** simulates the journey of 16th-century Spanish conquistadors in search of new worlds. Planning, thinking and patience are required to survive the trek. Moreover, the outcome

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CompuServe — 71266,46
Delphi — NJANALOG

of the game is determined almost entirely by your behavior and decisions.

For example, once you've discovered land, you must bring your ships into safe mooring, then decide how large an exploration party is needed and how much food to bring. Too many men will leave the ships unguarded. Too much food will slow your journey. And goods are useful for trading.

Once you've disembarked, natives may be encountered. Here, several choices can be made: do you give them gifts, trade with them, or beat them to a pulp?

Trading is safest, but slow, and it requires many goods. Gift-giving may not produce immediate results, save for demonstrating your goodness. If you're lucky, the natives may show you where a gold mine is. Conquering is easiest, but will cost in crew lives—and leave bitter memories. Also, the natives may communicate your hostile intent to their neighbors.

As in all good simulations, the user learns to think critically by playing. Each situation must be analyzed; consequences of actions thought of. Because **Seven Cities** is a rich, historical simulation, it should broaden the young user's understanding of historic events as new, unfamiliar situations are coped with.

There's no one solution to the game, no correct decisions or outcome. The simulation is open-ended in that different results occur with each voyage.

In addition to learning about patience, critical thinking and planning, the most valuable lesson to be learned by playing **Seven Cities** is to understand that certain behaviors have specific consequences. The ability to foresee consequences of one's behavior is as useful in this game as it is in our society.

Seven Cities of Gold clearly meets my definition of STE. In addition, it's extremely engrossing and fun to play.

M.U.L.E.

Another masterful example of STE (incidentally, a previous effort from Ozark Softscape, also published by Electronic Arts) is **M.U.L.E.** As a game for up to four players and an Atari, **M.U.L.E.** has the same depth, staying power and excitement as do some classic board games, like Monopoly, Life and Risk. As educational software, the game is superb—requiring organizational skills, cooperation with fellow players and decision making.

M.U.L.E. stands for Multiple Use Labor Element, a sort of quasi-mechanical, futuristic pack mule. You and the other players are colonists on a distant planet, whose objective is to make it a self-sufficient farming, energy and mining enterprise. At the start of the game, players decide what species to role-play, and are given money and supplies. Of course, each species has strengths and weaknesses—a good lesson on any world.

As each round begins, the players stake their claims in a land grant. During a turn, a player can choose to produce energy or food, or to mine the plot. Usually, the outcome is determined by how well the plot was chosen, or how resources were managed and distributed. But random events can upset results. Acid rain, pest attacks and planetquakes can't be anticipated—and occur throughout the game.

At the end of each cycle, players can buy or sell goods at an auction, depending on their surplus or shortage of goods. Prices are determined the old fashioned way—by the laws of supply and demand. Since the survival of the entire colony depends (more or less) on the success of each player, cooperation is encouraged.

M.U.L.E. teaches many concepts indirectly. Valuable lessons in the free enterprise system are taught, such as economies of scale, the law of supply and demand, the learning curve theory of production, and the law of diminishing returns. But, because players are having fun, no one suspects what they're doing is educational.

M.U.L.E. is a shining example of what can be done with a computer simulation. The concept is excellent, the implementation entertaining and challenging. . . and the result is educational and fun. What more could you ask from game *or* educational software?

Choplifter.

Choplifter is a unique arcade game that's a joy to play. While not as rich in content as **Seven Cities** or **M.U.L.E.**, this Broderbund game does educate, in an unobtrusive and entertaining way.

The basic concept of the game: you must rescue sixty-four hostages held in a foreign (unnamed) land. This is done by means of flying a helicopter from, and returning to, a safe country—represented by a U.S. Post Office flying the ol' red, white and blue.

The hostages are held in four barracks; one burning. Unfortunately, the prisoners are reluctant to stray from the barracks, because of tanks patrolling the area. In addition, on the higher levels, jet fighters and heat-seeking bombs also thwart your rescue efforts. The three helicopters are easy to fly and have machine guns.

A few more facts: a helicopter only holds sixteen hostages at a time; accidentally landing on hostages will kill them; they may also be killed by exploding tank shells, as well as gunfire from your 'copter. Oh, yes—no points for shooting enemy tanks and planes. At the end of the game, you're simply told the number of rescued, killed and remaining hostages. There *is* no winning or losing; you decide how well you did.

One of the things that makes **Choplifter** educational is the decision making involved. You decide how many hostages to rescue at a time (knowing that more will weigh you down and slow retreat). You also decide where to land, so the hostages can run to you, and how long to wait for remaining prisoners. Often, waiting that extra second for the prisoner results in as many as fifteen lost lives, as a tank lobs a shell into your helicopter.

The fact that you don't get points for downing enemy equipment is a lesson. Your guns can be used for self-defense only. On the other hand, Rambo types can go in guns blazing and suffer the consequences.

Choplifter's overall concept is beautifully simple. Its graphics and animation are also first-class. Participating in this game offers a chance to see how a computer can be used for fun—yet in an all too familiar, serious setting.

Flight Simulator II.

Yes, another simulation. **Flight Simulator II**'s only aim is to be a simulation. And a great one it is.

Sublogic's is the most realistic flight simulator for the Atari—bar none. The documentation is incredible. One manual, Flight Physics & Aircraft Control, teaches the concepts of flight and aircraft control almost as completely as a ground school handbook. Proper terms are used; plenty of illustrations are provided; and the language is understandable.

The other manual, the Pilot's Handbook and Airplane Flight Manual, talks specifically about how to fly the Atari version of a Piper PA-28-181. The simulation is described in detail, and all controls are explained. If you understand the concepts in **FSII**'s documentation and get comfortable flying the simulator, you could easily progress to learning on a real Piper.

Educational value? **FSII** lets the user enjoy and learn from an experience not normally readily available. In addition, the program's technical accuracy information is top-notch, providing a substantial learning experience. To top it off, there's nothing like the thrill of flying an aircraft, even a simulator.

Conflict in Viet Nam.

Now that the Viet Nam experience is behind us, we can take a closer look at what it was all about—and perhaps learn some lessons. This is precisely what Microprose has done with their simulation.

Conflict in Viet Nam has two major uses: to learn more about the Viet Nam war in a nonthreatening way, and to learn more about military operations, specifically that "police action."

Commanders on both sides of the conflict faced unique challenges. The Americans had unprecedented mobility and overwhelming firepower, but found difficulty locating the enemy to bring the full weight of ordnance to bear. The North Vietnamese had to move and strike carefully, or their units would be decimated. Both sides had to learn the value of pa-

tience and meticulous planning. Contrary to U.S. expectations, World War II in the jungle, it was not.

Military officers familiar with the Viet Nam era rate this simulation as very realistic. The game provides authentic background, plus a French scenario at the beginning and a South Vietnamese scenario at the end. The user can play on either side, providing the opportunity for an especially meaningful learning experience.

This software educates because the player must learn resource management, use of power and an understanding of politics. The documentation is exceptionally well done. A list of recommended readings is also provided.

Microprose produces only simulations; they view these as a serious medium for communication. Their products seem even better with each new release. We *all* have something to learn from **Conflict in Viet Nam**.

Some more examples.

One last type of STE is the text adventure, made up strictly of text on-screen. As one publisher advertises, "We put graphics where the sun don't shine." In many cases, the imagination is much stronger than what can be displayed on a computer screen.

A number of excellent products for the Atari are available, from companies like Infocom, Broderbund, Activision, and many others. One of the benefits of these games is that reading and comprehension may be strengthened. This is especially true for individuals who dislike reading books. The computer's magic can encourage them to read, even if only on-screen at first.

For younger people, graphic text adventures are a powerful lure toward reading. These programs display occasional pictures that coincide with the story. For those just learning to read, or with mild reading problems, graphic text adventures can be useful.

The other type of educational software.

So far, I've talked primarily about simulations, programs whose main intent is to simulate some kind of reality on the computer. I maintain that, as a byproduct of using these programs, we can learn valuable things, from decision making to resource management—concepts and skills with life-long usefulness.

The few products mentioned below are drill and practice programs. Their intent is to teach a specific skill, possibly disguised as a game. Some of these are merely electronic flash cards, creating random exercises for user response. Still, the computer adds two important ingredients to the learning situation.

First, most of the programs can be customized by the user, parent, or instructor. For example, the level of difficulty can be set, and the pace altered.

The second ingredient is perhaps more important, at least for users themselves: motivation. The computer is interesting—the game often has sound and color, and there's usually plenty of action. Since children like to play, why not learn as they play. . .or play as they learn?

Mastertype.

This typing tutor program is fun to play *and* instructive. In its fast-paced typing drill, you're pitted against the words. Your spaceship occupies center screen as "aliens" appear in all corners. An alien can be a letter or a number, a word or a phrase. Torpedoes have been launched from each alien. If you don't get them first, they'll inevitably get you.

Your typing skill is all that can save you. Type all four words correctly, and the aliens get blown to smithereens. Type a word incorrectly, or hesitate on your keyboard, and your ship is attacked. Naturally, as words are typed correctly, more appear, with faster torpedoes. The only way to master the game is to "master type."

At the end of a round, the program displays your typing speed, based on how fast you typed the words. A number of parameters can be controlled, like what will be displayed (home row keys, letters, numbers, vowels, words, etc.) and the speed at which the program paces you.

In addition to the game portion of **Mastertype**, there's a tutorial section. A keyboard is displayed on-screen, and rudiments of touch typing are taught.

Mastertype is a fun way to learn touch typing, or improve your skill.

CBS Success with Math series.

In the math arena, Success with Math stands out as a good example of drill-and-practice programs. The series has four programs: **Addition/Subtraction**, **Linear Equations** and **Multiplication/Division** for 7th- through 10th-graders, and **Quadratic Equations** for 8th- through 11th-graders.

All the versions of Success with Math are self-paced; the program will not advance until a student has successfully dealt with the current problem. The user gets two chances to answer the question. If both are incorrect, the program will supply the answer and demonstrate the solution. Also, before the round is finished, incorrectly answered questions come up again and again, until correctly solved.

The main use of Success with Math is for students who need reinforcement of basic concepts or remedial help. With variable difficulty levels and good interactivity, these programs are a step above mere "electronic flashcards."

Compu-Math.

Another good combo for math drill and practice—**Compu-Math: Fractions** and **Compu-Math: Decimals**, both from EduWare. These are designed for independent study, with a number of learning aids.

For example, when the student first starts the program, a pretest is given to determine the current level of knowledge. Based on these responses, the program directs the user to the appropriate learning unit of the program.

Each learning unit defines objectives for that lesson, gives examples of the concepts being taught, provides exercises for the student to try out the concepts, and tests to ensure learning has taken place. Graphics and animation enhance the experience and hold the student's interest.

The Factory.

In some ways, this description of **The Factory** by Sunburst should be located in the simulation section. However, since the program's main thrust is to teach students how a factory works, I've placed it here.

Meant for grade-school children, **The Factory** simulates a real manufacturing environment, with "machines" that can perform different operations repeatedly and in any order. These can punch holes, rotate the piece and apply one of three types of stripes to the product. It's all done in one of three game options, "Make a Product."

Another option has the user build an assembly line with the machines, then manufacture a "product" of one's own design. The third option tests the student's understanding of the processes involved, by showing a final "product" and requiring the user to figure out how and in what sequence it was made.

This program is excellent in teaching inductive reasoning (working backwards), and process control and analysis. Effective graphics and animation are used to illustrate the concepts described here.

Ending the End User.

Autumn is welcome once again, and, as the weather chills, many Ataris will be dusted off and brought out of the closet. Whether or not the computers were actually *stored* in the closet, the end of summer usually sees more indoor time and computer use. I hope that part of your increased computer time is spent using one of the programs mentioned above. Learning while having fun is a great way to pass the time.

With another month come and gone, the intervals between columns continue to shrink. As I write these words I'm already beginning for next month. If, like me, you find things in your life happening faster and faster, please take time to enjoy the important ones. Sure, computers and computing are fun, but your family and friends provide the best in life, too. Let them know they're special. And enjoy life. See you next time, friend. ■

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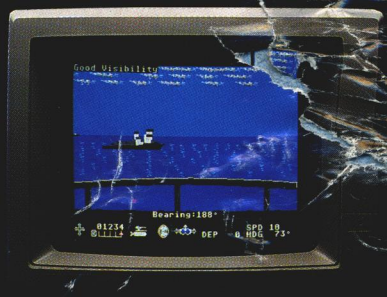
Captain's Log... War Date 10.01.44

Enhanced for 520 ST – Better Graphics, Sound, Play Action!

"Captain's Log, October 1, 1944. 0250 Hours. Fleet submarine USS Hammerhead proceeding Southwest at cruising speed. Our mission: intercept enemy convoy off the coast of Borneo. Disperse and destroy."

"0300 Hours. Two hours until dawn. Radar picks up convoy, escorted by two destroyers. We believe that one of the enemy's valuable oil tankers is part of convoy formation."



"0400 Hours. Lookouts on the bridge. Target identification party reports one tanker, 6,000 tons, troopship of 10,250 tons, with two *Kaibokan*-type escorts. Moving into attack position."

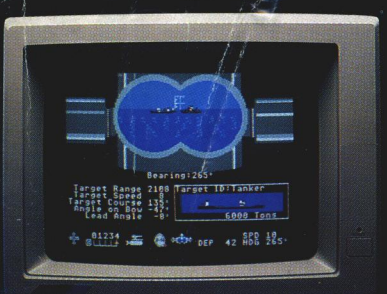
Atari 520ST screens shown

"0500 Hours. Sound General Quarters! Battle stations manned. Preparing for torpedo run. Gauge Panel OK. Periscope OK. Charts and Attack Plot Board OK. All mechanical systems OK."

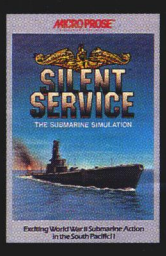
"0525 Hours. Torpedo rooms report full tubes forward and aft. Battery at full charge for silent running. We hope water temperature will provide thermal barrier to confuse enemy sonar."

"0600 Hours. We are at final attack position. Convoy moving at 10 knots. Target distance decreasing rapidly... Crash Dive! Escorts have spotted us and are turning to attack! Rig to run silent."

"0700 Hours. Depth charged for one hour. Some minor damage, but repair parties at work. Destroyer propeller noises receding. We'll come to periscope depth for our return punch."



"0715 Hours. Torpedo tubes 1, 2, 3 fired. Two destroyers hit and sinking. One of the enemy's last tankers coming into 'scope view – an ideal target position. On my mark... Fire Tube 4! Fire 5!"



"Superb" raves Scott May in *On Line*, "strategic intensity and heart-pounding action have rarely been merged this successfully." *Analog* calls it flatly "the best submarine simulation so far." *Compute* comments "Silent Service's detail is astonishing." Join the more than 150,000 computer skippers who have volunteered for **Silent Service**, the naval action/tactics simulation – from MicroProse.

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