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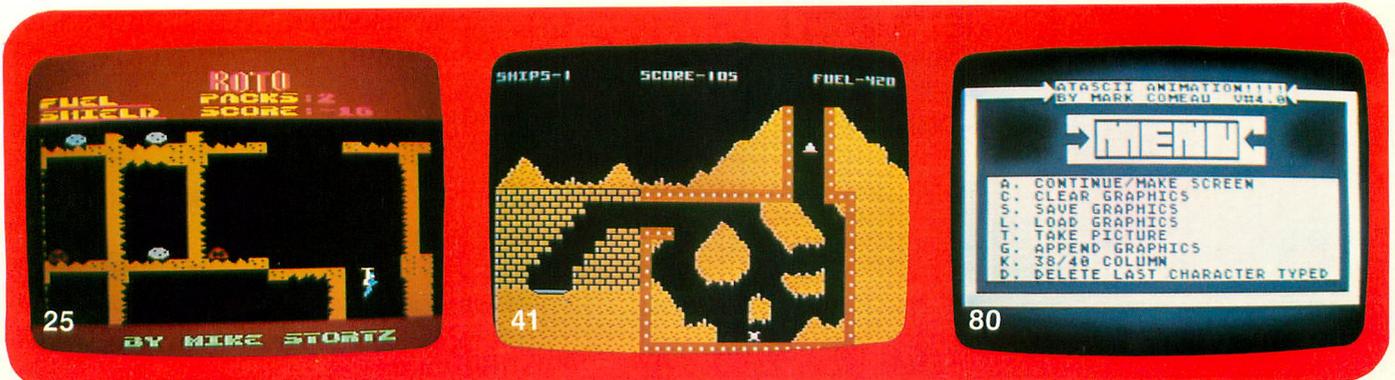
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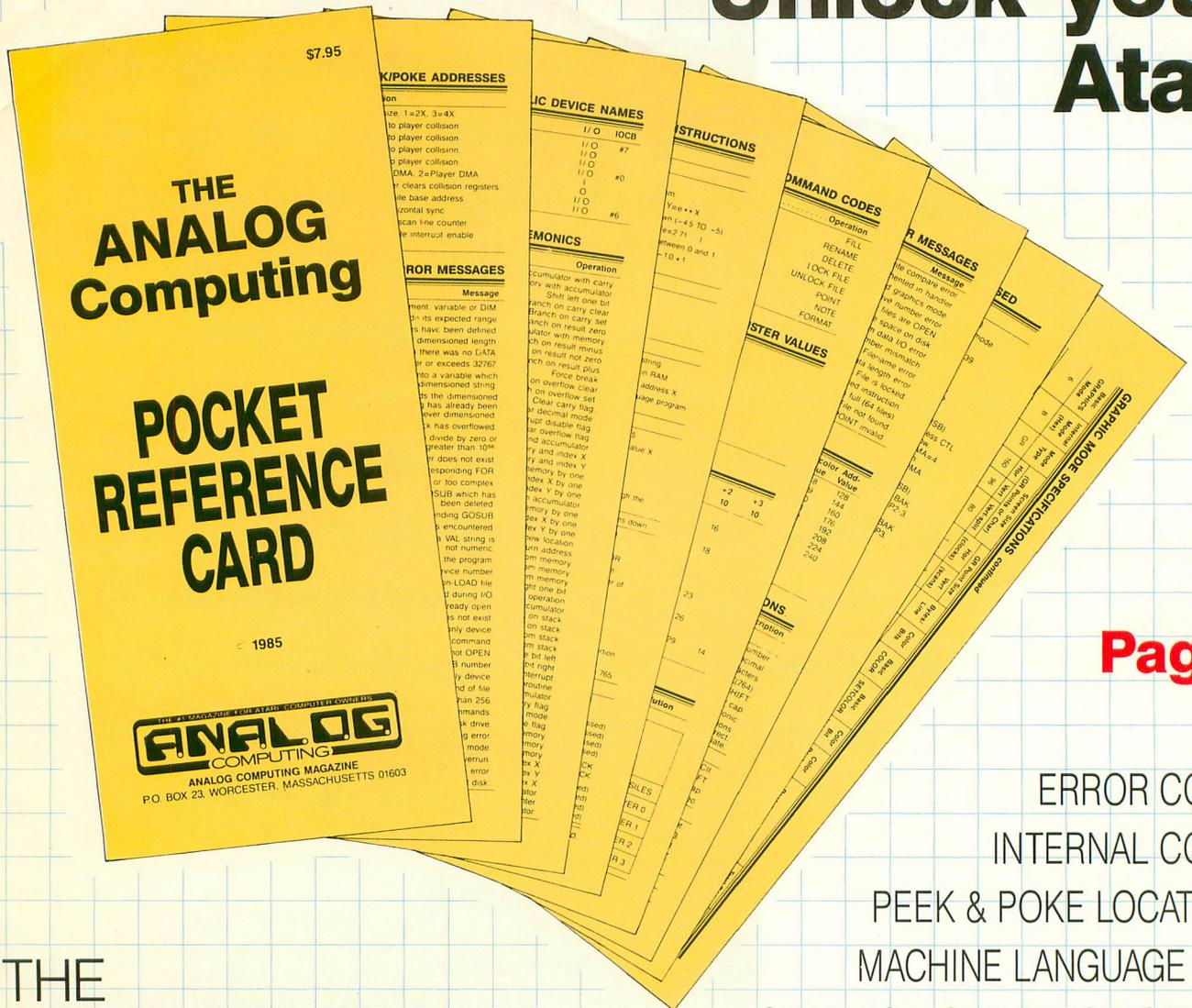
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## AUTHORS

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# EDITORIAL

There are going to be some exhausted programmers around **ANALOG Computing**.

Constant exposure to emissions from monochrome and color monitors will have turned their eyes into silvery orbs, like Yul Brynner's in *Westworld*. Their fingertips will have gone numb from pressing keytops and mouse buttons. Their ears will be attuned only to the siren song of computerized beeps and boops. For them, human voices will fade into white noise, then nothingness.

They will derive their nourishment—if any—from the contents of paper bags and styrofoam cups. They will go home only to set the timers on their videotape recorders for “Miami Vice” and “Hill Street Blues.” Then they will return, zombie-like, to the altar of silicon chips and electrical impulses.

The fanciful description above has more basis in reality than one might assume. What will have driven these men to such a sorry state?

Easy answer. **ANALOG Computing** has just received an Atari 520 ST, a 10-megabyte hard disk, two monitors (one RGB, the other monochrome), two 3½-inch disk drives, a C compiler, an assembler, the GEM operating system, and full technical documentation. **ANALOG Computing** is among the handful of companies to receive the new Atari ST computers at this early date.

Several weeks ago, an Atari official asked us to state, in writing, why this

magazine needed an ST, related hardware and software. There were a limited number of ST development packages available. Why did we deserve an ST more than some other companies waiting to do software development, vital to the success of the machine?

Lest some of our readers get annoyed at what seems to be Atari's cavalier treatment of us, let me state that the question was a formality. Unlike the monolithic old Atari, the new Atari Corp. has made a genuine effort to keep close tabs on Atari user groups and third-party companies. They're also aware of the support that computer magazines give the Atari community, machine-specific magazines in general, **ANALOG Computing** in particular.

Nevertheless, we drowned the poor Atari employee with a deluge of rational reasons (three, actually) for sending the ST package to us.

First, in our four years of existence, we've probably published more Atari computer programs than any other company in the world, Atari included. Our status as a software developer stems from our readers' demands for us to deliver the finest Atari programs of any computer magazine.

Second, the sooner we can get our hands on the ST, the sooner our readers can learn—as we learn—about all the details of the machine.

The fascination with this new computer won't be evidenced only in our programmers, however. The entire staff

of **ANALOG Computing** will be working with it, testing, playing, determining how useful Atari's new ST line is going to be, both to the hardened hacker and the neophyte purchaser.

In the months ahead, we intend to dissect the ST, its hardware, operating system (including GEM) and its software. Technical editor Tony Messina is preparing an in-depth look at the 68000 chip, the brain of the ST.

We also plan on being one of the first computer magazines to have type-in programs for them. And, in the not-too-distant future, we hope to get a look at Atari's mysterious 32-bit machine. (According to Leonard Tramiel, this machine will probably not be shown at the Hanover, West Germany computer show. Instead, it should make an appearance at the June CES in Chicago.)

All this, plus our regular features and articles covering Atari's current 8-bit line (and do we have some things to show you)!

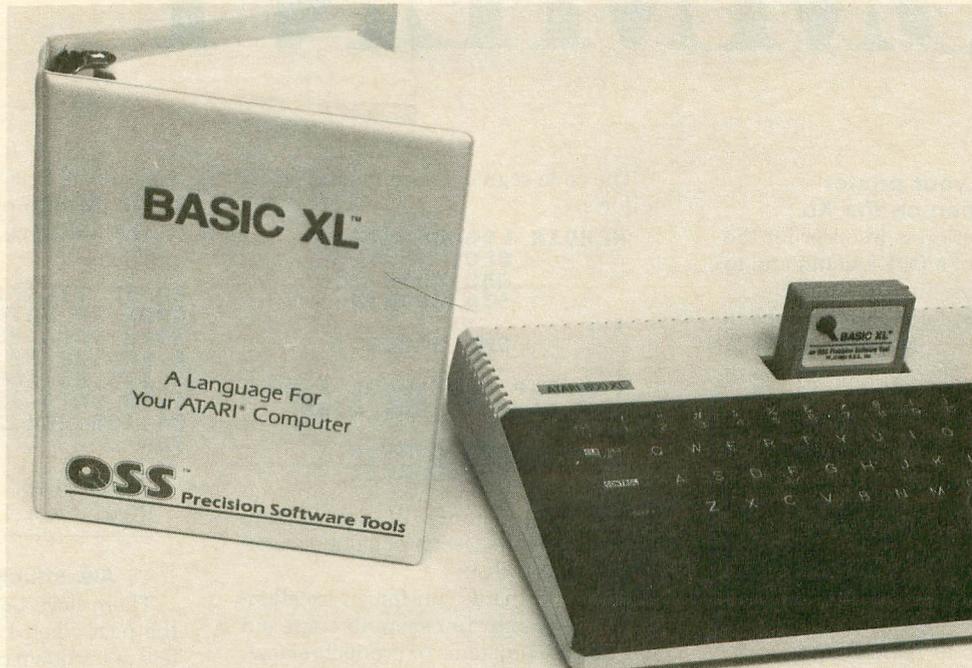
Oh, I almost forgot. The third reason we had to get an Atari ST?

If we hadn't, the publishers and (gasp) managing editor would probably soon be discovered dangling from lengths of ribbon cable, murdered at the rosin-core-solder-spattered hands of our programmers.

Jon A. Bell  
Managing Editor  
**ANALOG Computing**

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### Math Magic changes.

We were very pleased to see the review of our program, **Math Magic**, in the **Griffin's Lair** column of your magazine. A few things have changed for **Math Magic** that we would like you to be aware of.

First: **Math Magic** is now marketed by Texas Software and is no longer affiliated with Blakmagic software.

Second: **Math Magic** is now teacher certified by the National Educational Association.

Third: **Math Magic** has new documentation.

Sincerely,

Larry Hall, Director of Marketing  
Texas Software, 10165 Calder  
Beaumont, TX 77706

Due to a printing error, the photos of **Math Mileage** and **Math Magic** were switched in the **Griffin's Lair** column of issue 29. —Ed.

### Catching a runaway cursor.

First, I want to tell you that I really enjoy your magazine! I've learned quite a bit from your articles and programs.

Now, I would like to share something with your readers. I own an Atari 400 with 64K and replaced the original keyboard with an INHOME B-key. The keyboard worked fine for about a year, then I started having problems with a runaway cursor.

The cursor would act as if I was holding the space bar down, and wouldn't stop until I tapped on the key a few times. As you can imagine, this became very frustrating. I took the computer into the computer repair class where I work, and this is what they found.

The keyboard is basically a PC board with switches for keys attached. All of the copper circuit traces are on the bottom, except for the space bar, whose cir-

cuits are on the top of the board. The top of the board was painted light brown to match the color of the computer, and the paint also acted as an insulator.

Through extensive use (typing in programs from **ANALOG Computing**), the small metal bar under the space key wore the paint away, allowing a short to develop between the metal rod and the circuit trace. So, the computer would read this as the key being depressed and held down.

To fix the problem, they had to unsolder and remove one of the tabs holding the metal rod. Then they placed a strip of insulating tape where the abrasion had taken place (protecting the circuit traces) and resoldered the tab, thus stopping the runaway cursor.

I hope this will help anyone who has experienced the same problem.

Richard C. Smith  
Riverside, CA

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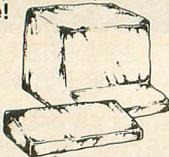
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## READER COMMENT *continued*

### XL fix for Dragonlord.

I have an Atari 800XL and, when I entered and ran the program **Dragonlord** (issue 29 of **ANALOG Computing**), I kept getting DIM errors. After a lot of trial and error with the program, I figured that it might be because this program was written for the 800 and not the 800XL. I proceeded to find a remedy for this.

In Lines 10 and 20, preset N values are the same as the number with N (example: N1=1, N2=2, etc.); I decided, rather than do this, I would try to use the numbers as they are.

Once I went through the whole program and changed all the N numbers to regular numbers by removing the N, the program ran very well on my 800XL.

I am not sure if this is the way Mr. Walnum intended his program to work, but I would advise any XL owner to try this.

L. Eugene Donie  
 Harlem, GA

This seems to be a fairly common problem with the BASIC that is built into the XL computers, manifested in two ways.

First, when you load a program on an XL machine by using the BASIC keyword **LOAD** or **CLOAD**, the bytes pointing to the end of the program are updated incorrectly and 16 unusable bytes are tacked onto the end.

Second, some of our programs assign constants to variables like K0=0, K1=1, K2=2, etc. (which is a technique used to save space in RAM). When the program is finally run, you might find that these variables are not at their assigned values.

These two problems can be fixed simply by **LISTing** the program to a cassette or disk file, typing **NEW** to clear out the computer's memory, then using the **ENTER** command to read the program back in. This corrected program may now be saved out.

Disk method:

```
LOAD "D:PROGRAM"
LIST "D:TEMP"
NEW
ENTER "D:TEMP"
SAVE "D:PROGRAM"
```

Cassette method:

```
CLOAD
LIST "C:"
NEW
ENTER "C:"
CSAVE
```

This should clear up some problems for XL owners. —Ed.

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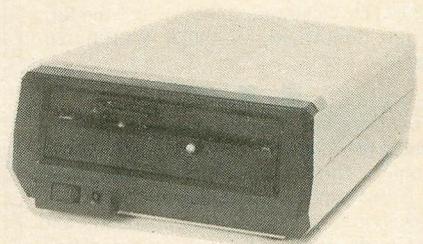
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# NEW PRODUCTS

## LINKWORD LANGUAGES BY ARTWORX

The **Linkword Language Series** is made up of four programs, lessons in Spanish, German, French and Italian.

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The **Linkword Language Series** was developed by Dr. Michael Gruneberg.

The programs retail for \$24.95 each from Artworx Software Company, 150 N. Main Street, Fairport, NY 14450 — (716) 425-2833 or (800) 828-6573.



## OTHER NEWS

The **Video Title Editor** creates titles, colored screens, leaders and messages, when used with your Atari computer and a VCR. An easy-to-use menu allows you to access over twenty different displays.

\$29.95 by Videoware, 19777 W. 12 Mile Rd., Ste. 180, Southfield, MI 49076 — (313) 626-7208.



Tri Micro has reduced prices of their integrated productivity software to \$29.95/title.

Some of the packages include: **The Write File** (word processor/database); **Your Home Office** (word processing/spreadsheet); and **Plus Graph** (complete business graphics package).

Contact Tri Micro, 14072 Stratton Way, Santa Ana, CA 92705 — (714) 832-6707.



A new catalog from Dataproducts lists computer printer ribbons for over 200 types of printers, plus thermal paper, printwheels and other accessories. The 23-page catalog is available from Dataproducts Supplies at (818) 887-8461 or 15250 Ventura Blvd., Ste. 310, Sherman Oaks, CA 91404-3201.



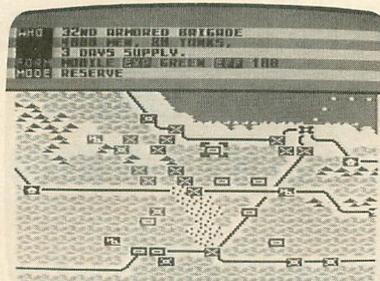
Infocom's latest interactive fantasy, **Wish-bringer**, is geared for introductory-level players. Authored by Brian Moriarty, the game has two different difficulty levels. It can be played in a "magic-mode" or a "logic-mode."

**ANALOG Computing** readers may remember Brian as the author of **Crash Dive!**, **Adventure in the Fifth Dimension** and **The Black Rabbit**.

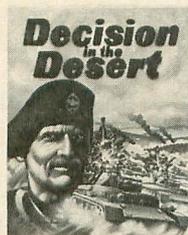
Cost is \$34.95, from Infocom, 55 Wheeler Street, Cambridge, MA 02138.

## COMMAND SERIES SIMULATIONS

**Crusade in Europe**, the first in the new **Command Series** from Microprose, recreates the American and British struggle against Nazi Germany from the D-Day invasion to the Battle of the Bulge.



Three short scenarios are included that can be played in an hour, plus two longer versions that can take two to four hours. The game can be saved and replayed at a later time.



The second release, **Decisions in the Desert**, puts you in the battle between Rommel's Afrika Korps and the British 8th Army, for control of North Africa. At \$39.95 each, from Microprose Software, 10616 Beaver Dam Rd., Hunt Valley, MD 21030 — (301) 667-1151.

## ST NEWS

Digital Research's **Graphics Environment Manager (GEM)**, besides running on the new Atari ST, has also been developed for Apricot, Epson, TI, Commodore and several other companies. With software transportability being somewhat easy, and the companies below supporting **GEM**, there should be interesting things happening the next few months.

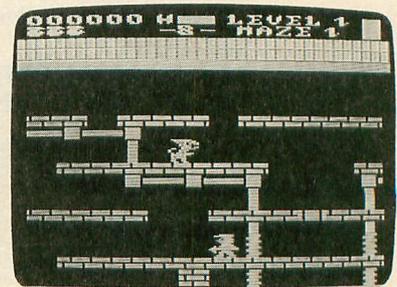
Spinnaker Software, Thorn EMI, Quadratron Systems, Lifetree Software, Haydon Software, ProVUE, Sierra On-Line, Schoenburg and Hoxie, Software Products Int., Chang Labs, Infocom, Batteries Included and Array/Continental have all hopped aboard the **GEM** wagon, developing products from educational lines to office automation.

If you are interested in writing **GEM** software, you can sign on to the **GEM** Programmer Support Service and receive the **GEM** Programmer's Toolkit, containing **GEM** software and a complete IBM PC development environment, with toll-free technical assistance. Cost is \$500, Digital Research, 60 Garden Ct., Monterey, CA 93942 — (415) 494-2030.

## CREATIVE SOFTWARE'S BESTSELLER

**Trolls and Tribulations** has seven levels with over 200 eerie chambers for you to explore. Under your city, you'll find an entire world full of troll-eating creatures, sinister skulls, amazing treasures and flying buzzards.

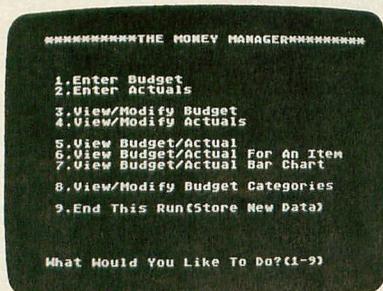
Disguised as a troll, you wander dark caverns and secret dungeons, in order to save the treasures from criminal greed. Chances are you'll be eaten, pushed into rising waters or cornered in a dungeon. Full color graphics and animation are featured in this 48K disk-based game.



Retail is \$24.95, from Creative Software, P.O. Box 61688, Sunnyvale, CA 94086.



## PRODUCTIVITY SOFTWARE FROM TIMEWORKS

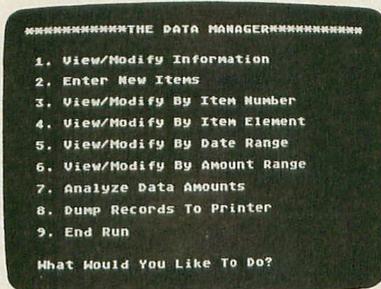


The **Money Manager**, a home and business budget cash flow system from Timeworks, allows you to enter sixteen budget and actual categories on a monthly basis, for a twelve-month period. Full analysis is provided, along with bar charts. Storage is allowed for, on tape or disk. This program can also be interfaced to work with Timework's **Electronic Checkbook**, a check recording, sorting and balancing system.

The **Electronic Checkbook** lets you organize

and record checkbook transactions, then cross search via check number, amount, description or date. Backup copies of your check records can easily be transferred.

The **Data Manager** is a general information and retrieval system, which also provides a

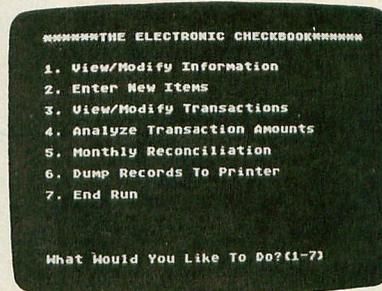


cross search using name, date range, amount, location, category and more. The program is also capable of analyzing to produce sum, average, standard deviation and frequency charts. Up to 5100 lines of information can be saved

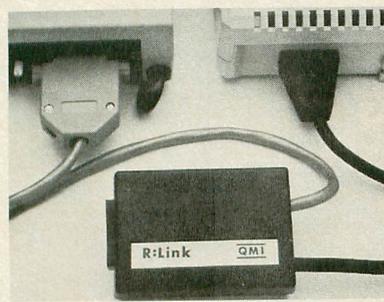
on one disk (or up to 5000 lines on a 60-minute tape).

Timeworks also provides extensive user support in the way of a toll-free help line to registered owners, a money back guarantee and a system trade-up policy. The latter is rather unique in that it allows you to trade up in software if you move up in hardware.

Cost is \$24.95 each, from Timeworks, 444 Lake Cook Rd., Deerfield, IL 60015 — (312) 948-9200.



## Q-MODEM AND R-LINK



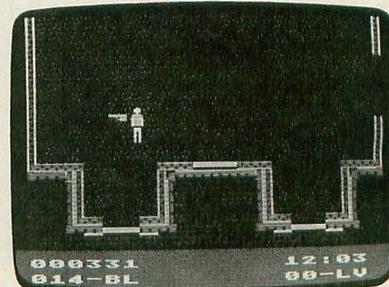
Quantum Microsystems has developed two telecommunications products just for the Atari computer line.

**Q-Modem** sports custom color displays and on-screen menus to access a built-in editor, disk utilities, multiple buffers and file transfer with or without Xmodem.

**R-Link** is a serial interface which connects between an Atari serial bus and a standard 300/1200 baud modem, eliminating the use of an 850 module. Compatibility is retained with Amodem and many BBS programs. For information, contact Quantum Microsystems, Inc., P.O. Box 179, Liverpool, NY 13088-179 — (315) 437-6617.

## IT'S MIDNIGHT AT MAXWELL MANOR

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all will assist you. Bugs in the garden, blood spots in the hall and huge spiders downstairs are only the beginning for you. This one-player game has more than 50 graphic screens and over 100 variations, plus 10 levels of skill.

The 48K disk costs \$25.00. Avlon Hill Microcomputer Games, 4517 Harford Road, Baltimore, MD 21214 — (301) 254-9200.

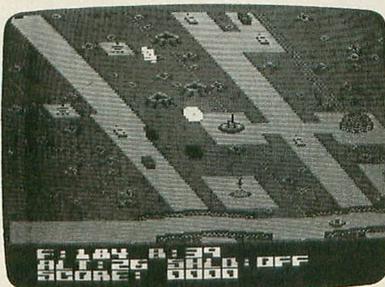
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**Blue Max 2001** is simply **Blue Max** with new graphics. The bombing, shooting and landing techniques are all the same as the original.

**Blue Max 2001** requires 48K disk and is available from Synapse Software, 5221 Central Avenue, Richmond, CA 94804.



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# Unicheck

## The Universal Checksum Program

---

by Tom Hudson

---

Many of our readers currently use the **D:CHECK2** and **C:CHECK** programs to find typing errors in the programs they enter from **ANALOG Computing**. Unfortunately, these checksum programs can be cumbersome to use. In an effort to simplify checking programs for typos, I have developed **Unicheck**.

This is a program which loads into your system at power-up time as a device, allowing you to generate a checksum table with a simple keyboard command. Your BASIC program stays in memory all the time, eliminating the annoying **LIST** and **ENTER** operations.

### Typing it in.

Before typing anything, look at the listings accompanying this article.

Listing 1 is the BASIC data and data checking routine. This listing is used to create both cassette and disk versions of **Unicheck**. The data statements are listed in hexadecimal (base 16) to conserve memory.

Listing 2 is the assembly language source code for **Unicheck**, created with the OSS MAC/65 assembler. You *do not* have to type this listing to use **Unicheck**! It is included for those readers interested in assembly language.

Follow the instructions below to make a cassette or disk version of **Unicheck**.

### Cassette instructions.

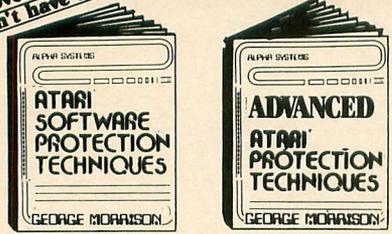
1. Type Listing 1 into your computer, using the BASIC cartridge and use **C:CHECK** to check your typing.
2. Type **RUN** and press **RETURN**. The program will ask:

**MAKE CASSETTE (0) OR DISK (1)?**

Type **0** and press **RETURN**. The program will begin checking the **DATA** statements, printing the line number of each as it goes. It will alert you if it finds any problems. Fix any incorrect lines and re-RUN the program, if necessary, until all errors are eliminated.

3. When all your **DATA** lines are correct, the computer will beep twice and prompt you to **READY CASSETTE AND PRESS RETURN**. 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 boot tape version of **Unicheck**, printing each **DATA** line number as it goes. When the **READY** prompt appears, **Unicheck** is ready to use. **CSAVE** the BA-

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SIC program onto a separate tape before continuing.

4. You will want to load **Unicheck** whenever you're entering programs from **ANALOG Computing**, so you can check them for accuracy. To do this, rewind the tape created by the program to the beginning. Turn your computer OFF. If you have a 400/800/1200XL computer, be sure the BASIC cartridge is inserted. Press the PLAY button on your recorder and turn ON your computer, while pressing the START button. The computer will beep once. Hit the RETURN key, and **Unicheck** will load into your computer. The **READY** prompt will appear, and you're ready to type in your program.

**Disk instructions.**

Type Listing 1 into your computer, using the BASIC cartridge. If you have **D:CHECK2**, use it to check your typing.

2. Type **RUN** and press RETURN. The program will ask:

**MAKE CASSETTE (0) OR DISK (1)?**

Type 1 and press RETURN. The program will begin checking the DATA lines, printing the line number of each statement as it goes. It will alert you if it finds any problems. Fix incorrect lines and re-RUN the program, if necessary, until all errors are eliminated.

3. When all DATA lines are correct, you'll be prompted to **INSERT DISK WITH DOS, PRESS RETURN**. Put a disk with DOS 2.0S or DOS XL into drive 1 and press RETURN. The message **WRITING FILE** will appear, and the program will create an **AUTORUN.SYS** file on the disk, displaying each DATA line number as it goes. When the **READY** prompt appears, **Unicheck** is ready to use. Be sure that the BASIC program is **SAVED** before continuing.

4. You will want to load **Unicheck** whenever you're entering programs from **ANALOG Computing**, so you can check them for accuracy. To do this, replace the disk containing the **AUTORUN.SYS** file in drive 1. Turn your computer OFF. If you have a 400/800/1200XL computer, be sure the BASIC cartridge is inserted. When you turn on your computer, **Unicheck** will load automatically. (Note: **Unicheck** will only work as an **AUTORUN.SYS** file. Do not try to load it with the Binary Load function.) The **READY** prompt will appear, and you're ready to type in your program.

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### Checking your typing.

Once **Unicheck** is loaded into your computer, it's ready to check the typing of your programs—anytime you want. After the program is typed in, just enter:

**LIST "U:"**

This will print a checksum data on your screen. If you have a printer, you can enter:

**LIST "U2:"**

This will print the checksum data on your printer. Let's see how to interpret the checksum data. Figure 1 shows a typical checksum data table.

```
10 DATA 34,455,234,22,55,38,93,45,114,
285,633,442,453,23,31,2957
160 DATA 82,94,64,73,347,199,287,84,15
6,368,59,40,98,9,342,2302
310 DATA 65,356,101,25,547
```

Figure 1.

Each line of the program being checked has its own checksum value. If any characters in the line are incorrect, the checksum for that line will differ from the corresponding magazine checksum. The checksum data is organized so that there are fifteen checksum values in each line, with the sixteenth value containing the total of the checksums.

The line number of the checksum line tells which line number is first in the checksum group. In Figure 1, the first line checked in the first checksum line is 10. The checksum for Line 100 is 34. The checksum of the line after Line 10 is 455, and so on. The total of the checksums in the first group is 2957. The first line checked in the second checksum line is 160, and its checksum is 82. The first line checked in the third checksum line is 310, and its checksum is 65.

Let's assume that the checksum data in Figure 1 was listed in the magazine, and you typed in the program and checked it with **Unicheck**. Figure 2 shows an example of what the **Unicheck** output may look like if you have typing errors.

```
10 DATA 34,455,234,22,55,38,244,45,114
,285,633,442,453,23,31,3108
160 DATA 82,94,64,73,347,199,287,84,15
6,368,59,40,98,9,342,2302
310 DATA 65,101,34,200
```

Figure 2.

The first thing to do is look at the total of the values in the first line. If there are any mistyped lines, it is easiest to spot here. This value should be 2957, as shown in Figure 1. However, in the results in the **Unicheck** output, the total is 3108. This means that *there is an error in the fifteen checksum values in this line.* Comparing the individual **Unicheck** check-

sum values to the magazine values, we find that the seventh checksum is 244 in the **Unicheck** output, but should be 93. This means that the sixth line after Line 10 has an error that must be fixed. Note the error and continue checking. The rest of the line is correct, so we go on to the second line.

Now we check the total of the second line. The total of 2302 in our **Unicheck** output matches the total in the magazine, so we can go on to the third checksum line.

The third checksum line is different from the others in that it only checks four lines. This is because it is at the end of the program, and the program did not have an even multiple of fifteen lines. The line is checked the same way as the others. As you can see, the checksum line total should be 547, but is only 200 in the **Unicheck** output. Looking at the **Unicheck** output, you will notice that there is one less checksum value (the 356 in the magazine checksum data). This means that the first line in the program after Line 310 is missing. The last checksum in this line

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CIRCLE #111 ON READER SERVICE CARD

is also incorrect. It is a 34 and should be 25. This means that the third line after Line 310 in the program is incorrect.

To summarize, there were three errors in the program we checked. Two errors were caused by typos, and the third appeared because of a missing line.

After all errors have been noted, make the necessary changes, re-LIST the program to "U:" or "U2:" and compare the Unicheck output to the magazine checksum data again. Simply repeat this process until all errors are eliminated. When you're finished, you'll have an error-free program!

### Some final notes.

I feel sure that users of ANALOG Computing's D:CHECK2 and C:CHECK will find Unicheck a much easier program to work with. There are a few things to remember when using it, however.

Unicheck takes up about 400 bytes of memory. Some programs may be too large to load into memory with Unicheck present, and you'll get an ERROR-19. In these rare cases, you should use the less convenient C: or D:CHECK programs.

Don't worry about pressing RESET when Unicheck is loaded. It will remain safely installed until you turn your machine off (or type DOS in a disk system — see below).

For disk users, typing DOS will remove Unicheck from memory. This is a necessary precaution with DOS 2.0S. The first time you type DOS, the computer will perform a system reset and remove Unicheck. Typing DOS again will take you to the DOS menu, as usual. If you return to BASIC, however, Unicheck will no longer be present.

Unicheck only works with programs from issue 10 or later. If it is used with programs before issue 10, incorrect checksum values will result. □

### Listing 1. BASIC listing.

```

10 REM *** UNICHECK ***
20 TRAP 20:? "MAKE CASSETTE (0), OR DI
SK (1)";:INPUT DSK:IF DSK>1 THEN 20
30 TRAP 40000:DATA 0,1,2,3,4,5,6,7,8,9
,0,0,0,0,0,0,10,11,12,13,14,15
40 DIM DAT$(91),HEX(22):FOR X=0 TO 22:
READ N:HEX(X)=N:NEXT X:LINE=990:RESTOR
E 1000:TRAP 120:? "CHECKING DATA"
50 LINE=LINE+10:? "LINE:";LINE:READ DA
T$:IF LEN(DAT$)<>90 THEN 20
60 DATLIN=PEEK(183)+PEEK(184)*256:IF D
ATLIN<>LINE THEN ? "LINE ";LINE;" MI55
ING!":END
70 FOR X=1 TO 89 STEP 2:D1=A5C(DAT$(X,
X))-48:D2=A5C(DAT$(X+1,X+1))-48:BYTE=H
EX(D1)*16+HEX(D2)
80 IF PA55=2 THEN PUT #1,BYTE:NEXT X:R
EAD CHKSUM:GOTO 50

```

```

90 TOTAL=TOTAL+BYTE:IF TOTAL>999 THEN
TOTAL=TOTAL-1000
100 NEXT X:READ CHKSUM:IF TOTAL=CHKSUM
THEN 50
110 GOTO 220
120 IF PEEK(195)<>6 THEN 220
130 IF PA55=0 THEN 170
140 IF NOT DSK THEN 160
150 PUT #1,224:PUT #1,2:PUT #1,225:PUT
#1,2:PUT #1,154:PUT #1,50:CLOSE #1:EN
D
160 FOR X=1 TO 66:PUT #1,0:NEXT X:CLOS
E #1:END
170 IF NOT DSK THEN 200
180 ? "INSERT DISK WITH DOS, PRESS RET
URN";:DIM IN$(1):INPUT IN$:OPEN #1,8,0
,"D:AUTORUN.5Y5"
190 PUT #1,255:PUT #1,255:PUT #1,0:PUT
#1,48:PUT #1,176:PUT #1,51:GOTO 210
200 ? "READY CASSETTE AND PRESS RETURN
";:OPEN #1,8,128,"C:":RESTORE 230:FOR
X=1 TO 13:READ N:PUT #1,N:NEXT X
210 ? :? "WRITING FILE":PA55=2:LINE=99
0:RESTORE 1000:TRAP 120:GOTO 50
220 ? "BAD DATA: LINE ";:LINE:END
230 DATA 0,8,243,47,158,50,169,60,141,
2,211,24,96
1000 DATA 0000000000E06000000E060E064C3E
07A00160A20FB5209DD206CA10F8A9018DC206
60A20FBDD2069520CA10F860,623
1010 DATA A5CF8DCE06A5CE8DCF06A5CD8DD0
0620E206A99BAED106E002F014A20B8E4203A2
008E48038E49032056E48CC2,922
1020 DATA 0660AEB9069D0001EEB906AEB906
E026F004C99BD0EBA20BBDAD069D0003CA10F7
A9008DB906A99B8D26012059,938
1030 DATA E48CC206A227A9209D0001CA10FA
60ADF006850AADF106850BADF206850CADF306
850D4C74E440015780000130,639
1040 DATA 0028004E00002041544144000000
00010A640110000000010000000000000000
000000000000000000000000,200
1050 DATA 004CFFFF3D5F735D019A01000000
0000000000000000000000000000000020FF
FFD8ADE068DE7028580ADE,524
1060 DATA 068DE8028581ADF406850AADF506
850BA0000B91A03C900F005C8C8C8D0F4A90099
1B03A906991C03A955991A03,320
1070 DATA 4C00A008201206A9008DCD0685CD
85CE85CF85D085D1A9028DC1068DCC06A5218D
D106D00C08201206ADCC06D0,132
1080 DATA 03202D06220628ACC206600885
D485D5201206A9008DBF068D0C006A202D8A5D5
DDC306901D38FDC30685D5F8,856
1090 DATA ADBF06187DC6068DBF06AD0067D
C9068DC0061890DBCA10D8AECC06F020A5D420
4106A5D4C920D015A9008DCC,269
1100 DATA 06A90485CCA6CCBDBA06204106C6
CC10F4AEC106F8ADBF061865D085D0A5D16DC0
06290F85D1CAD0EECEEC106AD,301
1110 DATA C106C904D005A9018DC106A5D4C9
9BF00820220628ACC20660A5D01865CD85CDA5
D165CE85CEA5CF690085CFD8,83
1120 DATA A9008DCE06A5D18DCF06A5D08DD0
0620E206A92C204106A90085D085D1A9028DC1
06EECD06ADCD06C90FD0B820,477
1130 DATA 2D06A90085DC85CE85CF8DCD06A9
018DCC06D0A3A90085CB85CCA4CCB9CE064A4A
4A4AD004A6CBF007E6CB0930,179
1140 DATA 204106A4CCB9CE06290FD008C002
F004A6CBF007E6CB0930204106E6CCA5CCC903
D0CA60A9018509A90685CEA9,474
1150 DATA 3085CCA90085CB85CD8D4402A8B1
CB91CD88D0F9ADE70285CDADE80285CEA93185
CCA201A000B1CB91CD88D0F9,95
1160 DATA E6CEE6CCA10F0ADE70285CD186D
E5068D0006ADE80285CE69008D0106A5CD186D
E5068D0206A5CE69008D0306,195

```

```

1170 DATA A5CD186DE7068D0606A5CE69008D
0706A5CD186DE8068DE306A5CE6DE9068DE406
A5CD186DEA068DEC06A5CE6D,533
1180 DATA EB068DED06A5CD1869038DEE06A5
CE69008DEF06A509C901D030A002A50D8DF306
91CD88A50C8DF20691CDA50A,846
1190 DATA 8DF006A50B8DF106A5CD850CA5CE
850DA9968DF406A9068DF5066CEE06A0028409
A90691CD88A91191CDA5CD85,461
1200 DATA 02A5CE8503A9718DF406A9E48DF5
066CEE060000000000000000000000000000
000000000000000000000000,784

```

CHECKSUM DATA.

(see page 13)

```

10 DATA 732,351,496,811,423,729,200,60
3,555,573,694,613,29,205,202,7216
160 DATA 760,198,962,645,494,30,155,40
7,655,57,943,792,477,479,7803
1070 DATA 809,718,135,156,208,0,195,99
3,307,36,295,113,135,995,5095

```

Assembly listing.

```

.OPT NO LIST
UNICHECK
Universal Checksum Program (V2.0)
by Tom Hudson, June 1985
ANALOG Computing
page zero equates
LEAD0 = %CB    !leading 0 flag
PRIX  = %CC    !0 print index
TOTLO = %CD    !BCD chksum total
TOTMD = %CE
TOTHI = %CF
CHKLO = %D0    !BCD checksum
CHKHI = %D1
BYTE  = %D4    !incoming char
BYTE2 = %D5    !incoming char
zero-page setup pointers
FROM = %CB
TO   = %CD
Program equates
CASINI = %02    !cass init vector
BOOT?  = %09    !boot device
DOSVEC = %0A    !DOS run vector
DOSINI = %0C    !DOS init vector
ZIOCB  = %20    !zero page IOCB
ICDNOZ = %21    !device # 1/2
LOMEM  = %80    !BASIC io memory
PRTBUF = %0100  !my print buffer
COLDST = %0244  !cold start flag
MEMLO  = %02E7  !low memory ptr
DDEVIC = %0300  !SID device #
HATABS = %031A  !handler tables
ICCOM  = %0342  !IOCB command
ICBLEN = %0348  !IOCB buf length
CIOV   = %E456  !CIO vector
SIOV   = %E459  !SID vector
WARMSV = %E474  !warm start
This code is placed at %3000
then moved to page 6 for easy
subroutine access
* = %0600
UNICHECK entry table
UHTBL .WORD %00    !open file
UC     .WORD %00    !close file
.UORD NOHAN-1
UW     .WORD %00    !write file
.UORD NOHAN-1
.UORD NOHAN-1
JMP OPEN !init vector
LDY #1   !operation OK
RTS     !return!
LDX #15
S2ZIOCB LDA ZIOCB,X !save the
          STA ZIOCB,X !calling IOCB
DEX
BPL S2ZIOCB
LDA #1   !set up good...
STA MYSTAT !return status

```

```

RTS !and exit
RZIOCB LDA ZIOCB,X !restore the
        STA ZIOCB,X !calling IOCB
        DEX
        BPL RZIOCB
        RTS !and exit
print checksum line total
PLTOTL LDA TOTHI !set up chksum
        STA TOT0 !print area with
        LDA TOTMD !total
        STA TOT1
        LDA TOTLO
        STA TOT2
        JSR JTOTL !print the amount
        LDA #155 !get CR...
        !
        !print char in A reg
        PBYTE LDX OUTPUT !get output unit
              CPX #2 !printer?
              BEQ PRINTR !yes!
              LDX %00B !output mode
              STX ICCOM
              LDX #0 !zero buffer
              STX ICBLEN !length (char in
              INC PBUFIX !accumulator)
              JSR CIOV !print to screen
              STY MYSTAT !save status
              RTS !and exit
PRTXIT LDX PBUFIX !get buf index
        STA PRTBUF,X !put char in buf
        INC PBUFIX !next buf index
        LDX PBUFIX !get index
        CPX #38 !end of buffer?
        BEQ PRNTIT !yes!
        CHP %9B !carriage return?
        BNE PRTXIT !no!
PRNTIT LDA PCONMD,X !commands...
        STA DDEVIC,X !to SID area
        DEX !more bytes?
        BPL SPLP !yes!
        LDA #0 !zero out...
        STA PBUFIX !buffer index
        LDA #9B !set up CR
        STA PRTBUF+38 !in buffer
        JSR SIOV !print the line!
        STY MYSTAT !save status
        BNE ALLDUN !now clear...
        LDA #32 !print buffer
        STA PRTBUF,X
        CPBUF DEX
        BPL CPBUF
        RTS !and exit!
MYDVEC LDA DVSAVE !restore...
        STA DOSVEC !DOS vector
        LDA DVSAVE+1
        STA DOSVEC+1
        LDA DISAVE !restore...
        STA DOSINI !DOS init vector
        LDA DISAVE+1
        STA DOSINI+1
        JMP WARMSV !system reset!
miscellaneous data
PCOMND .BYTE %40 !printer
        .BYTE %01 !unit #1
        .BYTE %57 !"W" = write

```

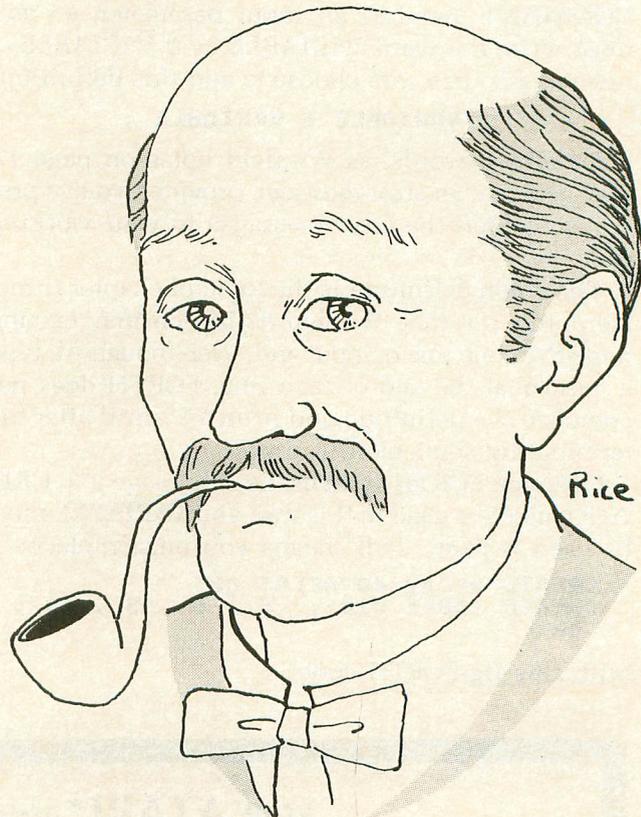
```

.BYTE %00 !output
.WORD PRTBUF !buffer address
.WORD %30 !timeout
.WORD %2B !buffer length
.BYTE %4E !normal print
.BYTE %00 !unused
PBUFIX
PDATA .BYTE " ATAD"
BCDBYT .BYTE 0,0
X .BYTE 0
MYSTAT .BYTE 0
DECTBL .BYTE 1,10,100
BCDADL .BYTE %01,%10,%00
BCDADH .BYTE %00,%00,%01
LFLAG .BYTE 0
LCOUNT .BYTE 0
TOT0 .BYTE 0
TOT1 .BYTE 0
TOT2 .BYTE 0
OUTPUT .BYTE 0,0,0,0,0,0,0,0
ZIOBAK .BYTE 0,0,0,0,0,0,0,0
!
!JMP vector for subroutine
JTOTL JMP %FFFF !to PTOTAL
!
!Relocation factors
OPNDLO .BYTE <OPEN-START-1
CLODLO .BYTE <CLOSE-START-1
WRTDLO .BYTE <WRITE-START-1
TOTDLO .BYTE <PTOTAL-START
TOTDHI .BYTE >PTOTAL-START
CENDLO .BYTE <CODEND-START
CENDHI .BYTE >CODEND-START
NEWMLL .BYTE 0 !new MEMLO...
NEWMLH .BYTE 0 !address
JMPDVL .BYTE 0 !device load...
JMPDVH .BYTE 0 !address
DVSAVE .BYTE 0 !DOSVEC save
DISAVE .BYTE 0 !DOSINI save
MYDOS .BYTE 0 !my DOSVEC
FILLER .BYTE 0,0,0,0,0,0,0,0
!
!This section is placed at %3100
!then moved down to the old
!MEMLO location.
!install U: device handler
START JSR %FFFF !init DOS
DEVICE CLD !no decimal mode
        LDA NEWMLL !alter the...
        STA MEMLO !low memory...
        STA LOMEM !pointers
        LDA NEWMLH
        STA MEMLO+1
        STA LOMEM+1
        LDA MYDOS !re-point DOSVEC
        STA DOSVEC
        LDA MYDOS+1
        STA DOSVEC+1
        LDY #0 !look for slot
        LDA HATABS,Y !get entry
        CHP #0 !open?
        BEQ BOTLDC !yes!
        INY !point to...
        INY !next...
        INY !entry
        BNE UINSLP !entry keep looking
        BOTLOC LDA # <UHTBL !set up...
              STA HATABS+1,Y !handler...
              LDA # <UHTBL !in the...
              STA HATABS+2,Y !device table
              LDA #U !call it U:
              STA HATABS,Y
              JMP %A000 !go to BASIC!
!
!UNICHECK 'OPEN' code
OPEN PHP
        JSR SAVE !save proc stat
        LDA #0 !zero out...
        STA LCOUNT !line counter
        STA TOTLO !checksum total
        STA TOTMD
        STA TOTHI
        STA CHKLO
        STA CHKHI
        LDA #2 !init...
        STA X !multiplier
        LDA LFLAG !new line flag
        LDA ICDNOZ !get U1/U2 #
        STA OUTPUT !scrn 2=printer
        BNE ALLDUN !OPEN done!
!
!UNICHECK "CLOSE" code
CLOSE PHP
        JSR SAVE !save proc stat
        LDA LFLAG !new line?
        BNE ALLDUN !yes!
        JSR PLTOTL !print last tot.
        JSR RESTOR !restore proc
        PLP
        LDY MYSTAT !set status
        RTS !all done!
!
!UNICHECK "WRITE" code
WRITE PHP
        STA BYTE !save proc stat
        STA BYTE2 !save incoing
        JSR SAVE !save IOCB stuff
        LDA #0 !clear out...
        STA BCDBYT !BCD byte value
        STA BCDBYT+1
        LDX #2 !this routine
        CLD !converts the
        LDA BYTE2 !binary byte
        CHP DECTBL,X !value to BCD
        BCC NXTDIG !for easier

```



# ASK MR. FORTH



by Donald Forbes

You are now in a position to take over the lectern as a FORTH professor and teach a course to beginners.

The equipment you will need includes: (1) the class textbook—Alan Winfield's 130-page paperback, *The Complete Forth*, from Wiley Press (605 Third Ave., New York, NY 10158); (2) your favorite Atari fig-FORTH; (3) the accompanying road map to insure a safe and comfortable journey for all; and (4) a hat you can pass around that's large enough to hold, in change, the \$16 you laid out for the book.

If you're ready and your audience is ready, we can start right in.

## Hello, class.

Chapter one is devoted to FORTH fundamentals. On page 5, since this is a book about FORTH-79, you encounter NEGATE, which you can define with this code:

```
: NEGATE MINUS ;
```

You then encounter PICK (page 7), which can be defined as:

```
: PICK 2 * SP@ + @ ;
```

and then ROLL, which requires:

```
: ROLL DUP 1 = IF DROP ELSE DUP 1  
DO SWAP R> R> ROT >R >R >R LOOP  
1 DO R> R> R> ROT ROT >R >R  
SWAP LOOP ENDIF ;
```

Here, incidentally, is a philosophical observation on PICK and ROLL made by Leo Brodie in his new book on systems analysis using FORTH, called *Thinking Forth*:

Some folks like the words PICK and ROLL. They use these words to access elements from any level on the stack. We don't recommend them. For one thing, they encourage the programmer to think of the stack as an array, which it is not. . . Second, they encourage the programmer to refer to arguments that have been left on the stack. . . without being explicitly passed as arguments. . . That's unstructured—and dangerous. Finally, the position of an element on the stack depends on what's above it, and the number of things above it can change constantly. . . Code like this is hard to read and harder to modify.

Chapter two describes a simple model of a FORTH system as it executes a line of input. You must remember (page 13) that VARIABLE in fig-FORTH, just like

# ASK MR. FORTH *continued*

CONSTANT, requires an input parameter, so you must write the word VARIABLE as 0 VARIABLE—unless, of course, you choose to add this definition:

```
: VARIABLE 0 VARIABLE ;
```

Redefined words, as Winfield notes on page 17, may generate an error message, provided you've previously added the error messages to your working disk.

The colon definition is the topic of chapter three. He points out that "a colon definition may occupy more than one line of input and, even though we type a 'return' at the end of each line, FORTH does not complete the definition and print 'ok' until after the terminating semicolon."

On some FORTH systems, he says (page 27), CREATE cannot be used in this way, and VARIABLE must be used instead. This means you must replace:

```
CREATE array 40 ALLOT ok
CREATE TABLE -10 , -5 , 0 , 5 , 10 ,
ok
```

with this fig-FORTH code:

```
0 VARIABLE MYARRAY 40 ALLOT ok
-10 VARIABLE MYTABLE
-5 , 0 , 5 , 10 , ok
```

On page 28, you may want to use .DEPTH to print the depth of the stack, instead of .S, which has probably been predefined in your FORTH to give a non-destructive stack print. On that page, you can redefine 2- as:

```
: 2- 2 - ;
```

Winfield's definition of CREATE, you must bear in mind, holds for FORTH-79 but not for fig-FORTH.

FORTH structures are introduced in chapter four, beginning with IF. On page 33, you may want to replace his line:

```
FORTH: A @ 2 = IF ." A=2" THEN
```

with this code:

```
0 VARIABLE A 2 A !
: A@ A @ 2 = IF ." A=2" THEN ;
```

which will execute correctly.

The range test (page 35) will work with this definition:

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```

0 VARIABLE X
: TESTX X @ 10 > IF X @ 100 < IF
  ." yes" THEN THEN ;

```

so that `55 X ! TESTX` will give `." yes"` but any number outside that range will merely return `ok`.

Here is another example of `AND` on that page that you might wish to add:

```

DECIMAL 77 ok
99 ok
BINARY .5 ( print stack)
1001101 1100011 ok
AND .
1000001 ok

```

The range test further down can be defined as:

```

: RANGETEST DUP 0 < SWAP 100 > OR
  IF ." no" THEN ;

```

At the end of this chapter, you must redefine `?DUP` with:

```

: ?DUP -DUP ;

```

FORTH loops are covered in chapter five. You can print as many as 256 squares beginning with 1, 4, 9, . . . (page 43) if you change `.` (dot) to `U.`, but you will overflow if you try 257.

The word `J` is needed (page 45) to access the index of the outer loop, since it is not defined in fig-FORTH, although your version may have it.

```

: J R> R> R> R R# !
  >R >R >R R# @ ;

```

The multiplication table will work with 3 `.R` for proper spacing on Atari's 32-character line (instead of Winfield's 64-character line). The next page refers to `&TERMINAL`, which looks for the break key in Team Atari Forth, but looks for one of the three yellow keys in `valFORTH`. Since your computer uses Atari ASCII (or ATASCII instead of ASCII), you may want to substitute 65 (for A) or 90 (for Z) in place of the 32 (ASCII space) that Winfield uses on page 47. The next page requires this definition:

```

: 0> 0 > ;

```

Note, in closing this chapter, that the word `ABORT`, which corresponds to a warm start, gives the fig-FORTH message.

The sixth chapter discusses saving and loading programs. You may want to skip his section 6.2, The Editor, since you have your own editor, and pick up with his section 6.3, More Block Handling. On page 59, you should specify a 32-character print line (instead of 64) in the definition of `INDEX`.

You can define the word `DATA` with:

```

0 VARIABLE DATA 80 ALLOT

```

which you can then clear with:

```

DATA 40 32 FILL

```

or fill with alphabetic characters, with:

```

: DATA# 40 0 DO I 65 +
  DATA I 2 * + ! LOOP ;

```

You will also need:

```

: MOVE CMOVE ;

```

Then you can choose an unused screen at the end of the disk, say screen 60, to define:

```

: SAVEDATA DATA 60 BLOCK DATA
  40 MOVE UPDATE ;
: LOADDATA 60 BLOCK DATA
  40 MOVE ;

```

If you then fill `DATA` with blanks or alphabetic characters, you can execute `SAVEDATA` and then examine screen 60 to verify that the data was moved. Conversely, you can edit the beginning of screen 60, execute `LOADDATA` and then use `DATA 40 TYPE` to examine the reverse movement. If you execute `60 CLEAR`, followed by `LOADDATA` and `DATA 40 TYPE`, then `DATA` should be filled with blanks.

If you are using `valFORTH`, make sure that your blocks are defined as 1024 bytes and not 512.

### Pause and continue.

The basics of character input and output, as well as number input, are covered in chapter seven.

You must replace Winfield's definition of:

```

: CR 13 EMIT 10 EMIT ;

```

with this Atari version:

```

: CR 155 EMIT ;

```

and, to set tabs, you need to change:

```

: TAB 9 EMIT ;

```

to read:

```

: TAB 127 EMIT ;

```

and, to clear the screen, instead of:

```

: CLRS 12 EMIT ;

```

you'll need:

```

: CLRS 125 EMIT ;

```

Incidentally, `valFORTH` uses `CLS` for the same command.

The fig-FORTH version of `CREATE` requires:

```

: CREATE 0 VARIABLE -2 ALLOT ;

```

as Winfield indicates in his footnote, so that you must define `STRING` as follows, and can use 4 `ALLOT` in place of 6 `ALLOT` (page 66):

```

0 VARIABLE STRING 4 ALLOT

```

For the Atari, you will need to redefine `GETSTR` in this fashion:

# ASK MR. FORTH *continued*

```
: GETSTR 6 0 DO KEY STRING I + C!  
LOOP ;
```

and then you can print the string with `PRINTSTR`.

In fig-FORTH, you need to change `WORD` to read `WORD HERE`, so that the `PRINTNEXT` definition now becomes:

```
: PRINTNEXT 32 WORD HERE COUNT TYPE ;
```

which is what the footnote (page 67) suggests. As Glen B. Haydon notes in *All About Forth* in a comment: "Care must be taken in moving source code from fig-FORTH to FORTH-79, which includes the ideogram `WORD`. In FORTH-79, `WORD` leaves the address of `HERE` on top of the stack. Also, while in fig-FORTH, the string is stored at `HERE`; in FORTH-79 another buffer may be used."

Once again, the `STRING` on page 68 should be defined as:

```
0 VARIABLE STRING 38 ALLOT
```

and then the commands `PUTSTR` and `PRINTSTR` will work as indicated.

On the next page, `INSTR` uses `EXPECT` for an input string (when it's printed by `PRINTSTR`, your FORTH may then put three hearts at the end).

The definition of `INPUT` (page 72) should be replaced with:

```
: INPUT CR ." ?" QUERY 1 WORD HERE  
NUMBER DROP ;
```

In this connection Haydon, in regard to `CONVERT`, notes: "This ideogram replaces the now obsolete (`NUMBER`) in the older fig-FORTH. As you might expect, no error message is given if the numeric text converts to a number larger than 32 bits. Any higher bits are lost."

Number topics, including double and mixed precision arithmetic, as well as formatted number printing, are covered in chapter eight.

FORTH on the Atari will recognize a double number if it contains a decimal point, either embedded or at the end. This convention differs from that used in Leo Brodie's book *Starting Forth*, which, in accordance with polyFORTH usage, looks for (page 164) one of these five punctuation characters (: , - . /) to place the entered value on the stack as a double-length integer. Winfield's second footnote (page 75) makes an allusion to this fact.

Once again, you'll need (page 76) to define:

```
: DNEGATE DMINUS ;
```

The word `U/MOD`, which in FORTH-79 divides a double number by a single number to leave a single precision remainder and quotient, should be redefined as:

```
: U/MOD U/ ;
```

and furthermore, `R@`, which copies a number `n` off the return stack onto the parameter stack, should be redefined as:

```
: RC R ;
```

Formatted number output (page 80) uses a redefinition of `.$` to print a string, which you may want to call `.$$` instead; note that the date `310585.` will print as `/31/05/85.` The definition of `D-` in fig-FORTH is:

```
: D- DMINUS D+ ;
```

since `D+` exists in fig-FORTH. You will need:

```
: 2DROP DROP DROP ;
```

before the end of this chapter.

FORTH stands alone in its ability to define new structures within the language—the topic of the last tutorial chapter, chapter nine. The difference between human languages and computer languages is that all

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human languages are extensible, and computer languages are not—except FORTH.

Because Winfield defines ARRAY and X and TEST multiple times, you may prefer to number them sequentially as ARRAY1, ARRAY2, . . . to avoid possible confusion over error messages or storage locations in memory. You will need to define the first array as:

```
: ARRAY1 <BUILDS 2 * ALLOT
DOES> SWAP 2 * + ;
```

and <BUILDS replaces CREATE (page 88) in his definition of *new\_\_defining\_\_word*. Here are Atari replacements for his defining word definitions:

```
: CONSTANT CREATE SMUDGE , ;CODE
: VARIABLE CONSTANT ;CODE
{ There is no FORTH-79
{ equivalent for ;CODE }
: CVARIABLE <BUILDS , DOES> ;
: CCONSTANT <BUILDS C, DOES> C@ ;
: ZVARIABLE <BUILDS 4 ALLOT DOES> ;
: Z@ DUP 2+ @ SWAP @ ;
: Z, HERE 2 ! 4 ALLOT ;
: ZCONSTANT <BUILDS 2, DOES> Z@ ;
```

Here are fig-FORTH versions of the double number fetch and store operations (page 89):

```
: Z@ DUP 2+ @ SWAP @ ;
: Z! SWAP OVER ! 2+ ! ;
```

Once again, replace CREATE with <BUILDS (pages 89 and 90). You'll want to define an array called READINGS with ten elements as follows, to be used later (page 93):

```
10 ARRAY# ( array name ) READINGS
9 0 READINGS ! 8 1 READINGS !
7 2 READINGS ! 6 3 READINGS !
5 4 READINGS ! 4 5 READINGS !
3 6 READINGS ! 2 7 READINGS !
1 8 READINGS ! 0 9 READINGS !
```

Although WORD became WORD HERE earlier (see page 69), the definitions of INPUT\$ and PUT\$ will work as shown.

The CONTINUE? routine to test for *continue yes/no* can be checked with this definition:

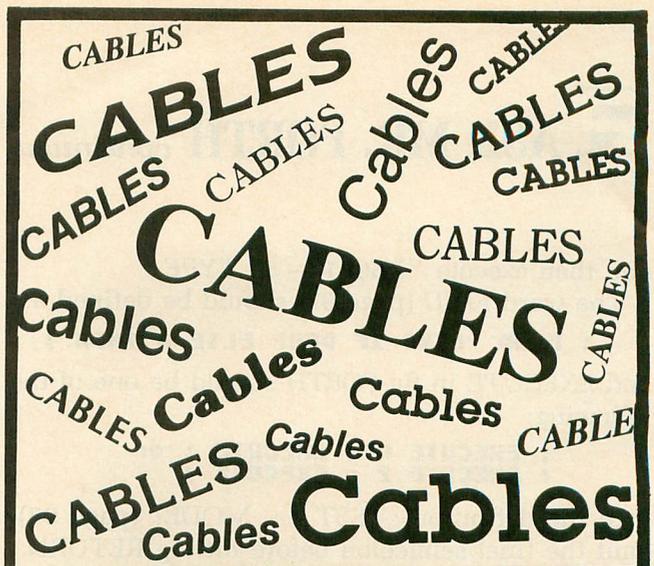
```
: YESNO 5 @ DO CR CONTINUE? CR LOOP ;
```

The definition of AVERAGE (page 93) should be changed to 10 0 DO, because you will be using 0-based indexing.

When you CREATE NULL (page 95), you can look at it in memory with HERE 6 - 4 TYPE where the inverse L signals the end of the name field. You can examine the code in memory for XSQ (page 96) with 'XSQ. (tic XSQ dot) to find the starting address and then define:

```
: HEXDUMP ( startadr endadr-- ) HEX
DO I C@ . SPACE LOOP DECIMAL ;
```

(continued on next page)



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# ASK MR. FORTH *continued*

and then execute 'XSQ 10 - 50 TYPE.

The word FIND (page 97) should be defined as:

```
: FIND -FIND IF DROP ELSE 0 THEN ;
```

and EXECUTE in fig-FORTH should be one of the following:

```
: EXECUTE CFA EXECUTE ; OR
: EXECUTE 2 - EXECUTE ;
```

In the definition :TEST 4+ MODE? (page 98), omit the final semicolon before hitting RETURN.

The table of code field addresses (page 99) can be executed with this amended (fig-FORTH) version of Winfield's code. Note that the example words each have five (5) characters, including blanks.

```
0 VARIABLE VECTORS 1 ZERO ONE TWO 1
: GOVECTOR 18 * ' VECTORS + 58 -
  CFA EXECUTE ;
```

The definition in the fig-FORTH Installation Manual of LITERAL (if compiling, create literal) is:

```
: LITERAL STATE 0 IF COMPILER LIT ,
  ENDIF ;
```

in which LIT is a primitive to push the following literal to the stack.

The last example in the chapter will work with this code:

```
: CATS ." cats " ;
: .PFA [COMPILE] CFA EXECUTE ;
.PFA CATS cats ok
```

Here are some final fig-FORTH definitions to make the list complete:

```
: EXIT R) DROP ;
: NOT 0= ;
: SAVE-BUFFERS FLUSH ;
: D< D- SWAP DROP 0< ;
: U< 0 SWAP 0 D< ;
: U. 0 D. ;
: DEPTH ( Team Atari Forth )
  234 SPE - 2 / ;
```

## Another (brief) pause.

Winfield concludes his book with two application programs: a largely mathematical calendar program and a video game that relies heavily on high speed graphics and, as he notes, is implementation dependent.

(continued on page 89)

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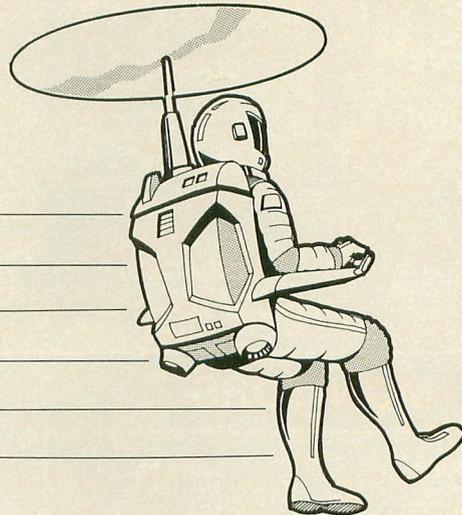


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# R. C. T. O.



---

by Mike Stortz

---

- 1996: Kara Hyke leaves show business after losing out in a disputed Oscar award.  
1997: Kara Hyke enrolls at M.I.T.  
2010: Kara Hyke discovers semi-matter.  
2016: Hyke-Grey effect discovered.  
2021: Hyke-Grey drive invented.  
2030: Hyke and Grey found Arcadia on Proxima III.  
2065: Hamner scout ship attacks Arcadia and is driven off after extensive damage to the city. Work on the shield begins.  
Today: Hamner fleet attacks Arcadia...

*Deep in caverns under Arcadia, fuel cannisters of semi-matter ore to power the city's defensive shield have been cached away against the day when the aliens would return. Composed of mixed-charge matter, hyke (as it is called) is easily persuaded to annihilate itself in the manner of matter-antimatter reactions, but is more easily stored.*

*Now that the attack has begun, brave volunteer retrievers must don helipacks, fly down into the caves and bring up the ore, so that Arcadia may not fall.*

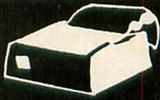
(continued on page 27)

---

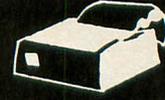
At 25, Mike Stortz is the P.D. Librarian for GRASP, the Richmond, Virginia Atari users group. Seemingly unable to find work in the programming field, he is working on about thirty projects at once, including a graphic arcade/adventure game.

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## R.O.T.O. *continued*

**R.O.T.O.** is a game of coordination, reflexes, timing and a hint of strategy that should keep you going for a while before Arcadia can claim victory.

Plug in your Action! cartridge and type in Listing 1. Action! is forgiving about case, spacing and line divisions, so you need not slavishly follow the format of the listing (which is compressed somewhat for purposes of publication).

*SAVE it before attempting to RUN it!* If you try to run **R.O.T.O.** from memory, the source code will be overwritten and ruined, causing much gnashing of teeth. Because **R.O.T.O.** is so large, it must be compiled off of disk or cassette.

### For disk.

After typing **R.O.T.O.** in, save it with the command CTRL-W and type in the filename "ROTO.ACT" then RETURN. SHIFT-CLEAR the editor, enter the monitor with the CTRL-M command, enter C "ROTO.ACT" and RETURN. This will compile **R.O.T.O.** into machine language. Now, save the compiled version by typing W "ROTO.AML" and RETURN. AML stands for Action! machine language. To run **R.O.T.O.** now, just type R and RETURN. In the future, simply type CTRL-M to enter the monitor, D and RETURN to go to DOS, and then binary loading the file ROTO.AML from DOS by using the L command in DOS 2 or DOS 3—or type LOAD ROTO.AML if you have DOS-XL.

### For cassette.

Type in **R.O.T.O.** and save it with the CTRL-W command. Do not use the "Screen Off?" option; it will upset the tape timing. Rewind your tape, press PLAY and RECORD, give the filename 'C:' and RETURN.

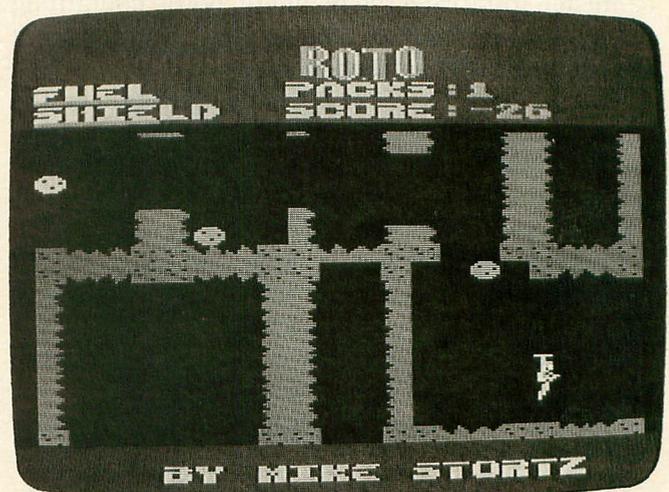
Go have lunch while the source code's being saved (about fifteen minutes). Come back, clear memory with the SHIFT CLEAR, and enter the monitor with the CTRL-M command.

Rewind the tape containing the **R.O.T.O.** source code, press PLAY, type in R "C:" and RETURN. Have some more lunch. The computer is rereading the source code, compiling it as it does. When it's finished compiling, the game will automatically start.

In the future, you may play **R.O.T.O.** by inserting the tape containing the source code into the recorder and typing the R "C:" command.

### Playing R.O.T.O.

After beginning, you should see the **R.O.T.O.** logo and your man flying about it, while an explanatory message scrolls beneath. You may begin by pressing the START button or the fire button on joystick 1. You will see a portion of a cavernous network and four green blocks with Hs on them. This is the fuel intake.



R.O.T.O.

Cannisters of hyke are scattered about the caves. They look like the fuel intake, except that they're glowing. Pick up these cannisters by touching them, then return to the intake and touch it. This advances your score and charges the shield in accordance with however many cannisters you've deposited.

Each cannister is worth fifty points. Returning one also refuels your helipack. Picking up more than ten cannisters before depositing them will cause their magnetic fields to interact with explosive results.

Your man moves up, down, left, right and diagonally in all directions, although he moves downwards faster than up. Moving against the screen's border will scroll more caverns into view, although you'll automatically stop at the far ends of the caves.

Don't run into a wall, or you'll lose a helipack. Watch your fuel, too. Running out will produce the expected effect.



Your retriever is also equipped with a molecular debonding device to facilitate going through rock. Press the fire button to let off a shot. The debonder will vaporize any chunk of rock you fire on, but you will lose a point for every piece of the caves you eliminate (because you're reducing their structural integrity).

Unfortunately, the debonder will also affect a fuel cannister. Rupturing the magnetic bottle containing the hyke will produce a large explosion and prevent anyone else from retrieving fuel.

Also, attacks from the alien fleet will shake the caves periodically, causing rocks to break loose from the ceiling. Shooting rocks is worth one point each (for cleaning up). Don't run into them, and be careful that the tremors don't send you into a wall.

Pressing any key while a game is in progress will pause it. Press another key to resume play. If you want to begin again, press START.

If you play well and retrieve enough cannisters to top 1000 points, the shield will have stayed up long enough for reinforcements to arrive—and the city will be saved.

On the other hand, if you wreck while hauling cannisters, you could deplete the ore supply so that victory is impossible.

Remember which portions of the caverns you've mined out, and definitely recall the way back to the fuel intake. The cave network is generated randomly each game, so expect variety.

R.O.T.O. may end in five ways:

- (1) Most frequently, you run out of helipacks (while there are many volunteers, there are only three of the sophisticated flying apparatuses).
- (2) The shield is battered down. This happens when you don't retrieve enough ore.
- (3) A fuel cannister is shot.
- (4) You carry more than ten cannisters at once.
- (5) The least common... Arcadia holds out, and the aliens are defeated—this time!

### That's it!

Action! deserves a word of praise here. R.O.T.O. was designed half in advance and half as I thought of another feature to put in. The excellent editor made

even major reshuffling and splitting of routines easy.

I shudder to think what I would have gone through using a conventional assembler. Even when the source code became too large to co-reside with the object code, I could compile off of my Axlon RAMDisk with little loss of development time.

The author would appreciate any letters of business offers, extravagant praise, or, failing that, constructive comment. Have fun and save Arcadia! □

### Listing 1. Action! listing.

```

; R.O.T.O.  by Mike Stortz

SET $000E=$4000
SET $0491=$4000

DEFINE bytes="64",lines="80",
        rock="194",pmb_page="128",
        cb_page="128",cb_adr="32768",
        dl_page="136",dl_adr="34816",
        misc_page="137",misc_adr="35072",
        sc_page="140",sc_adr="35840"

BYTE
rtclok=$14,atract=$40,lmargin=$52,
rowcrs=$54,dindex=$57,sdmctl=$22F,
gprior=$26F,crsinh=$2F0,
ch=$2FC,gractl=$D01D,
hitclr=$D01E,consol=$D01F,
audctl=$D208,skstat=$D20F,
pmbase=$D407,wsync=$D40A,
vcount=$D40B,nmien=$D40E,
chbas=$2F4,chbase=$D409,
hscrol=$D404,vscrol=$D405,
pcolr0=$2C0,pcolr1=$2C1,
pcolr2=$2C2,pcolr3=$2C3,
colpm0=$D012,colpm1=$D013,
colpm2=$D014,colpm3=$D015,
colr0=$2C4,colr1=$2C5,
colr2=$2C6,colr3=$2C7,
colr4=$2C8,
colpf0=$D016,colpf1=$D017,
colpf2=$D018,colpf3=$D019,
colpf4=$D01A

BYTE ARRAY hposp=$D000,mxpf=$D000,
           hposm=$D004,pxpf=$D004

CARD colcrs=$55,savmsc=$58,
     vds1st=$200,sds1st=$230,
     txtmsc=$294

BYTE i,j,k,l,cx,cy,x,y,xs,xsm,ys,joy,
     phase,mc,face,flag,bak,fore,
     fuel,packs,enable,whine,
     carried,end,cans,fallc,shake,
     shakec

```

```

BYTE ARRAY 1090=
[85 85 88 88 88 88 85 85
128 96 88 88 88 88 96 128
0 5 21 88 88 88 88 88
0 128 96 88 88 88 88 88
0 149 149 2 2 2 2 2
0 85 85 80 80 80 80 80
2 9 37 37 37 37 37 37
80 84 37 37 37 37 37 37
85 89 88 88 88 88 0 0
128 96 88 88 88 88 88 1
88 88 88 88 88 88 21 5
88 88 88 88 88 88 96 128
2 2 2 2 2 2 2 66
80 80 80 80 80 80 80 80
37 37 37 37 37 9 2 64
37 37 37 37 37 84 80 0],

```

```

cset=
[ 0 124 198 198 198 198 254 124
0 56 120 120 56 56 124 254
0 124 206 28 56 112 254 254
0 254 28 56 28 206 254 124
0 28 60 124 220 254 28 28
0 254 192 252 14 206 254 124
0 124 192 252 206 206 254 124
0 254 14 28 56 112 112 112
0 124 198 124 198 198 254 124
0 124 206 126 14 30 124 120
0 56 124 206 206 222 206 206
0 252 14 252 206 206 254 252
0 124 254 198 192 198 254 124
0 248 220 206 206 222 220 216
0 126 252 0 240 192 252 126
0 126 252 0 252 248 224 224
0 126 224 224 238 230 254 126
0 230 230 238 230 230 230 230
0 254 56 56 56 56 254 254
0 14 14 14 14 206 254 124
0 238 238 252 240 252 238 238
0 224 224 224 224 224 252 254
0 198 238 254 214 238 238 238
0 198 230 246 254 238 230 230
0 124 198 198 198 198 254 124
0 252 6 254 252 224 224 224
0 124 198 198 198 204 254 118
0 252 6 254 252 238 238 238
0 126 0 248 126 14 254 252
0 254 0 56 56 56 56 56
0 230 230 230 230 230 254 254
0 230 230 230 230 254 124 56
0 198 198 214 254 238 198 198
0 198 238 124 56 124 238 198
0 230 230 124 56 56 56 56
0 254 28 56 112 224 254 254
0 0 0 0 0 0 0 0
255 255 187 255 223 255 251 255
60 126 223 253 255 247 126 60
255 255 255 255 255 123 49 0
255 255 255 255 222 158 12 8
63 127 127 127 63 31 63 127
127 63 63 31 63 127 63 31
0 49 123 255 255 255 255 255
8 12 158 222 255 255 255 255
254 252 248 248 252 254 252 248
248 252 254 254 252 248 248 252
0 0 32 80 255 126 68 34
4 12 30 56 16 16 32 64
0 0 4 10 255 126 34 68
32 48 120 28 8 8 4 21],

```

```

man0=
[ 0 254 16 16 28 24 28 20
24 36 42 46 52 0 0 8
8 16 16 0 0 0 0 0
0 127 8 8 56 24 56 40
24 36 84 116 44 0 0 16
16 8 8 0 0 0],

```

```

man1=
[ 0 254 16 16 16 20 20 20
16 48 49 48 48 8 24 16
16 32 32 32 32
0 127 8 8 8 40 40 40
8 12 140 12 12 16 24 8
8 4 4 4 4],
rotor=[254 124 56 16 56 124
127 62 28 8 28 62],
can=[24 60 126 90 195 195 219 255],
dlldata=
[ 112 112 112 68 0 Misc_page
4 6 11 6 139 48],
dlldata2=
[ 112 70 160 Misc_page 136
65 0 dl_page1],
manadr=[0 21],rotoradr=[0 6],
missile,mdata=[3 12 48 192],
mx(4),my(4),id(20),ary,screen,dlist
CARD pmb,cb,a,temp,b,high
CARD ARRAY table(bytes),fall(20)
INT xd,yd,oxd,oyd,ii,score,shield
INT ARRAY mx(4)
PROC SetVbv=$E45C(BYTE aa,bb,cc)
PROC Vblank()
[$48] ; PHA
vscrol=ys hscrol=xs+xsm
[$68] ; PLA
[$4C $62 $E4] ; JMP XITVBV
RETURN
PROC Dli()
BYTE d
[ $48
$8A $48 $98 $48 $A5 $AC $48
$A5 $AE $48 $A5 $AF $48 ]
; PHA
; TXA PHA TYA PHA LDA $AC PHA
; LDA $AE PHA LDA $AF PHA
wsync=0
IF vcount<64 THEN
chbase=chbas+2
colpf0=fore
colpf4=bak
IF enable=1 THEN
colpf1=202
colpf2=(rtclock RSH 1)&$3A
colpf3=6
ELSE
colpf1=0
colpf2=0
colpf3=0
FI
ELSE
chbase=chbas
colpf1=202
colpf4=64
FI

```



# R.O.T.O. *continued*

```
[ $68 $85 $AF $68 $85 $AE
  $68 $85 $AC $68 $A8 $68 $AA
  $68]
```

```
; PLA STA $AF PLA STA $AE
; PLA STA $AC PLA TAY PLA TAX
; PLA
```

```
[$40] ; RTI
RETURN
```

```
PROC Wait(BYTE w)
BYTE w1
```

```
w1=rtclock
DO until rtclock=w1+w OD
RETURN
```

```
PROC PmSet()
```

```
sdmctl=62 gractl=3 hitclr=0
pcolr=152 pcolr1=118 gprior=33
pmbase=pmb_page chbas=cb_page
RETURN
```

```
PROC ZeroOut()
```

```
Zero(Missile,1280)
FOR i=0 TO 3 DO
  hposp(i)=0 hposm(i)=0
OD
SndRst()
RETURN
```

```
PROC DoPhase()
```

```
phase==+1
IF phase=6 THEN phase=0 FI
RETURN
```

```
PROC DoScore()
```

```
IF score>1000 THEN end=5 FI
dindex=2
rowcrs=4 colcrs=14 PrintBD(6,packs)
rowcrs=6 colcrs=14 PrintD(6," ")
rowcrs=6 colcrs=14 PrintID(6,score)
```

```
dindex=6
Plot(fuel,5) Plot(shield,7)
RETURN
```

```
PROC ChargeShield()
```

```
IF carried<>0 THEN
  shield==+carried LSH 2
  score==+carried*50 DoScore()
  SndRst()
  FOR i=1 TO 250 step 10 DO
    Sound(3,250-i,10,6)
    Wait(1)
  OD
  Sound(3,0,0,0)
  carried=0 fuel=50 whine=0
  color=1
  Plot(0,5) DrawTo(fuel,5)
  Plot(0,7) DrawTo(shield,7)
  color=0
FI
hitclr=0
RETURN
```

```
PROC CheckShake()
```

```
IF Rand(0)=255 AND
  Rand(5)=0 AND
  shake=0 THEN
  shake=Rand(10)+10
  shield==-Rand(20)
  IF shield<0 THEN shield=0 FI
  IF shield=0 THEN end=2 FI
  Plot(159,7) DrawTo(shield,7)
```

```
FI
IF shakec<>0 THEN
  shakec==--1
ELSE
  shakec=60
  IF shakec<>0 THEN
    shake==--1
    j=Rand(10)
    IF fall(j)=0 THEN
      a=table(cy)+cx+Rand(20)
      IF screen(a)=0 THEN
        fall(j)=a id(j)=rock
        screen(a)=rock
      FI
    FI
    Sound(2,255-shake,2,6)
    xsm=Rand(5)
  ELSE
    xsm=0
    Sound(2,0,0,0)
  FI
FI
RETURN
```

```
PROC CheckFuel()
```

```
IF (rtclock=0 or rtclock=128) AND
  fuel<>0 THEN
  DoScore() fuel==--1
FI
RETURN
```

```
PROC EndGame()
```

```
Zero(Misc_adr+80,80) ZeroOut()
dindex=2 rowcrs=4 colcrs=0
IF end=1 THEN
  PrintDE(6," NO PACKS LEFT")
ELSEIF end=2 THEN
  PrintDE(6," SHIELD DEPLETED")
ELSEIF end=3 THEN
  PrintDE(6," CANNISTER RUPTURED")
ELSEIF end=4 THEN
  PrintD(6," TOO MANY CANNISTERS")
ELSEIF end=5 THEN
  PrintDE(6," ARCADIA THANKS YOU")
FI
PutDE(6) PrintDE(6," game over")
FOR a=1 TO 400 DO
  Sound(0,a RSH 1,8,6)
  DO UNTIL vcount=128 OD
  FOR i=0 TO 60 DO
    colpf0=vcount+rtclock
    wsync=0
  OD
OD
RETURN
```

```
PROC GetDir()
```

```

joy=15!5tick(0) xd=0 yd=0
IF (joy&8)(<)0 THEN xd=1 FI
IF (joy&4)(<)0 THEN xd=-1 FI
IF (joy&2)(<)0 THEN yd=2 FI
IF (joy&1)(<)0 THEN yd=-1 FI
IF xd(<)0 or yd(<)0 THEN
  oxd=xd oyd=yd
FI
RETURN

```

#### PROC Scroll()

```

IF (joy&4)(<)0 THEN xs==+1 x==+1
  IF xs=8 THEN
    IF cx=0 THEN xs==--1
    ELSE cx==--1 xs=0
    FI
  FI
ELSEIF (joy&8)(<)0 THEN xs==--1 x==--1
  IF xs=255 THEN
    IF cx=44 THEN xs==+1
    ELSE cx==+1 xs=7
    FI
  FI
FI
IF (joy&2)(<)0 THEN ys==+1 y==--2
  IF ys=8 THEN
    IF cy=68 THEN ys==--1
    ELSE cy==+1 ys=0
    FI
  FI
ELSEIF (joy&1)(<)0 THEN ys==--1 y==+1
  IF ys=255 THEN
    IF cy=0 THEN ys==+1
    ELSE cy==--1 ys=7
    FI
  FI
FI
DO UNTIL vcount=128 OD
ary=@a a=screen+table(cy)+cx j=12
FOR i=0 TO 17 DO
  dlist(j+1)=ary(0)
  dlist(j+2)=ary(1)
  j==+3
  a==+bytes
OD
RETURN

```

#### PROC MoveMan()

```

Zero(pmb+y,26) Zero(pmb+256+y,26)
x==+xd y==+yd
hposp(0)=x hposp(1)=x
IF xd>0 THEN face=0
ELSEIF xd<0 THEN face=1 FI
a=pmb+y+(phase R5H 2)
temp=manadr(face)
MoveBlock(a,man0+temp,21)
MoveBlock(a+256,man1+temp,21)
a=pmb+y+1
a==+phase R5H 2
i=rotor(rotoradr(face)+phase)
Poke(a,i) Poke(a+256,i)
Sound(0,phase L5H 2-(yd L5H 3),8,2)
RETURN

```

#### PROC GoBoom()

```

SndRst()
Zero(missile,256) mx(0)=0 mx(1)=0
Wait(30)

```

```

ary=pmb+y
FOR i=0 TO 170 DO
  FOR j=1 to 20 DO
    colpm0=64+Rand(8) L5H 1
    colpm1=64+Rand(8) L5H 1
    wsync=0
  OD
  k=Rand(24) ary(k)==&Rand(0)
  k=Rand(24) ary(k+256)==&Rand(0)
  Sound(1,i,4,6)
  Wait(1)
OD
Zero(pmb,512)
SndRst() pcolr0=152 pcolr1=118
Wait(20) enable=0
FOR i=0 TO 14 step 2 DO
  fore=46-i
  Wait(5)
OD
fore=0 Wait(60) hitclr=0
carried=0 whine=0 shake=0 face=0
packs==--1
IF packs=0 THEN end=1 FI
FOR i=0 TO 19 DO
  screen(fall(i))=0
  fall(i)=0
OD
fuel=50 color=1
Plot(0,5) DrawTo(fuel,5)
color=0
x=84 y=110 cx=0 cy=0 xs=7 ys=0
DoScore() Scroll() MoveMan()
fore=36 enable=1
RETURN

```

#### PROC GetCan()

```

i=x-35 j=y-50
i==R5H 3 j==R5H 3
a=table(j+cy)+i+cx
IF screen(a)=159 THEN
  screen(a)=0
  carried==+1
  IF carried=11 THEN end=4 FI
  whine=200 hitclr=0
FI
RETURN

```

#### PROC Falling(CARD bb)

```

j=screen(bb-64)
IF j=159 OR j=rock THEN
  FOR k=10 TO 19 DO
    IF fall(k)=0 THEN
      fall(k)=bb-64 id(k)=j EXIT
    FI
  OD
  Falling(bb-64)
FI
RETURN

```

#### PROC ZapIt(BYTE zz)

```

attract=0
l=mx(zz)+2
j=mx(zz)-31-1 R5H 2-xs
k=my(zz)-72+ys
j==R5H 3 k==R5H 3
Missile(my(zz))=&255-mdata(zz)
mx(zz)=0

```



# R.O.T.O. *continued*

```

a=table(cy+k)+cx+j
IF screen(a)=159 THEN end=3 FI
IF screen(a)=rock THEN score==+2 FI
bak=70 fore=12
FOR j=0 TO 10 DO
  screen(a)=65
  FOR k=1 TO 100 DO OD
    screen(a)=0
    FOR k=1 TO 100 DO OD
      Sound(1,200,2,15-j)
    OD
  bak=0 fore=36 screen(a)=0
  Sound(1,0,0,0)
  hitclr=0 score== -1 DoScore()
  Falling(a)
RETURN

```

PROC Bump()

```

i=pxpf(0) j=pxpf(1)
IF (i&1)<>0 OR (j&1)<>0 OR
  (i&8)<>0 OR (j&8)<>0 THEN
  GoBoom()
ELSEIF (i&2)<>0 OR (j&2)<>0 THEN
  ChargeShield()
ELSEIF (i&4)<>0 OR (j&4)<>0 THEN
  GetCan()
FI
IF mxpf(0)<>0 THEN ZapIt(0) FI
IF mxpf(1)<>0 THEN ZapIt(1) FI
RETURN

```

PROC StartMiss()

```

IF Strig(0)=0 AND flag=0 THEN
  flag=1 mc==!1
  IF mx(mc)=0 THEN
    missile(my(mc))=&(255!mdata(mc))
    my(mc)=y+10
    missile(my(mc))=%mdata(mc)
    mx(mc)=(x+4+face R5H 3)&254
    mxd(mc)=face L5H 2-2
  FI
FI
flag=Strig(0)!1
RETURN

```

PROC MoveMiss()

```

j=2
FOR i=0 TO 1 DO
  temp=mx(i)
  IF temp<>0 THEN
    temp=-mxd(i) hposn(i)=temp
    IF x>temp THEN
      k=x-temp
    ELSE
      k=temp-x
    FI
    Sound(1,k,12,8)
  ELSE
    j=-1
  FI
  mx(i)=temp
  IF j=0 THEN Sound(1,0,0,0) FI
OD
RETURN

```

PROC MoveRocks()

```

FOR i=0 TO 19 DO
  temp=fall(i)
  IF temp<>0 THEN
    IF screen(temp)=0 THEN
      temp=0
    ELSE
      a=temp+64
      IF screen(a)<>0 THEN
        temp=0
        IF id(i)=159 THEN end=3 FI
      ELSE
        screen(temp)=0
        screen(a)=id(i)
        temp==+64
      FI
    FI
  FI
  fall(i)=temp
OD
RETURN

```

PROC CheckRocks()

```

fallc=-1
IF fallc=0 THEN
  fallc=20 MoveRocks()
FI
RETURN

```

PROC DrawWall(CARD st BYTE cc,in,len)
BYTE ii,jj
CARD tt

```

screen(st)=1
tt=st+in
FOR ii=1 TO len-2 DO
  jj=Rand(2)
  screen(tt)=cc+jj
  tt==+in
OD
screen(tt)=1
RETURN

```

PROC DrawCaves()

```

sdmctl=0 sdslst=dlist
Zero(sc_adr,5120)
Zero(misc_adr,512)
FOR i=0 TO 11 DO
  dlist(i)=dlldata(i)
OD
a=screen j=12
FOR i=0 TO 17 DO
  dlist(j)=64+32+16+6
  dlist(j+1)=a&5FF
  dlist(j+2)=a R5H 8
  j==+3
  a==+bytes
OD
dlist(j-3)=128+64+16+6
FOR i=0 TO 7 DO
  dlist(j+i)=dlldata2(i)
OD
txtmsc=misc_adr
FOR i=0 TO 7 DO
  Poke(misc_adr+17+i,79+i)
  Poke(misc_adr+57+i,87+i)
OD

```

```

rowcrs=2 colcrs=0
PrintE("fuel packs:")
colcrs=0
PrintE("shield score:")
PrintE(" by mike stortz")

dindex=6 color=1
Plot(0,5) DrawTo(fuel,5)
Plot(0,7) DrawTo(shield,7)

a=0
FOR i=0 TO 7 DO
  FOR j=0 TO 15 DO

    k=Rand(32)
    IF (k&16)(<)0 THEN k==%4 FI

    IF (k&1)(<)0 THEN
      DrawWall(a,3,1,4) FI
    IF (k&2)(<)0 THEN
      DrawWall(a+3,5,bytes,10) FI
    IF (k&4)(<)0 THEN
      DrawWall(a+576,7,1,4)
      IF Rand(5)=0 THEN
        screen(a+514)=rock
      FI
    FI
    IF (k&8)(<)0 THEN
      DrawWall(a,9,bytes,10) FI
    IF (K&16)(<)0 AND
      j>0 AND j<15 THEN
      screen(a+513)=159 FI
    a==+4
  OD
  a==+576
OD

FOR a=8 TO 68 STEP 10 DO
  i=(Rand(14)+1) LSH 2
  FOR j=i+1 TO i+2 DO
    screen(table(a)+j)=0
    screen(table(a+1)+j)=0
    screen(table(a+2)+j)=0
  OD
OD

screen(69)=95 screen(70)=95
screen(133)=95 screen(134)=95
PMSet()
RETURN

```

```

PROC Title()
BYTE t

Graphics(21)
PMSet() ZeroOut()
Zero(Missile,1280)
Zero(Misc_adr,3000)
screen=savmsc dlist=sdslst
colr0=150 colr1=146
colr2=40 colr3=68 colr4=64
k=0

FOR i=6 TO 13 DO
  FOR j=8 TO 15 DO
    screen(j*20+i)=logo(k)
    k==+1
  OD
OD
FOR i=6 TO 13 DO
  FOR j=16 TO 23 DO
    screen(j*20+i)=logo(k)
    k==+1
  OD
OD

```

```

dlist(31)=32
dlist(32)=64+32+6
dlist(33)=0
dlist(34)=Misc_page
b=Misc_adr

FOR i=35 TO 43 DO
  dlist(i)=32+6
OD
dlist(44)=6
FOR i=45 TO 52 DO
  dlist(i)=0
OD

dindex=0 lmargin=1
dlist(10)=6
savmsc==+100
PrintD(6,"last ") PrintID(6,score)
colcrs=10
PrintD(6,"high ") PrintCD(6,high)

savmsc=Misc_adr+300
rowcrs=0 colcrs=1

PrintDE(6," reserve ore ")
PrintDE(6,"transport operation")
PrintDE(6," THE CITY OF ")
PrintDE(6,"ARCADIA IS UNDER ")
PrintDE(6,"ATTACK. YOUR JOB ")
PrintDE(6,"IS TO RECOVER FUEL")
PrintDE(6,"CANNISTERS OF HYKE")
PrintDE(6,"AND RETURN THEM TO")
PrintDE(6,"THE UPPER LEFT END")
PrintDE(6,"OF THE CAVERNS. IF")

savmsc==+400 rowcrs=0 colcrs=1
PrintDE(6,"YOUR SCORE EXCEEDS")
PrintDE(6,"1000, ARCADIA HAS ")
PrintDE(6,"HELD OUT LONG ")
PrintDE(6,"ENOUGH FOR HELP TO")
PrintDE(6,"ARRIVE. DON'T ")
PrintDE(6,"SHOOT A CANNISTER ")
PrintDE(6,"OR CARRY MORE THAN")
PrintDE(6,"10 AT A TIME, AND ")
PrintDE(6,"DON'T RUN INTO A ")
PrintDE(6,"WALL. GOOD LUCK!")

savmsc==+400 rowcrs=0 colcrs=1
PutDE(6)
PrintDE(6," press START")
PRINTDE(6," to play")

```

```

x=86 y=58 yd=-1 xd=0 ys=0 xs=0
phase=0 l=0

DO
  IF yd=-1 THEN
    yd=0 xd=2 gprior=36
  ELSEIF yd=1 THEN
    yd=0 xd=-2 gprior=33
  ELSEIF xd=-2 THEN
    xd=0 yd=-1
  ELSE xd=0 yd=1
  FI
  FOR t=0 TO 39 DO
    IF xd=-2 and x=150 THEN
      gprior=36
    FI
    IF xd=-2 and x=116 THEN
      gprior=33
    FI
    MoveMan()
    DoPhase()
    l==+1
    IF l=2 THEN
      l=0 ys==+1
    FI
    IF ys=8 THEN

```



# R.O.T.O. *continued*

```

ys=0
b==+20
IF b=Misc_adr+1320 THEN
  b=Misc_adr FI
DO UNTIL vcount=128 OD
dlist(33)=Peek(@b)
dlist(34)=Peek(@b+1)
FI
Wait(2)
IF consol=6 OR 5strig(0)=0 THEN
  EXIT
FI
OD
UNTIL consol=6 OR 5strig(0)=0 OD
ch=255 SndRst()
RETURN

```

## PROC Init()

```

skstat=3 audctl=0 high=0 score=0

MoveBlock(cb_adr,57344,1024)
MoveBlock(cb_adr+128,cset,80)
MoveBlock(cb_adr+264,cset+80,208)
MoveBlock(cb_adr+512,cset+288,120)
MoveBlock(cb_adr+632,logo,128)
MoveBlock(cb_adr+760,can,8)

pmb=pmb_page*256+1024
missile=pmb-256

a=0
FOR i=0 TO 79 DO
  table(i)=a
  a==+bytes
OD

SetVbv(7,Vblank RSH 8,Vblank&$FF)
vdslst=Dli nmien=192
RETURN

```

## PROC LoopInit()

```

colr0=68 colr1=40 colr4=64
screen=sc_adr dlist=dlist_adr
savmsc=Misc_adr
PMset() ZeroOut()
phase=0 face=0 mc=1 flag=0
cx=0 cy=0 xs=7 ys=0 x=84 y=110
bak=0 fore=36 enable=1 fallc=1

```

```

packs=3 score=0 fuel=50 shield=50
whine=0 carried=0 end=0
shake=0 shakec=0 xsm=0
FOR i=0 TO 19 DO
  id(i)=0 fall(i)=0
OD
MX(0)=0 mx(1)=0
RETURN

```

## PROC GameLoop()

```

vdslst=Dli nmien=192
GetDir()
IF fuel=0 THEN
  yd=2 joy==%2
ELSE
  DoPhase()
FI
MoveMan()

IF x<70 OR x>176 OR
  y<90 OR y>172 THEN
  Scroll()
ELSE
  Wait(1)
FI

CheckFuel()
CheckShake()
CheckRocks()
StartMiss() MoveMiss()
Bump()

IF whine<>0 THEN
  whine==--1
  Sound(3,whine,10,4)
  IF whine=0 THEN
    Sound(3,0,0,0)
  FI
FI
IF ch<255 THEN
  ch=255 SndRst()
  DO UNTIL ch<255 OR
    consol<>7 OR
    5strig(0)=0 OD
  ch=255
FI
RETURN

```

## PROC Game()

```

Init()
DO
  Title()
  Graphics(0) crsinh=1
  LoopInit()
  DrawCaves()
  DoScore()
  color=0
OD
GameLoop()
UNTIL consol<>7 OR end<>0 OD

IF end<>0 THEN EndGame() FI
IF score>0 AND score>high THEN
  high=score
FI
OD
SetVbv(7,$E4,$62)
ZeroOut() Graphics(0)
RETURN

```



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# ON-LINE

## The *wheres*, *whys* and *whens* of software publishing

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by Russ Wetmore

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Recently, there was a public "CO" (a real-time discussion held on CompuServe, between CompuServe users) in the Family Computing Special Interest Group, relating to software piracy. A CO is, more often than not, just an informal get-together of computer enthusiasts. Sometimes, as in the case of the Family Computing CO, it is an advertised formal discussion about a particular subject, to which industry experts are invited to impart knowledge to others.

One of the things that came out in this discussion, which I've heard before, is that software is "too expensive." Consumers, especially in the case of computer software, sometimes fail to see the costs involved in the total production and, instead, focus on only the costs of the materials involved. "If the disk only costs a dollar, and the packaging another dollar, how can they justify selling it for one hundred dollars?"

### **Wholesale vs. retail.**

The concept of wholesale/retail is a time-honored one, a direct consequence of our free market system. The idea is simple.

A manufacturer doesn't want the massive headaches of trying to distribute his own product directly to the buying public. Unless the manufacturer is prepared to open sales outlets in every town in America, he must rely on dealers to sell

the product for him. That way, the consumer can go to a local store, see the product and ask questions about it before purchasing.

Dealers, however, aren't in it for fun. They must make a profit on their sales. In order to do this, they have to get a discount from the manufacturer, below the normal asking (retail) price. This is called "wholesale."

However, you can imagine what it might be like for a manufacturer to do business with the thousands of individual dealers—keeping orders straight, tracking down the inevitably late payments, maintaining technical service, etc. It would take a large staff dedicated solely to these tasks, not to mention the expense and the drain on resources involved.

In addition, a particular dealer would have to interact with a different publisher for every individual piece of software carried. A store owner would be faced with the ominous task of knowing how and whom to contact at each publisher, keeping track of what had been ordered, received and delayed—and on and on.

A much more sane arrangement involves companies known as "distributors." They deal with many publishers (and, frequently, hardware manufacturers) and make it easy for dealers by offering them one place from which they can order. Thus, manufacturers only have to contact a handful of distributors, whose sole job is to interface with all of the

*On our original \$50, the publisher might make \$4 or \$5, if he's lucky and everything goes like clockwork.*

*It's not as lucrative as it sounds—the number of software publisher failures in the past three years should indicate something to you.*

dealers each supports.

However, distributors aren't in it for fun, either. In order to give their dealers a large enough discount to make a profit (and to compete with those renegade manufacturers who do contact the dealers directly), they have to be able to offer the same discount themselves. This means that manufacturers have to offer distributors an even *larger* discount than the dealer normally gets.

#### **The cold, hard facts.**

Dealers typically get about a 40% discount on software. Distributors usually get an additional 15% to 20%. This means that a publisher only makes about \$20 from a \$50 package.

But you may say, "Twenty dollars is a lot of money! All right, so they aren't making the whole fifty dollars as profit, but twenty is still way too high!"

Yes and no. Out of that \$20 come a lot of expenses. (Also, remember that the numbers we're talking about in sales don't come near to matching the book and record album mega-industries.)

The author gets a cut, in the form of royalties. Depending on the publisher, these costs can range anywhere from 2% of the wholesale price all the way up to 25%. Some authors make more, but not normally with the more established companies.

The disk costs anywhere from 90¢ to \$1.50, depending on the quality of the disk and how elaborate the labelling is. The cost of any accompanying docu-

mentation can vary wildly, from a few cents for a paper insert to several dollars for nicely-bound, color manuals. The packaging costs can vary too, depending on how elaborate that is.

Okay, after the author's cuts and the material costs, the \$20 profit turns into something like \$12. What about the cost to set up the package in the first place?

Somebody wrote the documentation. Somebody drew the illustrations and designed the artwork for the package and manual. If the package is nonstandard, there were costs for creating the dies necessary to cut the packaging materials and documentation.

There are also shipping costs. Once you add all these costs together and amortize them out over the life of sales of the product, the \$12 has turned into \$10.

"Ten dollars! Still a lot of money, seeing as they're going to sell millions."

"No? Okay, hundreds of thousands."

"No? Well, then . . . one hundred thousand."

Guess again. We're talking more like thirty to forty thousand for a better-than-average seller.

Why so few, when there are so many computer owners out there? Lots of the blame for the low amount is attributable to piracy, of course.

Also, studies have shown that people who do the most buying of software do so within the first 180 days that they own their computer. At that point, they

have either put the thing on a closet shelf, have gotten interested in programming it themselves, feel that they have plenty of software already, or have found a pirate friend with an adequate supply of stolen software.

For whatever reason, to get back to the original discussion, an additional cost is advertising and marketing. Most software advertising is done via magazines. A typical cost for a full page, full color advertisement goes from \$2,500 for the smaller magazines all the way up to over \$10,000 for the more widely read national publications.

Marketing the product means, basically, bringing the product to the consumer's attention so that he or she will go looking for it. Many times, this takes the form of displaying at trade shows and conventions, rebates, special sale prices, and additional discounts or advertising subsidies to distributors and dealers, to make it more enticing for them to push the product harder.

The publisher generally has a formula for how much all of this is going to cost, based on the projected sales (which, as you can probably tell, is more a cross-your-fingers, gut-wrenching guess than an educated, bankable projection). The figure is normally 5% to 15% of their expected revenues.

Okay, now we're down to about \$8.

The publisher generally isn't a single person working out of a room in his house. He has an office to pay a mort-

# ON-LINE *continued*

gage on, rentals like warehouse space and vehicles, employees who demand to be paid weekly, insurance, equipment and its upkeep, utilities like phones and power, etc.

There has to be a small amount earmarked as contingency funds, in case a product doesn't go over as big as was hoped (you can't expect a winner every time).

With the complex business packages, a lot of companies find it necessary to send tutors out into the field to teach dealers and their employees how to use the product, let alone sell it.

There are taxes, business trips, lawsuits (you'd be surprised how many crop up in this industry) and the myriad other expenses usually lumped together into what's called "overhead."

So, on our original \$50, the publisher might make \$4 or \$5, if he's lucky and everything goes like clockwork.

If a program is a best seller, he might see a couple of hundred thousand dollars as clear profit. If the program is a dog or doesn't sell as he thinks it should have, he might even lose money on the project.

So, before you cringe at the cost of the latest piece of software that you just "have" to have, think about what went into getting it from the programmer's dream to your corner computer store's shelves.

It's not as lucrative as it sounds—the number of software publisher failures in the past three years should indicate something to you. And, as a parting note, I think that it's obvious that a lot of companies would be a lot healthier (and would be able to charge less for their products) if consumers didn't steal them. □

Russ Wetmore has been involved in the home computer industry for over six years. He's probably most widely known for his best-selling, award-winning Atari game program **Preppie!** He has also shown his talent as a composer/arranger whose work has been heard on national TV. Russ is President of Star Systems Software, Inc., a research and development firm specializing in entertainment and home productivity programs for a host of computers.

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by Jim Haney

When I purchased my Atari 800 two years ago, an Atari 410 recorder served as the mass storage device. We are all painfully aware of this device's limitations—slow I/O times and the inability to name files. After several months and much explaining to the family financial planner (commonly known as “wife”), funds were provided for the purchase of an Atari 810.

The increase in speed, reliability and storage capacity was phenomenal. The addition of the 810 actually raised my Atari from a simple game machine to a viable computer system capable of word processing, financial management and many other high-level programs.

My system kept expanding; the addition of an 850 interface, printer and modem, with the attendant growth of software, soon caused dissatisfaction with the limitations imposed by having only one disk drive. Each month when **ANALOG Computing** came, hours were spent drooling over advertisements for drives.

There were drives which displayed readouts and flashing tri-colored LEDs. However, they all had one major flaw: only *one* drive. There was *no* way to convince the financial planner to buy another single unit drive. Then I saw it! The **Astra 1620** appeared—the answer to my dilemma.

The package arrived, extremely well packed. The **Astra 1620**, as received, comes with several things that I feel are worthy of comment. The interconnecting cable is approximately five feet long, allowing the flexibility needed to place the drive conveniently. Also, as the power supply is contained within the unit, a six-foot cord aids in this flexibility.

The **Astra's** physical measurements closely approximate those of one 810, but, in double density mode, it's equal

to four of them. Installation in the cabinet section of my L-unit desk was accomplished with ease. The **1620** rests on the same shelf previously occupied by the 810.

Two other items of note were the inclusion of software, **SMARTDOS** and **HOMEWRITER**. **SMARTDOS** is now the only DOS I use.

It is menu-driven, similar to Atari DOS 2.0. However, at that point the similarity ends. **SMARTDOS** allows such feats as testing individual sectors and duping those sectors. Try that on your 810.

The **Astra 1620** is a no-frills unit enclosing a power supply, two half-height drives and a controller board. The control panel consists of an on/off switch with a red LED. Each half-height drive also contains on its front panel one LED.

On power-up, the drives' LEDs glow momentarily. The **1620** is virtually silent. Even if reading unformatted sectors on commercial programs, nary a sound is heard.

The rear panel contains the standard Atari connector for attaching interfacing cables. There is also an additional connector for daisy-chaining other Atari items, such as an 810, 410, etc. My old 410 remains happily connected to the rear of the **Astra** and accepts all commands from the 800.

I mentioned that the **1620** was a no-frills drive. Well, let me qualify that. It doesn't give digital readouts of sectors... **SMARTDOS** does. A full explanation of **SMARTDOS** would require a separate review, and I really want to discuss the **Astra** itself, as well as the superb support offered by its manufacturer.

The bottom line—have I encountered any difficulties with the **Astra**? Yes. **Blue Max**, a commercial program, would not

work with the **1620**. This is the only commercial program with which I've had problems. My **Astra** is an early model and, as such, did not have the modifications which are currently built into those now being shipped.

I also had a complete disk drive failure. The **Astra** uses belt-driven drives. After about six months, the screw which holds the driven flywheel worked loose, allowing the belt to come off. Since I'm an FCC-licensed technician and didn't want to spend \$45.00 an hour, I decided to open the beige box myself.

I found the loose screw, replaced it and re-installed the belt (the locktight applied by the factory had apparently missed its mark; the second drive was tight), and the drive worked perfectly sitting on my desk sans cabinet.

The controller board is inverted below the second drive, its front edge near the on/off switch. Upon re-installing the drives in the cabinet, contact was made with this switch and the controller board. When the power was applied, our house plunged into darkness!

I relate this to warn those who may have an early model **Astra**. I was now without a drive and back to the 410 (for which I had no backup copies). Disassembly bore out my worst fears. The 110V house current had lifted one resistor, burnt through a ground bus, then sent unwanted voltage to all the components. The board was *shot*. At this point, I deemed a call to Astra in order.

I was connected to Mr. Drew Featherston, an Astra executive. On hearing my problem, he promised to swap boards for a mere \$50.00 plus tax. I was elated; controller boards do not come cheaply.

The factory is located in Santa Ana, a mere twenty miles or so for me. One note: you must call Astra prior to show-



ing up or shipping equipment back, as you need a Return Goods Authorization number.

On arrival, I was impressed by the friendly and very helpful attitude of these busy people. Drew was interested in my problem and offered a tour of the manufacturing facility. He pointed out several modifications which have been made since my model sat on the assembly line.

One caught my eye—the heat shrink tubing placed around the on/off switch to prevent just such an accident as mine. He also indicated additional venting areas molded into the newer cabinets. Although my drive has never exhibited any problems attributable to heat, Drew explained that it was more for the owners' peace of mind. Also noted was the strengthening of the cabinet at several critical points.

I related my problems with **Blue Max** and was told that the correction was simple. At the time of manufacture, my

drive's speed was set at 300 RPM. Slowing the drives to 290 RPM would correct my problem. All drives currently made are set to this speed.

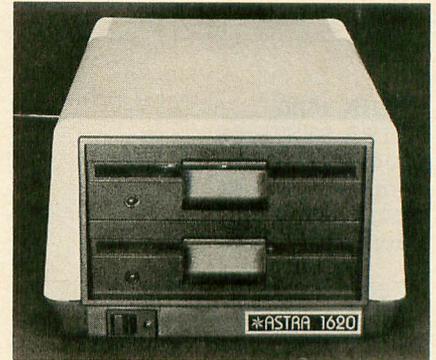
Back at home, I covered the errant switch with heat shrink tubing, then reinstalled the new controller board and *voila!* The disk drive was recognized by the 800 once again.

The speed of the drives can be adjusted by turning the small brass screw that protrudes from the multi-turn potentiometer at the underside of each drive. These potentiometers are located next to bright orange capacitors. **SMARTDOS** has a speed check program included.

To perform this speed reduction requires that your drives be completely outside their cabinet, along with the controller board. Do not attempt it if you don't feel completely qualified, or you, too, may have to pay a visit to the Astra plant.

When I finished the adjustments, **Blue Max** loaded and performed exactly as it

did on the 810. All my other programs to include **Flight Simulator II** from sub-LOGIC perform flawlessly on the **Astra**.



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Am I satisfied with the **Astra 1620**? Completely. Would I buy another product from them? Absolutely. For the money, you simply can't beat the **Astra 1620**. With other single-drive units selling for \$398.00, you can pay only \$67.00 more and have a two-drive unit—with the capability of four Atari 810s.

I'd say you can look for some great equipment from our friends at Astra. Not only is the **2001** on the market, but Drew and his company have just started shipping something called the **Big D**. Stay tuned for more!

  
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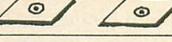
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# Lunar Patrol



by Michael J. Coulson

It is the year 2036. The newest rage in the international Olympics is the contest called **Lunar Patrol**. You've been chosen as the American pilot for this race. Taking off from the Clavius moonbase, your mission is twofold. First, you must go through the circuit, landing on as many of the ten pads as possible in the least time. Second, you must do this using as little fuel as possible. As an added fillip of danger (we have to keep the folks at home happy), this contest could cost your life.

### Setting up the game.

Immediately after typing in the program, **SAVE** it. Once this is done, you may **RUN** it.

**Lunar Patrol** is designed to run on 24K but can be made to run on 16K if Line 800 is changed to 800 **POP :GOTO 450** and all lines after that are deleted.

If you have 24K or more, then you can create your own screens. Using the characters I've set up (or you might add your own) and simple **PRINT** statements, you can make your own lunar bases. Starting at Line 900, you may add as many screens as you like, memory permitting, but you must do the following:



## Lunar Patrol *continued*

(1) Give the colors of the screen in the variables CL1 and CL2;

(2) If you have a fuel tank on your screen (only one), you must give its screen X and Y coordinates to the variables FX and FY, respectively;

(3) The next screen must be fifty lines higher than the start of the last screen, and must be within a fifty-line limit, with a RETURN statement; and

(4) Finally, fifty lines higher than the start of the last screen, place the commands `POP :GOTO 450`

This last command gives the computer a line number to reach, erases the GOSUB, and goes to the congratulation screen.

### Program description.

<b>Lines 40-125</b>	Main loop.
<b>Lines 130-150</b>	Landing routine.
<b>Lines 155-180</b>	Crash routine.
<b>Lines 185-190</b>	Fuel up routine.
<b>Lines 195-225</b>	End game routine.
<b>Lines 230-277</b>	Initialize VBI.
<b>Lines 280-355</b>	Character set.
<b>Lines 360-440</b>	Title screen.
<b>Lines 450-470</b>	Congratulations screen.
<b>Lines 500-900</b>	Game screens.

### Playing Lunar Patrol.

**Lunar Patrol** is a one-player game requiring a joystick in port 1.

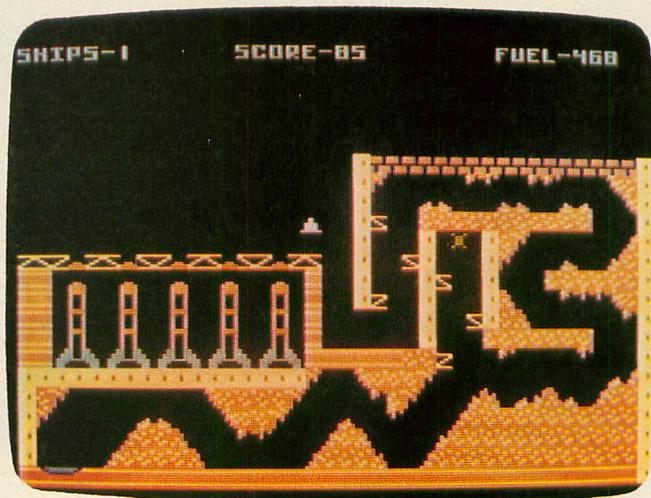
When the program is first run, there will be about a thirty-second delay as the VBI (vertical blank interrupt) and character data is read in. Once the game is ready, the computer will buzz, show you the previous high score and give you some options.

You can choose the starting screen by pressing OPTION. Pressing SELECT will increase the gravity pull. Press START or the trigger, and **Lunar Patrol** will begin. You may return to the title screen by pressing any of the console keys. Pausing the game is accomplished by pressing the SPACE BAR. Hitting it again will resume the game. Moving the joystick left and right rotates the ship left and right, respectively. Pressing the trigger will thrust the ship in the direction it's facing.

The object of **Lunar Patrol** is to maneuver your ship down into the lunar cavern and land it at the base (the grey landing pad) with the nose up. . .easier said than done.

Although you're given five points for about every second you are alive, you must keep a constant eye

on fuel. You are allotted 500 units to land at all eight bases! This fuel is used up quickly, so don't waste time, for if you run out, you'll smash into the lunar cavern—and will have to say good-bye to one of your three ships.



Lunar Patrol

But don't worry too much; there are fuel reserves on each screen (that flashing tank). They give you 200 units of fuel and 300 points. You lose a ship whenever it touches anything but a fuel reserve or the landing pad. After all three ships are lost, the game is over. An ending screen tells you your score and whether it was a high score or not.

Pressing START or the trigger will bring you to the title screen. If all screens were completed, a 10,000-point bonus is awarded, you receive a full tank of fuel and will start over with the gravity increased.

### About the game.

Confidentially, starting with the first screen, the farthest I've ever gotten is the seventh screen. I tried to make the game as difficult as possible, but not impossible. **Lunar Patrol** makes extensive use of Boolean algebra to help it run faster.

The BREAK key was turned off to stop a premature ending of the game. I did this with two POKES in Line 10 which change the interrupt vector for the BREAK key. Disabling the key this way means that you don't need to rePOKE after a graphics statement.

I've chosen an excellent VBI routine (Lines 230-277 by Sid Mier. It uses one USR call, then you have full control over horizontal and vertical movement. It allows you to instantly display another area of the player with simple POKEs. I would like to explain it, but there is too much to it. For a full explanation, see

COMPUTE!'s First Book of Atari Graphics.

Well, that's Lunar Patrol. I hope you enjoy it. ☐

High school freshman Michael J. Coulson is an honor student in New Jersey. With the aid of many books, he taught himself BASIC and is currently studying 6502 machine language. He's had a computer for one and a half years, and finds programming a challenge.

### BASIC listing.

```
1 REM LUNAR PATROL
2 REM by Michael J. Coulson
3 REM for ANALOG Computing magazine
4 REM
10 READ C1,C2,C3,C4,C5,C6,C7,C8,C9,C10
,C16,HCR:CN5L=HCR+C1:POKE 566,143:POKE
567,231
11 DATA 1,2,3,4,5,6,7,8,9,10,16,53278
15 DIM H5$(C10):PLX=53248:PLY=1780:H5$
="0":GP=C2:C20=20:C128=128
20 SC=C1:GOSUB 360:FUEL=500:SC=C0:LF=C
3
25 POKE 559,C0:? "K":POSITION C0,23:GO
SUB SCREEN:POKE 708,CL1:POKE 709,C8:PO
KE 710,CL2:POKE 559,62
30 POSITION C0,C0:? "SHIPS-":LF=C1:POS
ITION 13,C0:? "SCORE-":SC:POSITION 29,
C0:? "FUEL-":FUEL:POKE PLL,C7
35 DRAW=15:X=70:Y=45:DY=0.01:DX=C2:POK
E PLX,X:POKE PLY,Y:POKE PDR,DRAM:POKE
53252,C0:POKE HCR,C0
40 A=STICK(C0):B=5TRIG(C0):POKE 77,C0:
IF NOT FUEL THEN SOUND C0,C0,C0:GO
TO 55
45 IF NOT B THEN DX=DX+(DRAW=C8 OR DR
AW=15 OR DRAW=22)/C5-(DRAW=50 OR DRAW=
43 OR DRAW=36)/C5:SOUND C0,100,C8,C10
50 IF NOT B THEN DY=DY+(DRAW=36 OR DR
AW=29 OR DRAW=22)/C10-(DRAW=C1 OR DRAW
=50 OR DRAW=C8)*0.3
55 IF B THEN SOUND C0,C0,C0
60 DRAW=DRAW-(A=11)*C7+(A=C7)*C7:IF DR
AW<C1 THEN DRAW=50
65 IF DRAW>50 THEN DRAW=C1
70 DY=DY+0.1:IF ABS(DY)>GP THEN DY=5GN
(DY)*GP
75 DX=DX-5GN(DX)*0.02:IF ABS(DX)>C2 TH
EN DX=5GN(DX)*C2
80 X=X+DX:Y=Y+DY:IF X<48 THEN X=200
85 IF X>200 THEN X=48
90 IF Y<45 THEN DY=ABS(DY)
95 POKE PLX,X:POKE PLY,Y:POKE PDR,DRAM
:HIT=PEEK(53252):IF HIT THEN POKE HCR,
C0:GOTO 130
100 SC1=SC1+C1:IF SC1/C10=INT(SC1/C10)
THEN SC=SC+C5:POSITION 19,C0:? SC:SC1
=C0
105 F1=F1+0.5:IF F1/C8=INT(F1/C8) THEN
FUEL=FUEL-C8:FUEL=FUEL*(FUEL)-C1:POS
ITION 34,C0:? FUEL:"":F1=C0
110 POKE 711,PEEK(C20)
115 IF PEEK(CN5L)>C7 THEN SOUND C0,C0
,C0,C0:GOTO C20
120 IF PEEK(764)=33 THEN POKE 764,255:
SOUND C0,C0,C0,C0:FOR I=C0 TO C1 STEP
C0:IF PEEK(764)<>33 THEN NEXT I
125 POP:POKE 764,255:GOTO 40
130 IF HIT<>C2 OR DRAW<>C1 THEN 155
135 Y=Y-C1:POKE PLY,Y:IF PEEK(53252) T
HEN POKE HCR,C0:GOTO 135
140 POKE PLY,Y+C1
```

```
145 FOR I=SCREEN-C10 TO C0 STEP -C10:F
OR J=C1 TO C2:SOUND C0,150,C10,C10:NEX
T J:POSITION 14,C10:? "BONUS ";I;" "
150 SC=SC+C10:POSITION 19,C0:? SC:SOUN
D C0,C0,C0,C0:NEXT I:POKE PLX,C0:POKE
HCR,C0:SCREEN=SCREEN+50:GOTO 25
155 IF HIT=C8 THEN 185
160 IF HIT=C7 OR HIT=15 THEN 100
165 FOR I=65 TO 79 STEP C3:SOUND C0,25
0,C0,ABS(I-79):SOUND C1,200,C2,ABS(I-7
9):POKE 712,I:POKE PDR,I
168 FOR J=C1 TO C10:NEXT J
170 NEXT I:POKE 712,C0:SOUND C0,C0,C0,
C0:SOUND C1,C0,C0,C0:POKE PLX,C0:POKE
PLY,C0:POKE PDR,C1:LF=LF-C1:FUEL=500
175 IF LF>C0 THEN 30
180 GOTO 195
185 FOR I=15 TO C0 STEP -C3:SOUND C0,5
0,C10,I:NEXT I:SC=SC+300:FUEL=FUEL+200
:IF FUEL>750 THEN FUEL=750
190 POSITION FX,FY:? " ":POSITION 19,C
0:? SC:POSITION 34,C0:? FUEL:POKE HCR,
C0:GOTO 40
195 GRAPHICS 17:POKE 82,C0:POKE 87,C0:
? " YOU HAVE FA
ILED":? "
200 ? :? "YOU DID NOT COMPLETE":? "
YOUR MISSION"
205 IF SC>H5 THEN POSITION C2,C7:? "ne
w high score":H5=SC
210 H5$=STR$(H5):POSITION C2,C9:? "hi
gh score":H5:POSITION C2,C10:? "final
score":SC
215 FOR I=C1 TO LEN(H5$):H5$(I,I)=CHR$
(ASC(H5$(I))+C128):NEXT I:H5$(LEN(H5$
+C1))=""
220 IF PEEK(CN5L)=C7 AND STRIG(C0) THE
N 220
225 GOTO C20
230 PM=PEEK(106)-32:POKE 704,12:PLL=17
84:PMBASE=256*PM:IF PEEK(1536)=162 THE
N 250
235 RESTORE 255:FOR I=1536 TO 1706:REA
D A:POKE I,A:NEXT I:FOR I=1774 TO 1787
:POKE I,C0:NEXT I
240 FOR I=PMBASE+1023 TO PMBASE+2047:P
OKE I,C0:NEXT I:DRMBA5=PMBASE+C1
245 FOR J=C0 TO C10:FOR K=DRMBA5+J*C7
TO DRMBA5+J*C7+C6:READ A:POKE K,A:NEXT
K:NEXT J
250 POKE 559,62:POKE 623,C1:POKE 1788,
PM+C4:POKE 53277,C3:POKE 54279,PM:PDR=
1772:POKE 1771,PM:X=USR(1696):RETURN
255 DATA 162,3,189,244,6,240,89,56,221
,240,6,240,83,141,254,6,106,141
257 DATA 255,6,142,253,6,24,169,0,109,
253,6,24,109,252,6,133,204,133
259 DATA 206,189,240,6,133,203,173,254
,6,133,205,189,248,6,170,232,46,255
261 DATA 6,144,16,168,177,203,145,205,
169,0,145,203,136,202,208,244,76,87
263 DATA 6,160,0,177,203,145,205,169,0
,145,203,200,202,208,244,174,253,6
265 DATA 173,254,6,157,240,6,189,236,6
,240,48,133,203,24,138,141,253,6
267 DATA 109,235,6,133,204,24,173,253,
6,109,252,6,133,206,189,240,6,133
269 DATA 205,189,248,6,170,160,0,177,2
03,145,205,200,202,208,248,174,253,6
271 DATA 169,0,157,236,6,202,48,3,76,2
,6,76,98,228,0,0,104,169
273 DATA 7,162,6,160,0,32,92,228,96,8,
8,28,28,28,62,0,0,6,94,60,28,8,4,0,32,
60,63,60,32,0
275 DATA 4,8,28,60,94,6,0,0,62,28,28,2
8,8,8,16,8,28,30,61,48,0,0,2,30,126,30
,2,0,0,48,61,30,28,8,16
```



# Lunar Patrol *continued*

```

277 DATA 0,1,3,23,10,29,2,0,1,23,1,4,3
    2,0,0,0,0,0,0
280 CHSET=(PEEK(106)-C8)*256:RESTORE 3
    05
285 IF PEEK(CHSET+768)=202 THEN RETURN
290 READ C:IF C=-C1 THEN ? "J":RETURN
295 FOR J=C0 TO C7:READ A:POKE CHSET+C
    *C8+J,A:NEXT J
300 GOTO 290
305 DATA 16,0,168,136,136,136,136,168,
    0,17,0,32,32,32,32,32,0,18,0,168,8,
    168,128,128,168,0
306 DATA 19,0,168,8,40,8,8,168,0,20,0,
    136,136,168,8,8,8,0
310 DATA 21,0,168,128,168,8,8,168,0,22
    0,168,128,168,136,136,168,0,23,0,168,
    8,8,32,32,32,0
311 DATA 24,0,168,136,168,136,136,168,
    0,25,0,168,136,168,8,8,8,0
315 DATA 34,0,160,136,160,136,136,160,
    0,35,0,168,136,128,128,136,168,0,37,0,
    168,128,160,128,128,168,0
316 DATA 38,0,168,128,160,128,128,128,
    0,40,0,136,136,168,136,136,136,0
320 DATA 41,0,168,32,32,32,32,168,0,44
    0,128,128,128,128,128,168,0,47,0,168,
    136,136,136,136,168,0
321 DATA 50,0,168,136,136,168,160,136,
    0,51,0,168,128,168,8,8,168,0
325 DATA 53,0,136,136,136,136,136,168,
    0,96,202,242,252,223,253,127,247,255,9
    7,170,170,0,255,255,119,253,223
326 DATA 98,163,143,63,253,127,247,223
    225,99,255,253,223,255,127,247,223,25
    5
330 DATA 100,192,192,204,252,220,255,1
    27,247,101,240,240,252,252,220,255,119
    255,102,0,3,15,13,15,63,55,255
331 DATA 103,0,3,3,51,63,55,255,223,10
    4,247,127,220,252,204,192,192,192
335 DATA 105,223,255,61,55,63,13,15,3,
    106,0,0,0,0,12,60,247,223,107,0,0,0,0,
    48,60,255,215,108,255,115,240,192,0,0
336 DATA 0,0,109,223,243,48,48,0,0,0,0
340 DATA 13,0,0,0,168,0,0,0,0,113,2,2,
    10,10,42,42,40,40,114,130,130,130,130,
    170,0,0,0,115,128,128,160,160,168,168
341 DATA 40,40,110,0,195,60,60,60,60,1
    95,0
345 DATA 116,255,255,195,195,195,195,1
    95,195,117,0,0,0,0,60,255,255,118,0,
    0,85,1,4,16,64,85,119,0,0,85,64,16,4,1
346 DATA 85,111,85,85,85,93,93,85,85,8
    5
350 DATA 120,202,114,252,255,255,255,8
    5,255,121,170,170,0,255,255,255,85,255
    122,163,141,63,255,255,255,85,255
351 DATA 112,0,252,252,252,0,207,207,2
    07
355 DATA 1,255,85,255,255,255,255,85,2
    55,46,0,136,168,168,168,168,136,0,48,0
    168,136,136,168,128,128,0,-1
360 GRAPHICS C0:POKE 710,C128:POKE 712
    ,C128:DL=PEEK(560)+256*PEEK(561):POKE
    82,C0:POKE 752,C1: ? :POKE PLX,C0
365 ? "
    "
370 ? "
    "
375 ? "
    "
380 ? "
    "

```

```

385 ? "
    "
390 ? "
    "
395 ? "
    "
(C)opyright 1984 by Micha
el J. Coulson"
400 POSITION C20-(14+LEN(H5$))/C2,21: ?
    " HIGH SCORE - ":H5$:POSITION C5,15: ?
    " Please Wait - Initializing....":
405 GOSUB 230:GOSUB 280
410 POSITION C5,15: ? "
    " :POSITION 14,C16: ? " [S
green":CHR$(5C+176):"
415 POSITION 14,17: ? "
    " :PO
SITION 14,18: ? " [G-PULL":CHR$(175+GP
):"
    " :POSITION 14,19: ? "
420 C=PEEK(CNSL):GP=GP+(C=C5):5C=5C+(C
=C3):IF GP>C5 THEN GP=C2
425 IF 5C>C8 THEN 5C=C1
430 IF C<>C6 AND STRIG(C0) THEN 410
435 POKE 559,C0:POKE 82,C0:POKE 756,CH
SET/256:POKE 712,C0:5SCREEN=450+5C*50
440 POKE 752,C1:POKE DL+C3,68:FOR I=C6
    TO 28:POKE DL+I,C4:NEXT I:RETURN
450 GRAPHICS 17:POKE 82,C0:POKE 87,C0:
    ? "
    " CONGRATULAT
IONS": ? "
460 ? " YOU HAVE COMPLETED": ? " YOUR M
    ISSION, AND ": ? " HAVE BEEN ASSIGNED":
    ? " A NEW ONE."
465 ? "
    " GOOD LUCK": ? " : ? " bonus
    " +++++":5C=5C+10000:FUEL=500
470 FOR I=C1 TO 400:NEXT I:GRAPHICS C0
    :GOSUB 230:GOSUB 280:GOSUB 435:GP=GP+C
    1:GP=GP-(GP>C5):5SCREEN=500:GOTO 25
500 CL1=244:CL2=248:FX=11:FY=16
502 ? "
    " j>>>
    " g"
504 ? "
    " gce
    " fdj>
    " gc"
506 ? "gk j kgcccek jk jfe
    " jffccce jk
    " kgcc"
508 ? "cccccccccccccccccccccccccccccccc
    " fcccc"
510 ? "cccccccccccccccccccccccccccccccc
    " ccccc"
512 ? "cccccccclmlmllicccccccmihmli
    " ccccc"
514 ? "ccccchml
    " icccccl
    " ccccc"
516 ? "cccch
    " iccch
    " fcccc"
518 ? "ccch
    " fcch
    " gcccc"
520 ? "ccce
    " f0aaabccch
    " fce
    " iccccc"
522 ? "cccc
    " il0lmmmm
    " ich
    " iccccc"
524 ? "cccc
    " ccccc"
526 ? "ccccd>>>>
    " fcccc"
528 ? "cccccd>>>>
    " fcccc"
530 ? "cccccccd
    " ge j
    " fcccc"
532 ? "ccccccccccce j
    " jge jk jfd jfgccce jf
    " ccccc"
534 ? "cccccccccccccccccccccccccccccccc
    " ccccc":RETURN
550 CL1=14:CL2=198:FX=31:FY=20
552 ? "
    " j"
554 ? "
    " fce"
556 ? "
    " gccce"
558 ? "
    " jfcccccd"
560 ? "
    " gcccccccd jkk"
562 ? "e
    " jkk9 jffcccccccccccccccc
    " jkgkgk j"
564 ? "cd
    " fcccccccccccccccccccc
    " ccccc"

```



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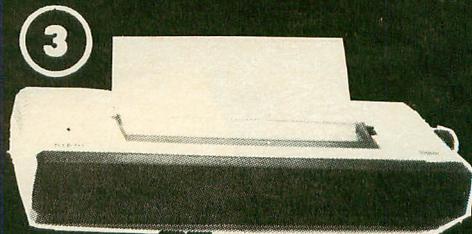
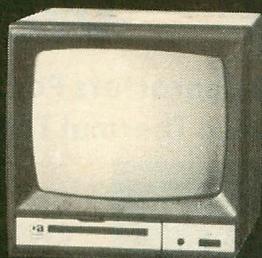
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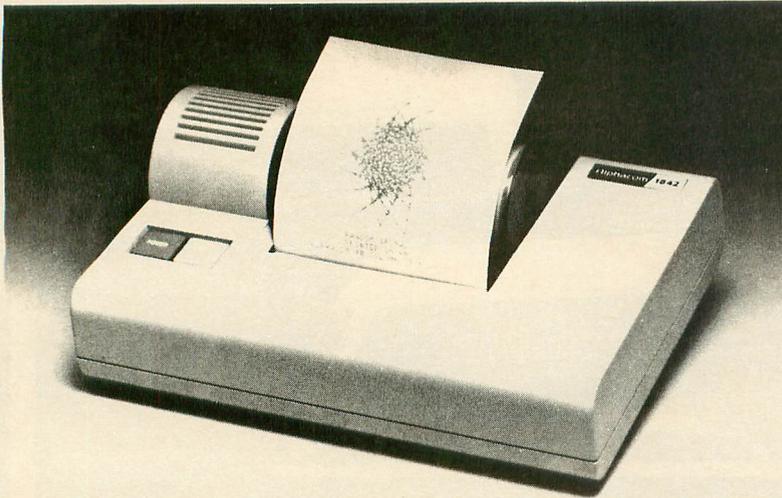
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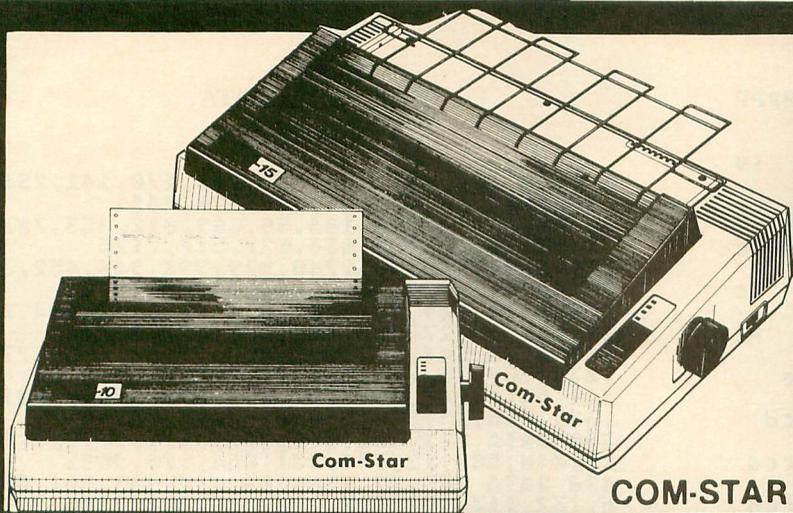
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# LAZER

# TYPE



---

by Matthew J.W. Ratcliff

---

The fiendish Fontoids have invaded the Earth's atmosphere!

It's up to you to protect helpless humans. With the aid of your trusty Lazer Key Command Console (you know, that item sometimes referred to as a keyboard), you can zap the invaders.

You must press the key which has a symbol matching an attacking Fontoid's shape. The Lazer Image Correlator will energize the proper lazer pod to eliminate the intruder. As you zap the Fontoids, more will attack, and they'll be increasingly difficult to type. They'll also attack more quickly and in larger numbers. As you learn to zap Fontoids, you'll discover that your typing skills improve dramatically.

### Using Lazer Type.

When booted up, **Lazer Type's** title and credits screen will appear. Press the **START** key for the game play options menu. The **OPTION** key sets the duration of the game, which can be from one to nine minutes.

The **SELECT** key is used to set the difficulty level. Level one is for the "hunt and peck" typist. Level nine is designed to challenge seasoned veterans of the keyboard. This game presents a bit of classical music in four-part harmony to help you relax during the hectic game play—the "Hallelujah Chorus" from Handel's *Messiah*. The **START** key toggles the music on and off.

Once all the game play options have been selected, position your fingers for typing and press the **SPACE BAR** to "become the ultimate typist."

### Playing.

**Lazer Type** appears as a galaxy of stars, with the lazer pods at the bottom of the screen. The Fontoids appear at the top and drift toward the Earth's surface. Some will fall much faster than others.

To do battle, simply press the keys which represent the Fontoids that appear. The **SPACE** is symbolized by a single character that looks like an **S** and **P** combined, similar to the **E** and **C** used by the Atari for the **ESCAPE** key. The **RETURN** key will be represented by an **R** and **T** in combination, in a similar manner.

Remember that accuracy is most important in this game. Incorrect keypresses count against you. Should a Fontoid reach the bottom, it will count as one typing error. Another will reappear at the top, of the same shape and speed. This procedure will repeat until you zap the Fontoid with the proper keypress—or until the game ends.

Once you have zapped for the preset time, the remaining Fontoids self-destruct. The title and credits screen will reappear, along with your ratings. To end **Lazer Type** early, just press the **START** key. Scores will be lower, since ratings are always based on the full time period.

Your score will be displayed in the form of words per minute (WPM) and a typing quality (TQ) percent-

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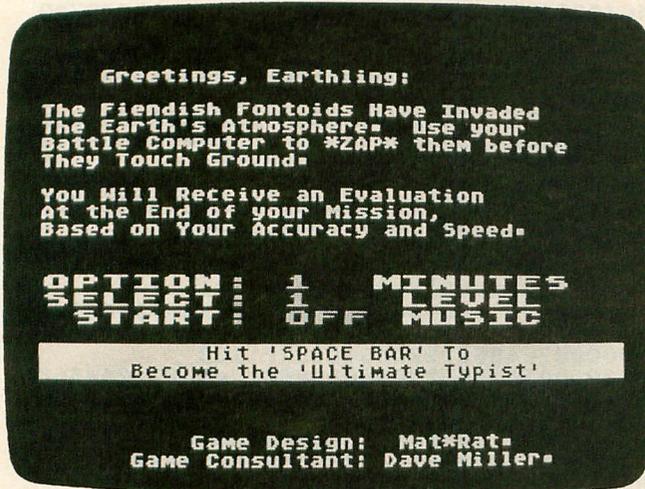
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# Lazer Type *continued*

age. The TQ gives an indication of how accurate a typist you are.



## Lazer Type.

Practice each level until you can consistently get 100% before moving on to the next level. WPM indicates how many equivalent words per minute you typed during game play. This number will be lower than you might expect, since you're not typing a logical sequence of characters (i.e., words).

WPM will provide a valuable point of reference for setting goals in future games. Your true typing speed may be as much as two times the best rating gotten in **Lazer Type**; typing mistakes are deducted from total characters typed before calculating WPM. If typing errors outnumber correct keypresses, both WPM and TQ will be zero. My best score on level nine is 34 WPM at 97% TQ, for a one-minute game. I doubt that anyone could get 100% over a nine-minute game at level nine.

As the game progresses, the Fontoids zoom down the screen. You'll have to type numbers and, finally, the math symbols as difficulty increases. Up to twenty different Fontoids can appear on the screen at one time, in higher difficulty levels or in longer games.

Become a master at the game of **Lazer Type** and you'll be a superb typist as well. □

*Matthew Ratcliff is an Electrical Engineer in Missouri. He has been programming in BASIC and assembly language on the Atari since 1982. He's also active in telecommunications and is a remote Sysop on the GATEWAY BBS, (314) 647-3290.*

## Listing 1.

```

10 REM *** LAZER-TYPE ***
20 TRAP 20:? "MAKE CASSETTE (0), OR DI
5K (1)";:INPUT DSK:IF DSK>1 THEN 20
30 TRAP 40000:DATA 0,1,2,3,4,5,6,7,8,9
,0,0,0,0,0,0,0,10,11,12,13,14,15
40 DIM DAT$(91),HEX(22):FOR X=0 TO 22:
READ N:HEX(X)=N:NEXT X:LINE=990:RESTOR
E 1000:TRAP 120:? "CHECKING DATA"
50 LINE=LINE+10:? "LINE:";LINE:READ DA
T$:IF LEN(DAT$)<>90 THEN 220
60 DATLIN=PEEK(183)+PEEK(184)*256:IF D
ATLIN<>LINE THEN ? "LINE ";LINE;" MISS
ING!":END
70 FOR X=1 TO 89 STEP 2:D1=ASC(DAT$(X,
X))-48:D2=ASC(DAT$(X+1,X+1))-48:BYTE=H
EX(D1)*16+HEX(D2)
80 IF PASS=2 THEN PUT #1,BYTE:NEXT X:R
EAD CHKSUM:GOTO 50
90 TOTAL=TOTAL+BYTE:IF TOTAL>999 THEN
TOTAL=TOTAL-1000
100 NEXT X:READ CHKSUM:IF TOTAL=CHKSUM
THEN 50
110 GOTO 220
120 IF PEEK(195)<>6 THEN 220
130 IF PASS=0 THEN 170
140 IF NOT DSK THEN 160
150 PUT #1,224:PUT #1,2:PUT #1,225:PUT
#1,2:PUT #1,169:PUT #1,32:CLOSE #1:EN
D
160 FOR X=1 TO 54:PUT #1,0:NEXT X:CLOS
E #1:END
170 IF NOT DSK THEN 200
180 ? "INSERT DISK WITH D05, PRESS RET
URN";:DIM IN$(1):INPUT IN$:OPEN #1,8,0
,"D:AUTORUN.5Y5"
190 PUT #1,255:PUT #1,255:PUT #1,169:P
UT #1,32:PUT #1,74:PUT #1,51:GOTO 210
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
210 ? :? "WRITING FILE":PASS=2:LINE=99
0:RESTORE 1000:TRAP 120:GOTO 50
220 ? "BAD DATA: LINE ";LINE:END
230 DATA 0,38,129,32,168,32,169,0,141,
47,2,169,60,141,2,211,169,0,141,231,2,
133,14,169,56,141,232,2
240 DATA 133,15,169,169,133,10,169,32,
133,11,24,96
1000 DATA A9018DD0208DDF208509A90E8DE0
20A9A9850A850CA920850B850DA9008DE1208D
4402A9208DDE20201726209A,452
1010 DATA 2F204B304C99240120010E000001
00201C1814100C08040100A91720B721A200A9
01A007202822A201A90CA820,702
1020 DATA 2822A202A908A004202822A2028E
EE20A200AD0AD2C99F0F99D0320E000F02120
8D21CADD0320D010CEEE20D0,564
1030 DATA 0BA2028EEE202097214C1521CAE0
FFD0E6209721E8E0A0D0CCA000B90320AA20A1
21208D2120AB21209721C8C0,686
1040 DATA A0D0EBA01320CD2D20A1218DB321
A93F8C762CA058203922AC762C8810E760AC0A
D2C0A0B0F9B90320AA20A121,832
1050 DATA 4CAB218D00208E01208C022060AD
0020AC0220AE012060AD0AD22903D0002690160
8DB321A9004CF32100533A00,308
1060 DATA 48A260A90C9D42032056E4A260A9
039D4203A9B49D4403A9219D4503689D4B0329
F04910090C9D4A032056E420,397
1070 DATA 1726A9108DF40260865585568454
6020EC21A260A90B9D4203A9009D48039D4903
ADB3214C56E420EC21ADB321,936
1080 DATA 8DFB02A260A9119D4203A90C9D4A
03A9009D4B034C56E40A0A0A0A9DC40298290E
1DC4029DC402604884BAA928,88

```



# Lazer Type *continued*

1090 DATA 85BB86CA46CA46CAA90085CB85DD  
 85C318A55865CA85CAA55965CB85CB20E62218  
 A5D465CA85CAA5D565CB85CB,637  
 1100 DATA 681004297FC6C3AA85DCE060B00D  
 A940E0209002A9E01865DC85DC1806DC26DD06  
 DC26DD06DC26DD18ADF40265,103  
 1110 DATA D085DDA000A208A90085D185D0B1  
 DC45C348680A489007ADB32105D185D1E001F0  
 0806D126D006D126D0CAD0E5,905  
 1120 DATA 689848A000A5D091CAC8A5D191CA  
 68A818A5CA692885CA9002E6CBC8C008D0B860  
 A90085D4A20846BA90031865,856  
 1130 DATA BB6A66D4CAD0F385D5600800464A  
 414C534B4448473B215455595249454F57564E  
 4223434D50512C2E585A3136,901  
 1140 DATA 3735383439333230313C3E2D3D2B  
 2A4C4A3B00004B2B2A4F00505523492D3D5600  
 43000042585A340033361B35,146  
 1150 DATA 32312C212E4E004D2F0052004559  
 005457513900303700383C3E46484400004753  
 414772656574696E67732C20,841  
 1160 DATA 45617274686C696E673A9B9B5468  
 65204669656E6469736820466F6E746F696473  
 204861766520496E76616465,187  
 1170 DATA 649B8546865204561727468277320  
 41746D6F7370686572652E202055736520796F  
 75729B426174746C6520436F,372  
 1180 DATA 6D707574657220746F202A5A4150  
 2A207468656D206265666F72659B5468657920  
 546F7563682047726F756E64,539  
 1190 DATA 2E9B9B8596F752057696C6C205265  
 636569766520616E204576616C756174696F6E  
 9B41742074686520456E6420,742  
 1200 DATA 6F6620796F7572204D697373696F  
 6E2C9B4261736564206F6E20596F7572204163  
 63757261637920616E642053,911  
 1210 DATA 706565642E9BF2006F7074696F6E  
 3A203120206D696E757465739B73656C656374  
 3A20312020206C6576656C9B,130  
 1220 DATA 2073746172743A204F4E20206D75  
 7369639BA9018DE320A9008D3C2E20262FADDF  
 2085BA90E85BB20E622A5D4,757  
 1230 DATA 8DE020AEDD20BDE4208DDE2020BC  
 2BA2008EFD228A855220B721A204A0018CF002  
 A90020EC21208730AD300285,630  
 1240 DATA D4AD310285D5A012A90691D4C8C0  
 16D0F9A200AD60249D4803AD61249D4903A96E  
 9D4403A9239D4503A90B9D42,574  
 1250 DATA 032056E4203F2FA200A00F209230  
 A274A031209730A20AA014209230A23FA03120  
 9730A206A015209230A256A0,572  
 1260 DATA 31209730A95F8DC502A9868DC402  
 ADE120D00320CD25AD1FD0C907F059C906D019  
 AEE120F00ACA8EE12020CD25,958  
 1270 DATA 4CA625E88EE12020262F4CA625C9  
 05D012AEDD2020372F8EDD20BDE4208DDE204C  
 A625C903D022AEDF2020372F,784  
 1280 DATA 8EDF2086BAA20E86BB20E622A5D4  
 8DE020203F2FA203203F2CCAD0FAADF22F014  
 C921D008A9008DFD224CFA2A,309  
 1290 DATA A9008DFD22203F2C4C5125A9008D  
 08D2A9038D0FD2A93DA0274CDE25A614E414F0  
 FC85CE8D352784FC8C3627AD,312  
 1300 DATA 2402AC2502C921D004C026F0108D  
 37278C3827A9218D2402A9268D2502A9008D39  
 27A9018D3B2760A510297F85,124  
 1310 DATA 108D0ED260201726ADF22D017AD  
 FC02A2FF8EFC02C9409004A900F004AABD2E23  
 8DFD22ADE120D04BCE3B27D0,544  
 1320 DATA 46202A27C9FAD0034C0E27C9FFD0  
 034C1D27C9FED0034C0827C9FCD0034CEB26C9  
 FDF072C9FBF062AC3927F01A,263  
 1330 DATA 8C3A27AC3C278C3B27A200F00320  
 2A279D00D2E8E8CE3A27D0F3AD3C2EF00A8D05  
 D2AD0AD209F8D007A9A48D05,341  
 1340 DATA D2A9008D04D2AD0AD22907AAD00A  
 D29D1010ADE320D00DEEE220D008CEE020D003  
 EEE320AD1FD0C907D002854D,843

1350 DATA 6C3727202A278D3B278D3C274C4A  
 26202A278D39278D3A274C4A26AC3927D0034C  
 4A268C3A27A200202A279D01,938  
 1360 DATA D2E8E8CE3A27D0F34C4A26202C2F  
 4C4A26AD37278D2402AD38278D25026C3727AD  
 352785CEAD362785CF4C4A26,359  
 1370 DATA A000B1CEE6CED002E6CF60000000  
 0000001414FD04FCA4A4A4A4FB10354855D935  
 4855D9354855D948486CAD40,323  
 1380 DATA 516CA248556CD900000000000000  
 00354855D9354855D9354855D948486CAD4051  
 6CA248556CD90000000003548,884  
 1390 DATA 6CAD354051A2354855D900000000  
 35486CAD354051A2354855D90000000035486C  
 AD395160C1355590D9356048,698  
 1400 DATA 9039604890355590D9355590D900  
 00000000000002F4872902F4872902F487290  
 484860722A486C6C2F487290,401  
 1410 DATA 000000000000000002F4872902F48  
 72902F487290484860722A486C6C2F48729000  
 0000002F4860722A486C6C2F,299  
 1420 DATA 48729000000002F4860722A486C  
 6C2F48729000000002F4860722A486C6C2F48  
 727235485580354C40803948,459  
 1430 DATA 6090394860900000000000000000  
 804848904848489048484890484848904808040  
 804080408039723972397239,846  
 1440 DATA 72356C356C6C6CD9356C356C35  
 6C356C356C356C6C356C353972397239723972  
 408040804080408040804080,947  
 1450 DATA 4080408048904890489048900000  
 00002F4848723548556C3948609000,203  
 1460 DATA 0000002F4860722A486C6C2F4872  
 90000000002F4860722A486C6C2F4872900000  
 0000000000006C6CD9006C,816  
 1470 DATA 6CD9006C6CD9006C6CD9006060C1  
 006060C1005555AD005555AD005151A200A2A2  
 A2005151A2005151A2005151,83  
 1480 DATA A251A25100005555AD005555AD00  
 6060C1006060C1006060C1006060C1006C6CD9  
 006C6CD90000000035486CAD,67  
 1490 DATA 354051A2354855D9000000003548  
 6CAD354051A2354855D90000000035486CAD35  
 4051A2354855D90000000035,293  
 1500 DATA 486CAD354051A2354855D9000000  
 0000000003500000035000000350000003500  
 35002F0072002F0090002A00,92  
 1510 DATA 00002A006C00280000051008000  
 2800000028006000280072000028007055006C  
 0055486C002F516C002F606C,78  
 1520 DATA 002F4872902F48729035486CAD55  
 486CD900554800356C55003900489048604890  
 007248903990489035004080,628  
 1530 DATA 355540802F6039722F5139724855  
 6C6C48556CD900006C6C35406C6C404C6C6C6C  
 6C406000487222F48397235,350  
 1540 DATA 48808039488080354C80802F4C80  
 8039484890394860902F007200396048900048  
 00AD48556CD935006C004855,116  
 1550 DATA 6C6C00600072397260902F007200  
 39009000006C6C00486C6C002A6C6C00356C35  
 6C0060607239606090355555,321  
 1560 DATA 004855556C0051518040A251A22F  
 5151002F5151C1005151905190395135555500  
 35555580356060A235606C1,129  
 1570 DATA 39606090396060A2356C6CAD3548  
 6CAD35556C00356C556C35005180354051A235  
 405180354051723548556C35,12  
 1580 DATA 48556C3548556C3548556C000000  
 000000000000000000000000000000000000  
 20A9FF8DFC02A9008DFD228D,536  
 1590 DATA 3C2E8DE2208DE32020D52DA013B9  
 6414F00620272D4C8E2BB90014F05CB95014F0  
 0938E9019950144C812BB93C,945  
 1600 DATA 14D016B91414186901991414C958  
 D018AD262D9964144C812B38E901993C14B914  
 14C901F011D024B928148DEE,116

1610 DATA 20A93038EED20993C1420CD2DB9  
0014488CF92AB91414A868203922ACF92AADFD  
22F00820772CA9008DFD22AD, 907  
1620 DATA 1FD0C906D0034CB62E8830034C15  
2BAEDE208E752C207C21ADFD22D005CE752CD0  
F3ADE320F0034CB62E4C132B, 723  
1630 DATA A900A885DA85D0A9E085DBA91085  
D1A9048DEE20B1DA91D0C8D0F9E6DBE6D1CEEE  
20D0F0A207BD0F2C9D0810BD, 612  
1640 DATA 172C9D1810BD1F2C9DE010BD272C  
9DF010BD2F2C9DF810BD372C9D7010CA10D9A9  
108DF4026000F8C0FF1BFB1F, 603  
1650 DATA 1800F0D8F0D8CF060600060C1830  
180C06006030180C18306042242663C183C7EFF  
0000003C3C3C00008E752C8C, 620  
1660 DATA 762CA2AF8E3C2E8E05D248A00AAD  
0AD209F88D04D288D0F5CAE0BF00EEA2A48E05  
D2A2008E04D28E3C2EAE752C, 407  
1670 DATA AC762C68600000208D21203F2CA0  
13D90014F00E8810F8EE342ED003EE352E4C97  
218D3D2E95014196414D0EA, 620  
1680 DATA AD3D2E20CD2D8E752C8C762CA058  
203922209721AE752CE8E8E8E8E752CA05820  
A12120AB21AE752CAC762CB9, 504  
1690 DATA 1414186908A8A900200B22AC762C  
AD262D996414CE392ED038A90F8D392EAD3B2E  
CD3AEF006EE3B2E203F2EAE, 450  
1700 DATA FC22E030F01EEFFC22AD262DC902  
F003CE262DADFC22A48D3E2EAD3A2EC914F003  
EE3A2EEE362ED003EE372E4C, 622

1710 DATA 972123208D2120A1218DB321B964  
1438E901996414F01420CD2DB91414A8A92220  
3922A9888D3C2E4C9721A900, 736  
1720 DATA 8D3C2E20CD2DE8E8E8E8E752CB9  
1414A8A90020AB21A057AE752CA900200B2220  
972120CD2D8E752CB91414A8, 316  
1730 DATA A9008DB321203922A058AE752C20  
A1218DB321A93F20392220A1218DB321209721  
B91414C958D010EE342ED003, 558  
1740 DATA EE352EA9019914144CCA2DA90099  
0014991414995014992814993C14203F2E4C97  
2148980A0A0AAA6860A213A9, 190  
1750 DATA 009D14149D00149D28149D3C149D  
50149D6414CA10EBA2088EFC22A2048E3B2E8E  
752CE88E3A2E8E3E2EADD020, 473  
1760 DATA 0A8DEE2038A923E8E208D262D20  
3F2ECE752CD0F8A9008D362E8D372E8D342E8D  
352E8D382E8D3C2EA90F8D39, 852  
1770 DATA 2E60000000000000F000000001A2  
0520A92EB91414F00ECAD0F5A013B91414F004  
8810F860209D2EBDFE22A213, 595  
1780 DATA DD0014F0F3CA10F8990014A90199  
1414A93038ED3E2E8D3D2EAD0AD2293FCD3D2E  
B0F66D3E2E992814A900993C, 230  
1790 DATA 14209D2E388DEE20A930E8E2099  
501460AD0AD2293FCD2C22B0F6AA6048AD0AD2  
291FC914B0F7A86860A200A0, 572  
1800 DATA 13B90014F006E8A94B9964148810  
F2E000F014A200A013B96414F004E820272D88  
10F4E000D0ECA2028E752C20, 470

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CIRCLE #126 ON READER SERVICE CARD





# Personal Planning Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14 Flag Day	15
16 Father's Day	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

JUNE

by Wayne Gautney

After many hours of destroying enemy surges and voltage spikes in **Livewire!**, and defending the Earth from killer bombs in **Planetary Defense**, I began to hear my mother complaining, "Is that all you can do with that thing... just play games?"

Well, from that moment on, I became determined to show her that my Atari 800 was much more than a game machine. I started looking for a good "business" application that I could implement in Atari BASIC. A spreadsheet was out of the question; a finance program sounded dull. Then I saw an appointment calendar program on the Apple Macintosh which featured "windows" that overlapped the screen display. This was to be my source of inspiration for the **Personal Planning Calendar!**

### About the program.

I started with two machine language "speed-ups." The first one, MOV\$, written by D.K. Titchenell, moves large blocks of RAM to different locations at high speed.

The second, FAST\$, written by Steve Kaufman, transfers large blocks of data to and from disk as fast as the disk drive can read or write the information. With these routines in hand, I quickly developed the text editing and data storage subroutines.

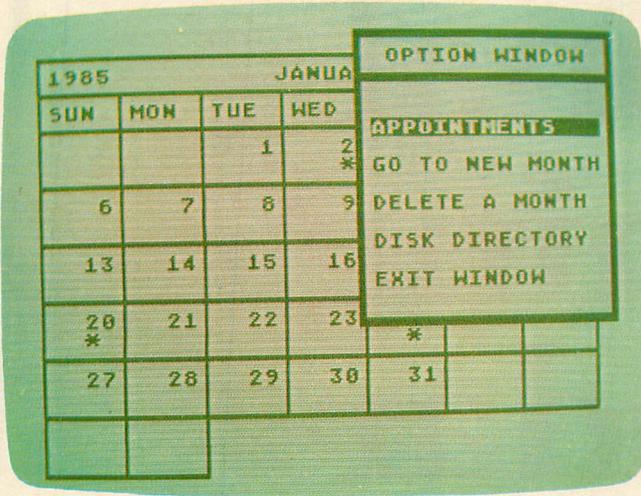
### Using the Calendar.

When you boot up the **Personal Planning Calendar**, you are presented with a "months of the year" menu. Select a month, and the program displays a small box with 1985 inside it. Use OPTION to increase the year or SELECT to decrease it, choosing from 1985 to 1999.



# Personal Calendar *continued*

When you have the desired year inside the box, press START. You will then be asked if the month and year that you entered are correct. If not, press OPTION and you can re-enter the data; if it is correct, press START. The computer will then look for the program on disk. You must wait a few seconds while the file data is loaded and the **Calendar** is displayed.



**Personal Planning Calendar.**

If there is no file for the chosen month on the disk, you will be prompted to press OPTION to re-enter the month and year, or press START to create a file for the chosen month on the disk in drive 1.

You should use DOS 2.0S with this program, and you can store about fourteen months on a blank disk. Finally, the **Calendar** will display the month in calendar form on the screen. Press the OPTION key, and the "option" menu will scroll down the right side of the display. Use OPTION and SELECT to position the cursor over the desired menu choice and press START.

Selecting the "appointments" option causes a large window to appear in the center of the screen. You are then asked for the day of the month you wish to examine. Type it in and press the RETURN key. The prompt message then clears and is replaced by the appointment(s), if any, under the selected day. You may type over them or enter new appointments.

When you finish editing the text, press ESCape. You'll be prompted to press OPTION to save your changes to disk, SELECT to obtain a hard copy on your printer, or START, which simply clears away all windows.

The "go to new month" option creates no windows,

but merely returns you to the "months of the year" menu.

The "delete month" option creates a window and asks for the month and year of the month you wish to delete. When you delete the month you're working with, you are returned to the "months of the year" menu.

Choosing the "disk directory" option opens yet another window, revealing all files used by the **Calendar**. All files are named systematically, for example: June 1992 would have the filename D:JUNE.92.

### A final word.

Although the **Personal Planning Calendar** has been tested, errors can still occur. Be especially careful when editing text.

Well, I certainly hope you enjoy using this program as much as I enjoyed creating it. My next project? I'm going to try simulating DNA and RNA molecules on my computer as a science project in Biology. □

Wayne Gautney, a high school junior, is listed as an Academic All-American Student in the 1984 U.S. Achievement Academy Yearbook and has won recognition in both the National Youth Art Competition and the Congressional Arts Caucus. He's had his Atari 800 for three years and is now learning Action!, planning to major in computer science in college.

```

0 DIM FAST$(39),A$(76),MONTH$(10),D$(3
),F$(17),BLK$(20),Y$(4),DDAYS(5),CL$(1
45),NULL$(200),MM$(15),ST$(31)
1 RESTORE 3000:FOR I=1 TO 39:READ A:FA
ST$(I)=CHR$(A):NEXT I
2 MM$="(XXXXXXXXXXXX)":ERROR=4000
3 DIM MOV$(39),B$(6200),OP$(200):FOR I
=1 TO 39:READ A:MOV$(I)=CHR$(A):NEXT I
5 C255=255:C64=64:C256=256:CON50L=5327
9:KEY=764
6 B$="":B$(6200)="_:B$(2)=B$:OP$=B$:
BLK$=B$:NULL$=B$
7 GRAPHICS Z:POKE 559,Z:POKE 710,196:P
OKE 712,196:POKE 709,14:POKE 752,1
8 POSITION 2,1:POKE 82,2:POKE 83,39:
"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
"
9 ? " PERSONAL PLANNING CALENDAR
"
10 ? " by Wayne Gautney : 12/10/84
"
11 ? " for ANALOG Computing
"
12 ? "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
XXXX":?
13 ? "
14 ? "
15 ? "
16 ? "
17 ? "
18 ? "
19 ? "
20 ? "
21 ? " ? " PLEASE SELECT MONTH " :PO
KE 559,34:CLOSE #1

```

```

22 OPEN #1,4,Z,"K":GET #1,R:CLOSE #1
23 R=R-64:IF R<1 OR R>12 THEN 22
24 RESTORE 9999+R:READ MONTH$,NUM:M=R
36 DAY=Y:POSITION 2,6:? MM$:Y=1985:X=1
1
37 ? " ENTER YEAR BELOW":? :?
38 ? "USE OPTION TO INCREASE YEAR":?
  ? "USE SELECT TO DECREASE YEAR":?
  ? "PRESS START TO SELECT YEAR":?
39 ? :? "
40 ? " YEAR:1985 "
41 ? " ":POKE 559,34:FOR
R=1 TO 22:NEXT R
42 G=PEEK(CONSOL):IF G=7 THEN 42
43 IF G=3 THEN Y=Y+1
44 IF G=5 THEN Y=Y-1
45 IF G=6 THEN YEAR=Y:GOTO 50
46 IF Y<1985 THEN Y=1999
47 IF Y>1999 THEN Y=1985
48 POSITION X,18:? Y:FOR R=1 TO 32:NEX
T R:GOTO 42
50 POSITION 2,6:? MM$:?
51 ? "YOU ENTERED THE FOLLOWING MONTH:
":?
52 ? MONTH$:", " ;YEAR: ? :?
53 ? "IF THIS IS CORRECT, THEN"
54 ? "PRESS THE START KEY.":?
55 ? "IF IT IS INCORRECT, THEN PRESS"
56 ? "THE OPTION KEY."
57 A=PEEK(CONSOL):IF A=7 THEN 57
58 IF A=6 THEN GOSUB 900:GOTO 60
59 CLOSE #1:CLOSE #2:CLOSE #3:GOTO 7
60 ? "K":POKE 559,Z:POKE 710,206:POKE
709,6:POKE 712,206:? :POKE 82,2:POKE 8
3,39:POKE 752,1:GOTO 62
61 ? " | | | | |
":RETURN
62 ? :? "
63 ? " |
|
64 ? " |-----|
|
65 ? " |SUN |MON |TUE |WED |THR |FRI |S
AT |"
66 FOR T=1 TO 5:? " |-----|-----|
":GOSUB 61:GOSUB 61:N
EXT T
70 ? " |-----|-----|-----|
|
71 ? " | | | | |":? " | |
72 ? " | | | | |":? " | |
73 MDPT=(40-LEN(MONTH$))/2
74 POSITION MDPT,2:? MONTH$
75 POSITION 3,2:? YEAR:POSITION 33,2:?
YEAR
76 GOSUB 310
77 POKE 559,34
80 IF PEEK(CONSOL)<>3 THEN 80
90 GOTO 400
310 GOSUB 1000
350 SP=1+5*C:5=1:FOR Y=6 TO 21 STEP 3
360 FOR X=6 TO 37 STEP 5
365 IF 5=1 THEN X=5P
367 IF 5>9 THEN X=X-1
370 POSITION X,Y:? 5
371 IF 5T$(5,5)="@" THEN POSITION X,Y+
1:? "*"
374 IF 5>9 THEN X=X+1
375 IF 5=T THEN RETURN
376 5=5+1:NEXT X:NEXT Y:RETURN
400 GOSUB 1200:POKE 82,22
401 POSITION 22,Z:? "
"
402 ? " OPTION WINDOW "
403 ? " ":? "
"
404 GOSUB 650

```

```

412 Y=5:X=1
413 G=PEEK(CONSOL):IF G=6 THEN 420
414 IF G=7 THEN 413
415 IF G=5 THEN Y=Y+2:X=X+1:IF X>5 THE
N Y=5:X=1
416 IF G=3 THEN Y=Y-2:X=X-1:IF X<1 THE
N Y=13:X=5
417 POSITION 23,5:? CL$
418 POSITION 23,Y:? A$(15*X)-14,15*X)
419 GOTO 413
420 CHOICE=X
421 IF X=2 THEN FOR T=1 TO 5:CLOSE #T:
NEXT T:GOTO 7
422 IF X=3 THEN 600
423 IF X=4 THEN 1220
424 IF X=5 THEN GOSUB 1205:GOTO 80
426 POKE 82,12:POSITION 11,7:? "
":FOR T=8 TO 20:POSITI
ON 11,T:? "
427 NEXT T:POSITION 11,21:? "
"
428 POSITION 13,9:? "Please enter the"
429 POSITION 13,10:? "date you wish to
"
430 POSITION 13,11:? "examine.":POKE 7
52,Z
431 TRAP 431:POSITION 13,13:? "E+ <<
("":INPUT #16:DDAYS$:POKE 752,1:DD=VAL(
DDAYS$):IF DD<1 OR DD>NUM THEN 431
432 POSITION 13,9:? "
↓-----↓
↓-----↓
433 POSITION 13,8:? " APPOINTMENTS "
:COL=1:ROW=1
434 OP$=B$(200*DD-199)
436 FOR T=1 TO 10
437 POSITION 12,T+9:? OP$(20*T-19,20*T
):NEXT T:POKE 82,12:POKE 83,32:? "":
439 CLOSE #1:OPEN #1,4,Z,"K":COL=1:RO
W=1:BLK$=OP$:POSITION COL+10,ROW+9:POK
E 752,Z:? "":
440 GET #1,R:IF R=155 THEN 455
441 IF R=27 THEN 500
442 IF R=126 THEN 460
443 IF R>155 AND R<160 THEN 440
444 IF R>27 AND R<32 THEN 440
445 IF R>124 AND R<128 THEN 440
446 IF R>253 THEN 440
447 COL=COL+1:IF R=32 THEN R=95
448 IF COL>20 THEN COL=20
449 IF COL<Z THEN COL=Z
450 POSITION COL+10,ROW+9:IF R=155 THE
N ? "+" :CHR$(R):R=95:BLK$(COL,COL)=CH
R$(R):GOTO 440
451 BLK$(COL,COL)=CHR$(R):IF R=253 THE
N BLK$(COL,COL)=CHR$(95)
452 ? CHR$(R):GOTO 440
455 REM DOWN-ROW
456 OP$(20*ROW-19,20*ROW)=BLK$
457 ROW=ROW+1:IF ROW>10 THEN ROW=1
458 BLK$=OP$(20*ROW-19,20*ROW)
459 COL=1:R=155:GOTO 450
460 REM BACKSPACE
461 COL=COL-1
462 IF COL<1 THEN COL=1:GOTO 440
463 ? "+_€":BLK$(COL+1,COL+1)="_":GOT
O 440
500 GOSUB 940
501 OP$(20*ROW-19,20*ROW)=BLK$
502 IF OP$=NULL$ THEN 5T$(DD,DD)=" ":G
OTO 504
503 5T$(DD,DD)="@":B$(200*DD-199,200*DD
)=OP$:TRAP ERROR
504 CLOSE #1:OPEN #1,8,Z,F$
505 ? #1:5T$
506 FAST$(10,10)=CHR$(11)
507 D=USR(ADR(FAST$),1,ADR(B$),6200):C
LOSE #1:POP :GOTO 60

```



```

1241 TRAP 1242:IF VAL(F$(11,12))>84 TH
EN RETURN
1242 POP :T=T-1:NEXT T:RETURN
2000 ? "K[+]+"
2001 ? "THERE IS NOT A FILE FOR ";MONT
H$: ? "ON THIS DISK!+++"
2002 ? " OPTION = RE-ENTER DATA++"
2003 ? " START = CREATE NEW FILE"
2004 G=PEEK(CONSOL):IF G=6 THEN RETURN
2006 IF G=3 THEN POP :CLOSE #2:CLOSE #
3:CLOSE #1:GOTO 7
2007 GOTO 2004
3000 DATA 104,104,104,10,10,10,10,170,
169,7,157,66,3,104,157,69,3,104,157
3010 DATA 68,3,104,157,73,3,104,157,72
,3,32,86,228,132,212,160,0,132,213,96
3100 DATA 104,104,133,215,104,133,214,
104,133,217,104,133,216,104,133,218,10
4,170,160,0
3110 DATA 177,214,145,216,200,208,4,23
0,215,230,217,202,208,242,198,218,16,2
38,96
4000 REM ERROR ROUTINE
4001 GRAPHICS Z:POKE 710,70:POKE 709,1
4:POKE 82,2:POKE 83,39: ?
4002 G=PEEK(195):IF G=170 THEN 4007
4003 ? "AN ERROR HAS OCCOURED!": ? : ?
4004 IF G=162 THEN ? "THERE IS NOT ENO
UGH ROOM ON THE DISK TO CREATE A FILE
FOR ": ? : ? : ? : ? "RUN++++":END
4005 IF G=144 THEN ? "THERE IS NO DISK
IN DRIVE #1, OR THE DISK HAS A WRITE
-PROTECT NOTCH ON IT.":END
4006 ? "ERROR - ";G;CHR$(155);"+++RUN+
++++":END
4007 ? "THE FILE FOR THAT MONTH IS NOT
ON THIS DISKETTE.":CHR$(155);"+++
RUN++++":END
10000 DATA JANUARY,31
10001 DATA FEBRUARY,29
10002 DATA MARCH,31
10003 DATA APRIL,30
10004 DATA MAY,31
10005 DATA JUNE,30
10006 DATA JULY,31
10007 DATA AUGUST,31
10008 DATA SEPTEMBER,30
10009 DATA OCTOBER,31
10010 DATA NOVEMBER,30
10011 DATA DECEMBER,31

```

CHECKSUM DATA.

(see page 13)

```

0 DATA 730,268,292,294,731,491,922,802
,645,837,877,25,37,169,593,7713
16 DATA 467,281,180,218,35,206,776,926
,294,347,349,984,737,323,467,6590
42 DATA 257,683,692,990,282,291,727,34
8,747,339,195,137,240,167,267,6362
58 DATA 273,763,817,766,640,662,393,71
5,976,374,61,280,359,997,114,8190
76 DATA 773,800,911,454,794,964,171,70
1,829,883,556,823,115,699,307,9780
401 DATA 63,494,858,983,485,606,549,94
8,186,893,511,713,802,639,592,9322
423 DATA 420,514,242,259,784,239,875,9
23,582,875,793,143,250,210,769,7878
441 DATA 483,752,856,580,860,759,245,3
96,222,269,340,793,3,849,856,8263
458 DATA 825,247,465,55,132,163,989,83
1,490,583,413,628,236,281,888,7226

```

```

601 DATA 964,643,20,177,936,768,363,14
7,77,865,717,231,815,944,297,7964
629 DATA 482,412,857,61,487,198,406,66
,783,888,34,602,317,548,679,6820
667 DATA 616,706,652,722,849,21,729,34
8,18,492,693,190,629,182,885,7732
914 DATA 245,32,510,968,238,826,307,25
8,618,634,436,787,204,911,206,7180
968 DATA 630,84,587,679,605,965,325,61
9,100,118,596,389,85,791,579,7152
1011 DATA 598,589,608,595,579,591,596,
611,623,588,579,601,592,604,768,9122
1200 DATA 716,614,786,773,715,870,267,
253,923,342,965,862,746,212,273,9317
1234 DATA 580,177,754,725,877,305,993,
423,939,30,279,82,727,717,754,8362
3100 DATA 900,399,236,798,68,772,59,11
8,403,977,791,80,619,652,137,7009
10005 DATA 364,382,623,36,795,97,15,23
12

```

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THIS MONTH:

**Atari's  
founder  
Nolan  
Bushnell  
talks about  
his future  
and the  
new Atari**

---

by Arthur Leyenberger

---

In last month's column I mentioned that I hoped to have some robot-related news and projects to talk about this issue. But, before I could even sit down at the keyboard, I got a chance to meet and talk with Nolan Bushnell. I thought you would enjoy hearing what he's up to these days.

If you look carefully, we are talking about robots. Next month, we'll definitely get down and do some robot computing with Andy and Verbot.

Nolan Bushnell is a name that's very familiar to Atari enthusiasts. He is credited with inventing the video game in the early 1970s. While everyone else was playing pinball, Nolan came up with a deceptively simple idea: allow one or more people to control a video blip on a CRT. We all know that his creation was the now-famous *Pong*.

Bushnell is also known for founding Atari and guiding it through the formative, video game years. Warner Communications eventually bought the company from Bushnell for a cool \$27 million.

Being a creative person and an entrepreneur, Nolan next founded Androbot Company. Androbot was one of the first companies to manufacture a personal robot.

Androbot wasn't the only venture that occupied Nolan's time. While children may not readily recognize the name

Bushnell, they certainly know of Chuck E. Cheese Pizza Time Theatres. That and Androbot were two of the many companies founded or financed by Bushnell's Catalyst Technologies Company. Catalyst's mission was to help launch new high-technology, consumer-oriented companies.

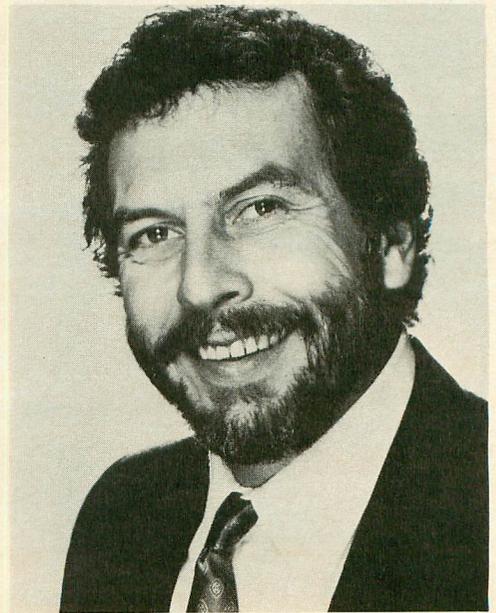
Bushnell sold Androbot in 1984 and applied his energies to Axlon, Inc., a company specializing in the design and manufacture of "personality-based" toys and games. Says Bushnell, "I had so many ideas for toys and games after I left Atari that I decided to form Axlon. The concept of mental exercise combined with sheer fun and games is the cornerstone philosophy of Axlon, and one we will promote through all of our products."

I had a chance to meet and talk briefly with Nolan at the 1985 New York Toy Show, where Axlon was displaying several products of interest to Atari users. Andy the robot is an Atari computer peripheral.

Andy's main features are light, sound and bump sensors that act as his eyes and ears. He connects to any Atari computer via the joystick port and, using a "personality editor" (a logo-like computer language), can be programmed to move around and make sounds. Like any current home or personal robot, Andy can't really do very much, but he has educational value in the field of programming. As the advertising slogan

I believe that there is still so much to be done with making computers easy to use and useful. The Macintosh and the GEM system are attempts to make computing what it should be.

—Nolan  
Bushnell



points out, "Andy can't bring you breakfast in bed, but he will give you food for thought."

Axlon was showing another noncomputer product that was very unusual. Petsters are described as plush electronic toys. Petsters combine the look and feel of a stuffed animal with microprocessor-controlled behavior. They respond to sound, light and touch, and resemble a household pet in many ways. Both the Catster and the Dogster come when they are called, go to sleep when the lights are turned out, and can be allowed free to roam in their environment.

It's amazing how much like a real pet a Petster behaves. Before going to sleep, the Catster or Dogster will circle its territory to gain maximum comfort. The Catster will purr when it's petted, meow occasionally and even assume different moods.

Petsters are 15 inches long, 11 inches wide and about 7 inches tall. They operate on five D-cell batteries and are expected to cost under \$100.

The other toy that Axlon was showing is called Alexander Graham Bear. A.G. Bear is the new teddy bear on the block. In addition to being cute and cuddly, he talks. . . not in English, but in "bearese."

Like all of the other Axlon toys, A.G. is electronically controlled. When you talk to him, his electronic circuits store the number of audible syllables, the syllable length and their approximate val-

ue. He then plays this loosely-mimicked phrase back to you. He can also begin talking with you spontaneously and may assume different moods. A.G. Bear may very well be the Cabbage Patch phenomenon of 1985.

Before talking with Nolan Bushnell, I sat and listened as he did a phone interview. With his tongue implanted firmly in his cheek, Nolan talked about Axlon's new toys, mainly the Catster.

Saying that clawing, scratching and litter boxes are things of the past, Nolan spoke of this new toy as being a playmate that would interact with its user in addition to being comforting and companionable. Winking at me, Nolan told the phone interviewer that there are a couple of things the Catster won't do: it won't catch mice and it won't jump up on your lap.

The Catster has wheels instead of legs and is primarily a floor cat. Again, he made the comparison with a real pet. "The difference between a toy and a pet is that no one ever turns a pet off. You don't need to turn this product off, either. It operates for a long time on one battery charge and, when it is asleep, uses very little battery current."

Nolan told the interviewer, "I don't like to use the word 'robot' because this is really a cuddly, warm and affectionate creature. Robots are considered to be kind of cold and unfriendly, although it does have some of the elements that are found in industrial robots."

Our interview started when Nolan ended his phone conversation.

**AL:** I noticed that you really enjoyed doing that phone interview.

**NB:** Oh yeah! You have to have a little bit of fun with them. The other part of it is how you maintain press momentum . . . Because, if you are dry and uninteresting, they say, "Hey, gee, that's boring for my listeners." But, if you are half comedian and half pitch man, then it perpetuates itself.

**AL:** You've been a showman from way back, and I think that is part of the fun. I want to pick up on one of the things you mentioned: that Axlon is not marketing the Petsters as robots. I understand that the toys really are sophisticated robots inside. Why are you playing down the robot thing?

**NB:** The reason for it is very clear. Boys and "techie" adults will see it for what it is, but if you start saying that it is really a complex robot, market research says that it just turns the girls off. We see this as being a strong crossover product aimed at both boys and girls, and adults.

**AL:** As you said, the Catster is a cuddly, warm toy. I have three cats at home, and none of them obey me. This could be the first cat that ever obeyed me. Is it programmed occasionally not to obey its commands?



The Catster.

**NB:** That's correct. There are 256 (a good computer number) different personalities that the pet can assume. It is really a random number generator inside.

**AL:** You have been quoted as saying that the domestic pet is obsolete. Do you really believe that, or is that a marketing thing?

**NB:** There is an important marketing notion that says that what you want to do is create controversy. The best way to have someone sell your product is to violently oppose your product. That will force a whole set of other people to embrace it. So, if you can divide the nation into people who hate your product and those who love your product, you have a better chance of getting a 50 percent market share. Anybody who has a 50 percent share is doing great.

So you get this debate going. The worst thing that can happen to a product is anonymity. By setting up this purposefully outrageous statement, you create the controversy. We were going to go so far as to include a coupon to put your real pet to sleep. We realized that would be somewhat tasteless.

**AL:** You have been involved in many endeavors and seeding different companies; do you think what you are into now is going to be what you have been looking for?

**NB:** I have really been a fish out of wa-

ter since I sold Atari. I really enjoyed the technical product business and manufacturing. Since I left Atari, I have been involved mostly with venture capital activities, and that is not nearly as satisfying, because you are always a staff person.

You're not line, or rolling up your sleeves and saying, "We're going to do it this way." Rather, you're on the board of directors and you say, "Hey, wouldn't it be nice if we did so and so?" It was always someone else articulating it.

---

*There is an important marketing notion that says that what you want to do is create controversy.*

---

It was really frustrating, too, because in venture capital, you are always working on somebody else's problems. The problem companies are the ones you are always working on. So I decided that I would de-emphasize my venture capital activities and focus my time and efforts on a particular company—and that is Axlon.

**AL:** What is going on with Androbot these days?

**NB:** Androbot is being sold. I sold most of my interest about a year ago. It is one of those things that, when the products don't go in the direction that you want to, you get out. They were heading towards industrial robots and that type of thing.

**AL:** Have you seen the new Atari products that Jack Tramiel announced at CES, and would you like to comment on them?

**NB:** I think they look strong. It's one of those things that just might be too late. It's a product line that makes me wonder why anyone would spend six or seven hundred dollars for a computer, when, for a few hundred more, they could get a Macintosh. (Ed. note—A 512K Macintosh retails for over \$2500; additional disk drives for the Mac are \$495. For \$3000, one could buy two complete Atari 520ST systems.)

**AL:** Although, if the Atari ST computers are really color Macs at one-third the cost, then they may have a market.

**NB:** At this point, the GEM system really isn't as good as MacPaint. It may get refined, but there just isn't the care and detail there.

I believe that there is still so much to be done with making computers easy to use and useful. The Macintosh and the GEM system are attempts to make computing what it should be. It is a step in the right direction, but I feel that they



Alexander Graham Bear.

are not really breakthrough products.

**AL:** *What would be a breakthrough product, and where do we have to go to make computers what they should be?*

**NB:** A couple of things need to happen. Since it is a competitive industry, I don't want to talk too much about it. Part of it is the visual bandwidth, the amount of information that can be carried on a channel or displayed.

**AL:** *Do you think home computers as a market are dead?*

**NB:** No. They have, in fact, reached a level of what I call commodity products. These type of products take on certain characteristics in the marketplace. The ability to innovate to the point of major breakthroughs is really in the eye of the beholder.

There is a level of stability in the computer market where there may only be a 1 percent improvement. But I think most of the people who want a computer have already got one. Of course, there will be upgrades and all of that.

When I think of all of the different disk formats and programs and standards that exist, I am just appalled. I've got Atari software, Apple II software, Mac software, IBM software; I just wish there were some way to standardize all of this stuff.

**AL:** *The Petster is really kind of a new product, a new market. In the robotics*

*world, a lot has been said about the future of robots in the home. The notion is that, until robotics are brought into the home in a natural way, like the way you would interact with a pet, the robotics market will not be realized. Do you think things are going to take off now?*

---

*The ability to innovate to the point of major breakthroughs is really in the eye of the beholder.*

---

**NB:** Let's just say I learned a few things at Androbot. You've got to try new things. The world is like running down a hallway. It is only when you get 90 percent of the way down the hallway that you realize that the real market is off to the left. You can look into that room and, instead of being a closet, it's a ballroom.

One of the things that I have always tried to do is to stay on the edge and be one of the first ones to recognize that there is a ballroom at the end of the hall. But you have got to get down that hallway in order to find out. And sometimes

you open the door, and there is a closet —or the door doesn't even open.

---

Nolan Bushnell has a habit of finding those ballrooms at the end of the hall. It looks as if Axlon's new products will, in fact, just be the beginning of entering that ballroom.

The Petsters will be available in June and will cost under \$100.00. Each toy will have one of 256 different personalities (breeds?) programmed into it. A.G. Bear will be available in May and will cost under \$50.00. Andy the Robot is available now for \$119.00 from Axlon, P.O. Box 306, 125 Main St., Half Moon Bay, CA 94019.

Thanks, Nolan, for a fascinating discussion and, of course, for beginning what we all now know as the Atari adventure. The Atari adventure continues next month, right here in **ANALOG Computing** with you, the **End User**.

---

*Arthur Leyenberger is a human factors psychologist living in New Jersey. He does free-lance writing and microcomputer consulting, and has been an Atari enthusiast for over three years.*

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# PANAK STRIKES!

## Reviews of the latest software

by Steve Panak

Since summer is on the way, all but the hard-core computer junkies among us have forsaken their keyboards, modems and floppy disks in favor of swimming holes, baseball and those cool, early evening drives with that special someone. While the faithful Atari sits waiting.

But, my, doesn't the tune change when the blue sky turns dark, and the weather forces us all indoors for a hot, muggy afternoon. Let's hope all circuits will function when you come back crying for something to do, begging to play one of these games.

**STEALTH**  
by Tracy Lagrone and  
Richard E. Sansom  
**BRODERBUND**  
17 Paul Drive  
San Rafael, CA 94903  
48K Disk \$29.95

On a dark, desolate and doomed planet, the Council of Nine mercilessly rule over all they survey, cruel overlords of an alien world. If they have their way, their evil will surely spread malignantly throughout the rest of the populated galaxy. You are the only one who can stop them. You are the only one who can penetrate their forces and topple their tower.

So read the tantalizing paragraphs on

the carton of **Stealth**, the new game from Broderbund. Unfortunately, this teaser is, in reality, a trap for the inattentive, as **Stealth** is only another blast-'em-up that's a good five years behind the times.

In **Stealth**, you pilot a Stealth Starfighter mere feet above the barren terrain, avoiding a few surface blemishes and ample enemy fire as you quickly close in on the Dark Tower. Upon reaching this, you must knock it down with a number of direct hits, one for each level of difficulty that you've achieved.

The enemy's tanks, bunkers and scout planes fire on you, while radar towers track you, lock on and launch missiles. On upper levels, volcanoes, both dormant and active, are added. They threaten to scorch your wings, dropping you from the sky like a moth who's flown too close to a flame. Finally, as if this isn't enough, fighter planes attempt to "kamikaze" you from the sky.

You are constrained by your energy,

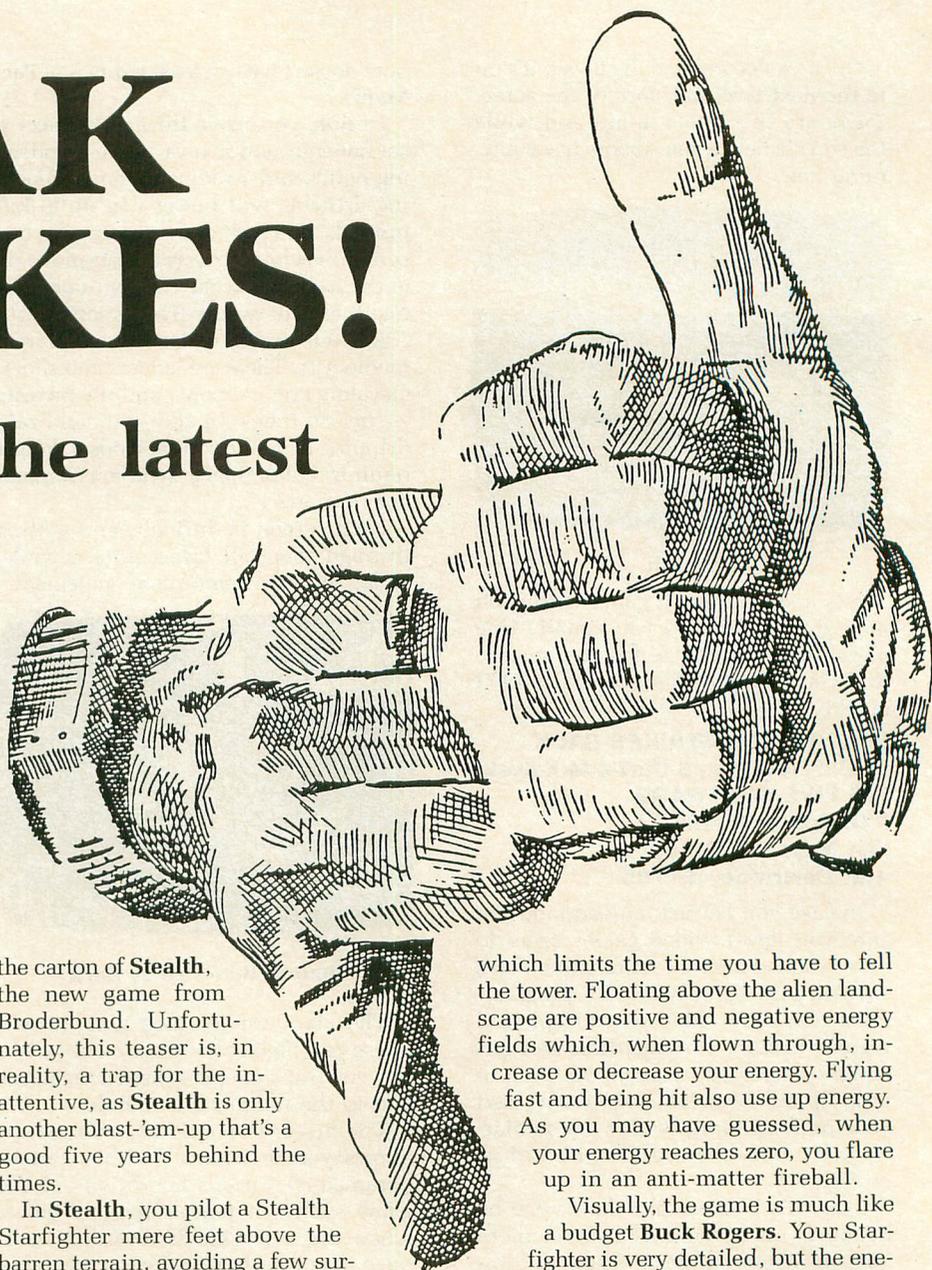
which limits the time you have to fell the tower. Floating above the alien landscape are positive and negative energy fields which, when flown through, increase or decrease your energy. Flying fast and being hit also use up energy.

As you may have guessed, when your energy reaches zero, you flare up in an anti-matter fireball.

Visually, the game is much like a budget **Buck Rogers**. Your Starfighter is very detailed, but the enemy forces are simple block figures, only slightly more sophisticated than the old 2600's.

However, all screen objects move rapidly, and your ship in particular controls nicely, leaning on turns and jerking if hit. The joystick is used for all game control except pause, which utilizes the space bar.

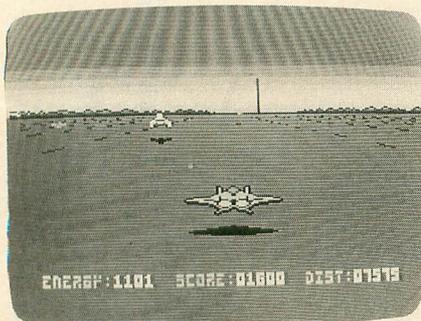
Sound is also pretty standard stuff, as is the high game save feature. This is a very conservative and safe game, with no surprises. The bottom of the screen displays energy, point and time totals, as well as distance to the tower, which looms on the horizon but never really seems to get any closer.





## PANAK STRIKES! *continued*

Once you've toppled the tower, it's on to the next level for more of the same. There are five levels in all, and while they do challenge you, there's never anything new.



**Stealth.**

It is a shame that a game with such nice graphics denies you equally fine playability. **Stealth** is fascinating the first time around, but you'll tire of it quickly.

**BOUNTY BOB STRIKES BACK**  
by Bill Hogue and Curtis Mikolyski  
**BIG FIVE SOFTWARE**  
P.O. Box 9078-185  
Van Nuys, CA 91409  
40K Cartridge \$49.95

In case you haven't noticed (and I'm sure you have), video games seem to have reached a level of stagnation that's equaled only by network TV programming. The same old ideas, concepts and themes winding through disks and cartridges a year or two ago continue to crop up this year (and, no doubt, next year, *ad infinitum*). But it's not similarity that dooms these games, it's lack of quality.

I say this because any theme can be bettered, made more exciting or more colorful. Well, unlike the "new and improved" plastering the laundry detergent boxes on the grocer's shelves, **Bounty Bob Strikes Back** lives up to its claims.

**Bounty Bob** is a follow-up adventure to **Miner 2049er**, although this fact isn't overly evident from the packaging. Indeed, the only way one might realize that **Bob** is a sequel is by recognizing the similarity between the games or by carefully reading the box. Thus, **Bob** does not rely on a past glory to pull its load. After popping in the cartridge, you'll quickly find out that **Bob** needs no help.

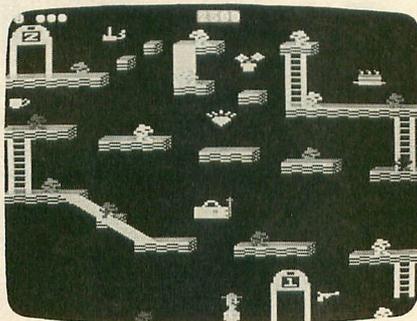
For those familiar with **Bob** or **Miner 2049er**, these games are basically variations on the **Donkey Kong** theme, with a sprinkling of **Pac-Man** (what game

now doesn't have at least a *pinch* of **Pac-Man**?)

In **Bob**, you move through a maze—set underground in a vast cave—collecting points and avoiding mutants. Touching artifacts will power you up to kill mutants. Once all of the territory in one screen has been covered, you move on to the next, but what's really unusual is that there are twenty-five screens in all.

It is this variety which saves **Bob** from mediocrity. There are ladders and slides, elevators and cannons, and my favorite—suction tubes. In addition, acid rain dripping from the ceiling lends a danger reminiscent of **Space Invaders** (remember that one?)

Each screen is difficult, and getting through them all takes quite a while. Note: this is an *optimistic* statement.



**Bounty Bob Strikes Back.**

The standard features are present: pause key, high score screen, one or two players. But a couple of special features add to the uniqueness of **Bob**.

The first is the option screen, which allows you to control (within certain parameters) various conditions of the game, such as number of lives per game, when the extra life is awarded, and, most importantly, if the secret messages are to be displayed.

These secret messages tell you how to warp through levels, jumping them three at a time. This lets you play the higher levels without wasting hours (and lives—we all get careless) on the intermediate ones that you've already mastered. At the same time, you must work to progress, since these messages are only shown when you've earned them.

The graphics are not spectacular, but they're not disappointing either, simply average. Screen movement is quick, but one would expect that from a cartridge. Sound is good, and its volume can be varied with the option screen, as well as with the monitor volume dial.

Disappointments: not enough flexibility on the option screen, although it is possible that more flexibility (lives, perhaps) would decrease difficulty and hence decrease value—**Bob** relies on the expectation and elation of a new board to fuel the fires of interest.

Big complaint: the high score screen. While a nice bit of animation occurs (little bulldozers push letters that fall to form your name; little birds pick up the score and letters, rearranging the high score table), this takes time. . . too much time, and it cannot be bypassed if two play. Since this is a cartridge, and the scores survive only as long as the power, the high score save is a waste.

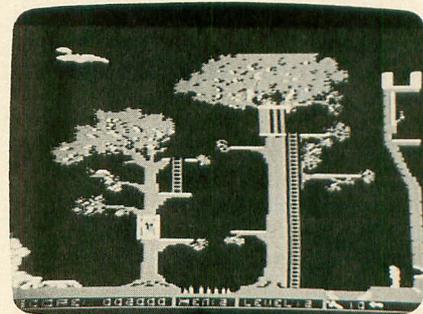
I'm hard to please—a critic has to be—but I liked **Bob**. . . I played **Bob** and, maybe most importantly, I was angry when I couldn't beat **Bob**.

So get your miner's helmet, pick and shovel, and get ready to dig this game.

**CONAN**  
by Eric Robinson and Eric Parker  
**DATASOFT**  
19808 Nordhoff Place  
Chatsworth, CA 91311  
48K Disk \$34.95

It seems that, when designers are really starved for ideas, they come up with something truly original—like a sequel or maybe "an all new game inspired by a not-too-great movie."

By that remark, you may think I've tipped my hand as to how I feel about the **Conan** game. Well, you're right.



**Conan.**

Perhaps old Arnold just doesn't make much cash from pumping iron any more (or maybe he's laughing at all of us), but it seems he's not too particular about where he places his likeness. I'm sure that if he knew about this, he would mutter a few gutteral sounds and terminate those in charge.

**Conan** the video game is really not

like anything I've seen before; for this, we can be eternally thankful.

The play is simple: you use the joystick to control a little musclebound (it's amazing what you can do with high-res graphics) figure. You move him through castles and caves, swamps and sewers, searching for gems and keys. Using the button, you launch his mighty sword to make mincemeat out of bats and floating eyeballs and a whole host of other uglies.

The graphics are good and highly detailed (however, at no time do the bicep muscles quiver). There are also good sound effects, and fortunately for all of us, the background music can be toggled off with the S key.

The problem is one of control. The game depends a lot on jumping—**Conan** jumps over creatures; **Conan** jumps over crevices; **Conan** jumps over everything, spinning through the air in a prehistoric tuck and roll.

The trouble is that jumping requires

a diagonal command from the joystick, and we all know how hard that is to do. So, rather than jumping, most of the time **Conan** dissolves atop a scorpion, while you wrestle with the joystick.

Throwing the sword is also hard to get used to, but is easily mastered—it's just a matter of timing.

That's really about it; you run around until you're done. I found little excitement. In fact, I found **Conan** to be a bore, but boredom wasn't the only insult I suffered.

The game crashes. Irrecoverably and frequently. You'll suddenly find yourself unable to move, either stuck to the side of the screen or against a tree or wall. No amount of begging will release you. The only way to continue is to commit hari-kari with the sword.

Actually, the only way to save face is to end it all by immersing the disk in a bucket of warm sake. Playing **Conan** is truly barbaric, both to your computer and to your intelligence.

That about wraps it up for this time. Now go outside and enjoy the good weather. I'll be waiting patiently for the next rainy day. □

The author wishes to thank Perfect Computers of Niles, Ohio for valuable assistance in the preparation of this article.

Steve Panak is a banking computer operator and free-lance writer living in northeastern Ohio. He holds a B.S. in B.A. and currently attends law school, where he develops software to teach complex legal concepts. In his spare time, he enjoys computer games.

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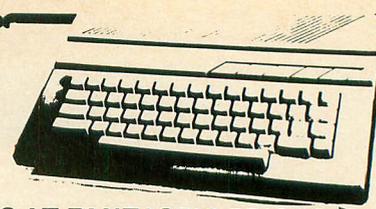
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# V

## A memory storage device

by Philip Altman

This article is about a new handler, **V:**, which turns unused memory into a working storage device. **V:** is used in much the same way as the cassette or disk storage devices you're familiar with, but unlike these, **V:** is volatile—its contents disappear when the computer is turned off.

You can **LIST** or **SAVE** a program to **V:** and later retrieve it with **ENTER** or **LOAD**. Since **V:** resides entirely in memory, data transfer is almost instantaneous. Using **V:** instead of a disk also saves wear and tear on the drive.

The capacity of **V:** depends on the amount of free RAM in your system and on the size of the program currently in memory. **V:** is especially useful for temporary storage of programs and for merging program data. You can also use **V:** to clear a cluttered variable name table.

**V:** works with all Atari computers, with the **BASIC** and **Assembler/Editor** cartridges, and with most programs that access devices in the standard way.

### System considerations.

**V:** is written entirely in machine language and fits in page 6 (\$600-6FF) with room to spare. It loads as a binary object file from the **DOS** utilities menu with option **L**. It is **SYSTEM RESET**-proof and re-

mains accessible until the computer is turned off. **V:** uses no addresses outside page 6, other than **\$CB** and **\$CC** (203,204), which are used temporarily.

### Using V.

**V:** is entered from **BASIC** with Listing 1. After entering the program, check it and save it to a **DOS 2.0** disk in drive 1. Now type **RUN**. A binary file, called **D1:V.OBJ**, will be created. When the **READY** prompt returns, type **DOS** and use option **L.** to load **V.OBJ**. Now return to **BASIC**.

Let's try some simple examples. After typing **NEW**, enter the following short program: **10 PRINT "V: WORKS!";G.10**. Now save the program to **V:** by typing **SAVE "V:"**. Clear the program and verify that it's gone by trying to list it. Now enter **RUN "V:"** and watch what happens. Stop execution by hitting the **BREAK** key. List the program and note that it has reappeared intact.

Next, let's try merging program data. Load any **BASIC** program. Now, move a block of lines to **V:** with **LIST "V:"**, start line, end line **<CR>**. Erase the program with **NEW** and enter or load another program.

Type *ENTER* "V:" and note that the stored lines have been merged with the current program. Pre-existing lines with the same line numbers are overwritten, while new lines are inserted in their appropriate positions. This also works with the Assembler/Editor if the ,M option is used.

Clearing the variable name table of unused variable names is also easy. Just list the program to V:, type *NEW*, and enter it again from V:. Cassette users will really notice the marked improvement in speed.

### Limitations.

V: saves data in memory in reverse order, beginning at the highest free address and progressing downwards. Programs, on the other hand, expand upwards in memory as they grow. So, as long as a program isn't too large relative to your system's memory capacity, a gap of free memory should always remain between a program and any data stored in V:. If there is any overlap, the results will be strange.

Note, also, that V: ignores filenames, so each time you use it to store data, previously stored informa-

tion is effectively erased. Because V: stores data beginning just below the display list, switching graphics modes is also likely to destroy any information in V:.

However, V: can still be used within a graphics mode, although its capacity will be significantly less in the higher resolution modes, since screen RAM is larger. In most cases, especially with a 48K system, you should be able to load the DUP.SYS utilities while a program is stored in V:, so long as V:'s boundary does not descend below the end of DUP.SYS (\$3306-13062).

You can check V:'s lower limit at any time with `PEEK(1538)+256*PEEK(1539)`. If you use V: in this way, incidentally, you won't need a MEM.SAV file to preserve your program. Just retrieve it from V: after returning to BASIC. But don't try to use any of the DOS copy functions. These will almost certainly clobber anything stored in V:. □

*Philip Altman, M.D. is a physician specializing in pathology. He has been programming Atari computers for over three years and is interested in machine language and utility programs. He has authored several articles for ANALOG Computing.*

## Attention Programmers!

**ANALOG Computing** is interested in programs, articles, and software review submissions dealing with the Atari home computers. If you feel that you can write as well as you can program, then submit those articles and reviews that have been floating around in your head, awaiting publication. This is your opportunity to share your knowledge with the growing family of Atari computer owners.

All submissions for publication must be typed, upper and lower case with double spacing. Program listings should be provided in printed form, and on cassette or disk. By submitting articles to **ANALOG Computing**, authors acknowledge that such materials, upon acceptance for publication, become the exclusive property of **ANALOG Computing**. If not accepted for publication, the articles and/or programs will remain the property of the author. If submissions are to be returned, please supply a self-addressed, stamped envelope. All submissions of any kind must be accompanied by the author's full address and telephone number.

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Listing 1.  
BASIC listing.

```

1 REM =====
2 REM V: A Memory Device
3 REM =====
4 REM
5 REM by Philip Altman
6 REM
7 REM THIS PROGRAM CREATES A BINARY
8 REM FILE (D:V.OBJ) WHICH LOADS AND
9 REM RUNS THE V: HANDLER
10 OPEN #1,8,0,"D:V.OBJ"
11 PUT #1,255:PUT #1,255:PUT #1,4
12 PUT #1,6:PUT #1,203:PUT #1,6
13 TRAP 15:FOR I=1 TO 1000
14 READ D:PUT #1,D:NEXT I
15 PUT #1,224:PUT #1,2:PUT #1,225
16 PUT #1,2:PUT #1,10:PUT #1,6:END
17 DATA 32,0,0,76,40,6,165
18 DATA 12,141,5,6,165,13,141
19 DATA 6,6,169,4,133,12,169
20 DATA 6,133,13,173,229,2,141
21 DATA 2,6,173,230,2,141,3
22 DATA 6,160,253,200,200,200,185
23 DATA 26,3,208,248,169,86,153
24 DATA 26,3,169,66,153,27,3
25 DATA 169,6,153,28,3,96,80
26 DATA 6,106,6,126,6,166,6
27 DATA 79,6,79,6,160,1,96
28 DATA 165,42,201,8,240,4,201
29 DATA 4,208,245,173,230,2,141
30 DATA 1,6,174,229,2,142,0
31 DATA 6,165,145,208,85,165,42
32 DATA 201,4,240,221,173,0,6
33 DATA 141,2,6,173,1,6,141
34 DATA 3,6,208,207,174,0,6
35 DATA 134,203,174,1,6,134,204
36 DATA 160,0,177,203,164,203,208

```

```

37 DATA 3,206,1,6,206,0,6
38 DATA 174,3,6,236,1,6,144
39 DATA 175,204,2,6,208,170,160
40 DATA 136,96,174,1,6,134,204
41 DATA 174,0,6,134,203,160,0
42 DATA 145,203,138,208,3,206,1
43 DATA 6,206,0,6,165,145,205
44 DATA 1,6,144,137,228,144,176
45 DATA 133,160,147,96

```

### CHECKSUM DATA.

(see page 13)

```

1 DATA 183,98,187,993,204,997,902,952,
776,7,4,952,280,550,49,7134
16 DATA 117,862,121,350,332,23,616,645
,327,356,38,915,387,614,38,5741
31 DATA 612,116,38,55,607,651,7,78,645
,389,125,615,150,641,751,5480

```

```

;-----
;V - A Memory Device
;-----
;
;* by Philip Altman *
;
;This program creates
;a dynamic storage device
;(V:) in RAM
;
;-----
;OS EQUATES
;-----
DOSINI = %0C ;DISK BOOT INIT
ICAX1Z = %2A ;0 PAGE AUX BYTE
MEMTOP = %90 ;BASIC TOP MEM
HIMEM = %02E5 ;OS TOP MEMORY
HATABS = %031A ;OS HANDLER TBL
;
;-----
;IOCB EQUATES
;-----
OPNRD = %04 ;READ
OPNWRT = %08 ;WRITE
;
;-----
;CIO ERROR CODES
;-----
MEMFUL = %93 ;MEMORY FULL ERR
EOFERR = %88 ;EOF ERROR
;
;-----
;0-PAGE EQUATES
;-----
ZEROPG = %CB
;
** %0600
;
;-----
;PROGRAM STORAGE
;-----
PTR ** **2 ;NEXT FREE ADRS
EOF ** **2 ;EOF POINTER
;
;-----
;WARMSTART ENTRY
;-----
WARMST JSR ** * ;INIT DISK
JMP LDHAND ;LOAD HANDLER
;
;-----
;COLDSTART ENTRY
;-----
COLDST LDA DOSINI ;MOVE OLD
STA WARMST+1 ;DOSINI TO
LDA DOSINI+1 ;WARMST
STA WARMST+2
LDA # <WARMST ;POINT DOSINI
STA DOSINI ;TO WARMST
LDA # >WARMST
STA DOSINI+1
LDA HIMEM ;INIT EOF PTR
STA EOF
LDA HIMEM+1
STA EOF+1
;
;-----
;INSERT V: HANDLER
;-----

```

```

;
;LDHAND LDY ##FD ;SRCH HANDLR TBL
LOOP INY ;FOR ZERO BYTE
INY ;SKIP 3 BYTES
INY ;EACH TIME
LDA HATABS,Y
BNE LOOP ;BR UNTIL FOUND
LDA #V ;INSERT "V:"
STA HATABS,Y ;& HANDLER ADRS
LDA # <HNDBTBL
STA HATABS+1,Y
LDA # >HNDBTBL
STA HATABS+2,Y
RTS ;RETURN TO OS
;
;-----
;V HANDLER ADDRESS TABLE
;-----
HNDBTBL .WORD VOPEN-1 ;OPEN
.WORD VCLOSE-1 ;CLOSE
.WORD VGET-1 ;GET BYTE
.WORD VPUT-1 ;PUT BYTE
.WORD VSTAT-1 ;STATUS
.WORD VSPEC-1 ;SPECIAL
;
;SUCCESS LDY #1 ;RET GOOD STAT
VSTAT RTS
VSPEC RTS ;NOT IMPLEMENTED
;
;VOPEN LDA ICAX1Z ;GET AUX BYTE
CMP #OPNRD ;?WRITE
BEQ OPN
CMP #OPNRD ;MUST BE READ
BNE VSPEC ;ELSE ERROR
LDA HIMEM+1 ;INIT PTR TO
STA PTR+1 ;LAST FREE ADRS
LDX HIMEM
STX PTR
LDA MEMTOP+1 ;?FREE MEM LEFT
BNE TSTPTR ;BR ALWAYS
;
;VCLOSE LDA ICAX1Z ;GET MODE
CMP #OPNRD ;?READ
BEQ SUCCESS ;BR IF SO
LDA PTR ;WAS WRITE
STA EOF ;SO MARK EOF
LDA PTR+1
STA EOF+1
BNE SUCCESS ;BR ALWAYS
;
;VGET LDX PTR ;MOVE INDEX
STX ZEROPG ;TO PAGE ZERO
LDX PTR+1
STX ZEROPG+1
LDY #0
LDA (ZEROPG),Y ;GET BYTE
LDY ZEROPG
BNE LO1
DEC PTR+1 ;BUMP PNTR DOWN
DEC PTR
LDX EOF+1 ;? AT EOF
CPX PTR+1
BCC SUCCESS
CPY EOF
BNE SUCCESS ;OK IF PTR>EOF
LDY #EOFERR ;ELSE EOF ERROR
RTS
;
;VPUT LDX PTR+1 ;MOVE INDEX
STX ZEROPG+1 ;TO PAGE ZERO
LDX PTR
STX ZEROPG
LDY #0
STA (ZEROPG),Y ;PUT BYTE
TXA ;DECR INDEX
BNE LO
DEC PTR+1
DEC PTR
LDA MEMTOP+1
CMP PTR+1 ;?ROOM FOR
BCC SUCCESS ;MORE DATA
CPX MEMTOP ;OK IF PTR >=
BCS SUCCESS ;MEMTOP
LDY #MEMFUL ;ELSE NO RAM
RTS
;
;-----
;COLDSTART ENTRY
;-----
** = %02E0
.WORD COLDST
;
.END

```

## Attention XL Owners!

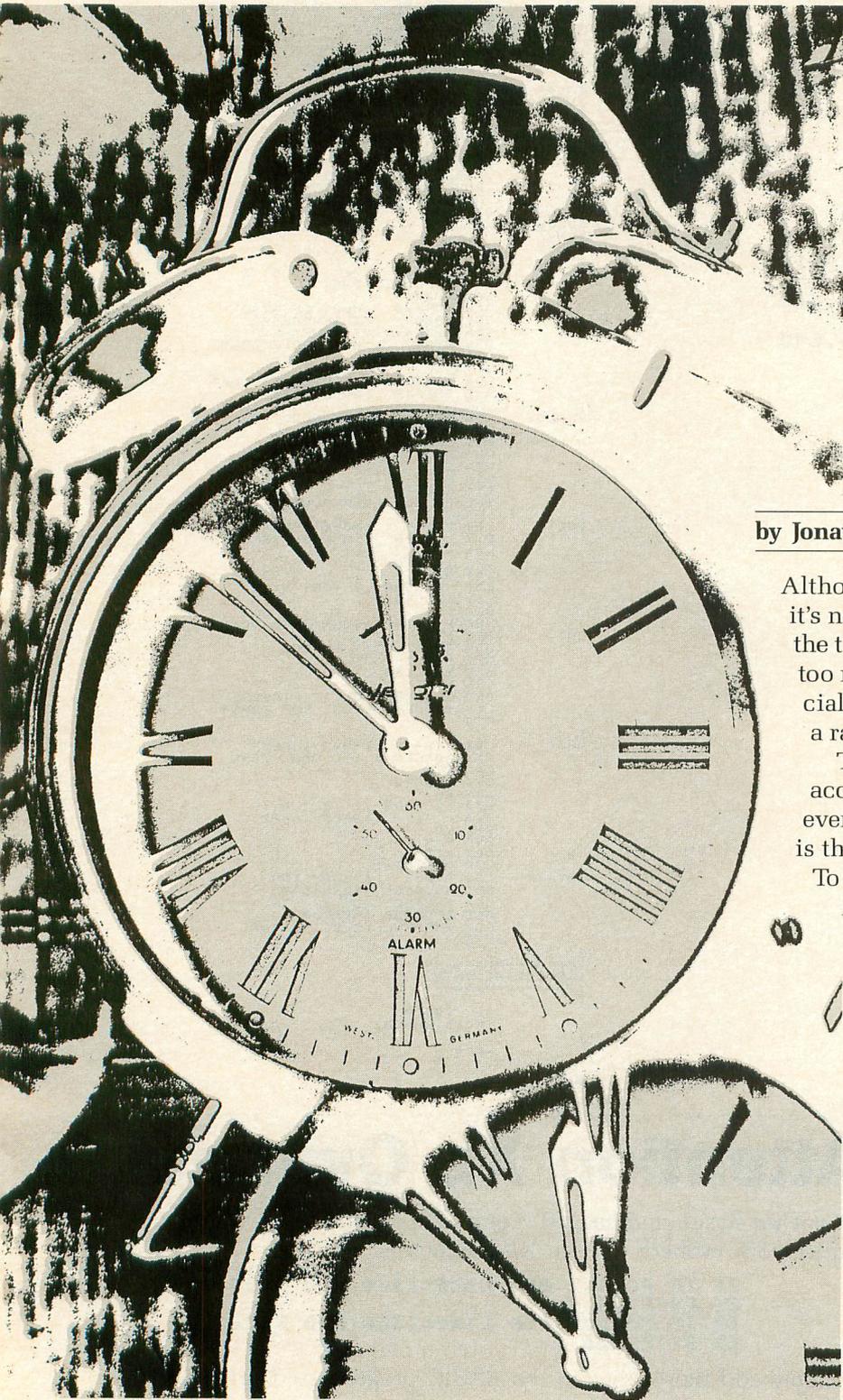
TwoGun (issue number 28) requires the following two-line addition to work properly on the XL computers:

```

71 IF PASS=2 AND LINE=1360 AND X=69 TH
EN BYTE=95
72 IF PASS=2 AND LINE=1360 AND X=71 TH
EN BYTE=228

```

Simply add these lines to the BASIC program and reRUN it.




---

by Jonathan Buckheit

---

Although the Atari does have a "clock" built in, it's not easily accessible to the user. What's more, the time isn't displayed on the screen. I found this too much of an inconvenience to live with, especially since the Atari can display the clock in a rather novel way. Wherefore, the **Atari Clock**.

To set up a real-time clock, we must have an accurate way to measure time. One of the only events that takes place punctually on the Atari is the Immediate Vertical Blank Interrupt (VBI).

To read up on it, I suggest *De Re Atari* from APX or *Mapping the Atari* from COMPUTE! Books.

We must use the Immediate VBI because the Deferred VBI is locked out during I/O. In fact the **Atari Clock** doesn't display the time during critical I/O (as checked by CRITIC at 66 [\$42]).

As I said, the VBI is pretty punctual. It occurs about sixty times per second, but not quite; it's a couple of milliseconds off. The **Clock** compensates for this loss by adjusting the time about every thirteen seconds.

Note: those not on U.S. standard TV (i.e., PAL) can't use this program without modification, because the VBI occurs at a different interval.

Now that we have a way to calculate



# ATARI CLOCK

the time, we must find a way to display it. My requirements were: (1) that the **Clock** should not go away because of graphics calls, SYSTEM RESETs or I/O; and (2) that it shouldn't take up any user screen area.

What?! How can you display something on the TV or monitor without using the screen? Certainly, you couldn't do it on an Apple or even a Commodore 64. The Atari, however, with its advanced display chips, is quite capable of performing this operation with relative ease.

### So how do we do it?

Have you ever noticed that there's quite a bit of blank area before the actual screen starts? The purpose of this was to compensate for the TV overscan (when the TV crops off the left, right, top or bottom of the picture). Perhaps this is a little bit too much compensation, for I've never run across a TV with this much overscan (although it's conceivable that some have it).

I took eight of the twenty-four blank scan lines and subverted them into one graphics 0 line (note that, by following the same principle, you can get 320x200 in graphics 24). The **Clock** is displayed on this line on the top of the screen.

### Getting the Clock up and running.

There are three program listings accompanying this article. One is the source code for the **Clock**, created with the OSS MAC/65 Assembler. It's intended to help you learn about the program and assembly language.

You don't *have* to type it in—although if you own the Assembler, you may do so, assemble to disk with the filename AUTORUN.SYS and eliminate typing in CLOCK CREATE. It's up to you.

Assuming you didn't use the assembly version, you now type in both the CLOCK CREATE and the SET CLOCK programs, and SAVE them as MAKCLOCK.BAS and SETCLOCK.BAS, respectively. Now you RUN MAKCLOCK.BAS; it will check its DATA, and if everything is copacetic, it will write out an AUTORUN.SYS file to a DOS disk, which you provide.

The MAKCLOCK program asks you whether or not you're using Atari DOS. If you are, a different version will be written. This version disables the **Clock** on a DOS call to prevent it from locking up because of overwrite and VBI problems with Atari DOS.

If you typed in the assembly version, set DOSII? variable to 1 if you're using Atari DOS.

Now, boot up with this disk. You'll see nothing different. But wait, RUN SETCLOCK.BAS and INPUT the correct time. After you type in the seconds and press RETURN, a graphics 0 line will appear at the top of the screen (after one second). Go ahead, press SYSTEM RESET. Naturally, the **Clock** sedulously remains, adjusting itself to compensate for the delay.

Next, change to a different graphics mode. Again, it keeps on ticking. For the final test, LOAD a program. The **Clock** will stop while it's LOADING, but, after that's done, it will adjust again. If this is all you

*(continued on next page)*



# Atari Clock *continued*

want to use the **Clock** for, you've gotten as far as you have to.

Normally, the **Clock** LOADs in at \$2200 (8704), which is the OS/A+ DOS XL MEMLO. If you're using a different DOS (say, DOS XL with an XL computer, and you get a MEMLO as low as \$0A00), go right ahead (if you have an Assembler) and change the origin. Reassemble to disk as AUTORUN.SYS.

### Important memory locations used.

First, note that **START** refers to the load address (default = \$2200).

**START** — Latch

A value non-zero but less than 128 stops the **Clock**, but the time is kept.

A value non-zero but greater than 127 stops the **Clock**.

A value of zero (the default) displays the **Clock** and keeps the time.

HOUR = **START** + 75  
MINUTE = **START** + 76  
SECOND = **START** + 77

These locations are where you can read the **Clock**. Note, however, that a time of 5:15:58 is stored as follows:

\$05 )5), \$15 (21), and \$58 (88)

Astute readers will realize that I am storing these values in binary coded decimal (see the **Boot Camp** tutorials, issue 15 in particular). If you don't know how to convert hexadecimal to decimal, here are examples:

\$15 = 1 \* 16 + 5 = 21  
\$58 = 5 \* 16 + 8 = 88

Well, that's about it. I hope that you will find the **Atari Clock** as useful as I have. □

Listing 1.  
BASIC listing.

```
100 REM *****
110 REM * ATARI CLOCK CREATE *
120 REM * by Jonathan Buckheit *
130 REM *****
140 REM
150 GRAPHICS 0:POKE 752,1:"<math>\downarrow\downarrow\downarrow</math>Reading
DATA":DIM BUF$(400)
160 ? "<math>\downarrow</math>Reading Line: ":LINE=330
170 POSITION 16,5: LINE
180 TRAP 220:FOR I=1 TO 25:READ A:ON A
=256 GOSUB 490:SUM=SUM+A:L=L+1:BUF$(L,
L)=CHR$(A):NEXT I
190 IF PEEK(183)+256*PEEK(184) <>LINE T
HEN 300
```

```
200 READ CKSUM:CKSUM=CKSUM+(CHAR=ASC("
Y")):IF SUM=CKSUM THEN LINE=LINE+10:GO
TO 170
210 GOTO 290
220 IF PEEK(195) <>6 THEN 290
230 ON LEN(BUF$( <>400 GOTO 190:?"<math>\downarrow</math>DA
TA lines O.K.":?"<math>\downarrow</math>Insert a DOS disk,
press [F10]."  
240 IF PEEK(53279) <>6 THEN 240
250 TRAP 310:OPEN #1,8,0,"D:AUTORUN.SY
S"  
260 POKE 850,11:ADDR=ADR(BUF$):POKE 85
2,ASC(CHR$(ADDR)):POKE 853,INT(ADDR/25
6):POKE 856,136:POKE 857,1
270 X=USR(ADR("hhhh<math>\downarrow</math>LU"),16):IF PEEK(8
51) >127 THEN 310
280 ? "<math>\downarrow</math>File Written.":POKE 752,0:END
290 ? "<math>\downarrow</math>Incorrect DATA at line ":LINE:
LIST LINE:POKE 752,0:END
300 ? "<math>\downarrow</math>Line ":LINE;" is missing!":POK
E 752,0:END
310 ? "<math>\downarrow</math>Disk WRITE error.":POKE 752,0:
END
320 REM * ML DATA FOLLOWS *
330 DATA 255,255,0,34,251,34,255,256,0
,0,160,81,162,34,169,6,32,92,228,32,13
,34,169,64,141,2501
340 DATA 231,2,169,35,141,232,2,96,112
,112,66,35,34,1,0,0,0,0,0,0,0,0,0,0,0,
3769
350 DATA 0,0,0,0,52,41,45,37,26,0,0,0,
26,0,0,26,0,0,0,0,0,0,0,0,0,0,4022
360 DATA 0,0,0,0,0,0,0,0,0,96,0,13,173
,0,34,48,61,173,48,2,201,27,208,7,173,
5286
370 DATA 49,2,201,34,240,27,173,48,2,2
4,105,3,141,33,34,173,49,2,105,0,141,3
4,34,169,27,7136
380 DATA 141,48,2,169,34,141,49,2,206,
78,34,208,15,238,79,34,169,60,141,78,3
4,165,66,13,0,9340
390 DATA 34,240,3,76,95,228,206,80,34,
208,8,169,13,141,80,34,206,78,34,248,1
73,77,34,24,105,11968
400 DATA 1,141,77,34,201,96,208,39,162
,0,142,77,34,173,76,34,24,105,1,141,76
,34,201,96,208,14349
410 DATA 21,142,76,34,173,75,34,24,105
,1,141,75,34,201,19,208,5,169,1,141,75
,34,206,79,34,16456
420 DATA 208,185,173,75,34,32,4,35,140
,54,34,141,55,34,173,76,34,32,4,35,140
,57,34,141,58,18444
430 DATA 34,173,77,34,32,4,35,140,252,
34,119,35,60,34,141,61,34,76,95,228,72
,74,74,74,74,20510
440 DATA 32,16,35,168,104,41,15,24,105
,10,96,173,2,34,133,10,173,3,34,133,11
,173,14,34,133,22216
450 DATA 12,173,15,34,133,13,172,96,22
8,174,97,228,169,6,32,92,228,169,0,141
,231,2,169,34,141,25005
460 DATA 232,2,108,10,0,165,12,141,14,
34,165,13,141,15,34,169,4,133,12,169,3
4,133,13,160,81,26999
470 DATA 162,34,169,6,32,92,228,173,1,
34,208,3,76,16,34,165,10,141,2,34,165,
11,141,3,34,28973
480 DATA 169,20,133,10,169,35,133,11,7
6,16,34,226,2,227,2,64,35,0,0,0,0,0,0,
0,0,30335
```

```

490 ? :? "Using DOS II (Y/N)?"::OPEN #
3,4,0,"K:"
500 TRAP 500:GET #3,CHAR:IF CHAR(>ASC(
"Y") AND CHAR(>ASC("N") THEN 500
510 CLOSE #3:? CHR$(CHAR):A=0:IF CHAR=
ASC("Y") THEN A=1
520 RETURN

```

### CHECKSUM DATA.

(see page 13)

```

100 DATA 526,491,472,535,86,369,490,25
1,674,625,132,717,622,816,830,7636
250 DATA 434,628,381,276,953,830,851,6
13,694,89,248,165,413,933,298,7806
400 DATA 941,712,723,923,892,262,128,6
30,884,946,698,997,595,9331

```

### Listing 2.

```

110 REM ***** SET CLOCK *****
120 REM
130 REM A Program To Set ATARI CLOCK
140 REM
150 REM Written by Jonathan Buckheit
160 REM
170 REM You must have the AUTORUN.SYS
180 REM file loaded in before running
190 REM this program!
200 REM
210 START=8704:REM $2200 - If you chan
ged the origin, change this also!
220 REM
230 OPEN #1,4,0,"E":? :? " SET CLOC
K by Jonathan Buckheit ":DIM HEX$(2):P
OKE START,255
240 IF PEEK(743)+256*PEEK(744)(>START+
320 THEN ? :? "A ATARI CLOCK NOT L
OADED !!!":END
250 TRAP 250:? :? "Enter Hour:";GOSUB
290:HOURL=BYTE:IF HOURL<1 OR HOURL>18 TH
EN 250
260 TRAP 260:? :? "Enter Minute:";GOS
UB 290:MINUTE=BYTE:IF MINUTE<0 OR MINU
TE>96 THEN 260
270 TRAP 270:? :? "Enter Second:";GOS
UB 290:SECOND=BYTE:IF SECOND<0 OR SECO
ND>96 THEN 270
280 POKE START+75,HOURL:POKE START+76,M
INUTE:POKE START+77,SECOND:POKE START+
78,60:POKE START+79,0:POKE START,0
285 NEW
290 INPUT #1,HEX$:IF LEN(HEX$)=1 THEN
HEX$(2)=HEX$:HEX$(1,1)="0"
300 B1=ASC(HEX$):B2=ASC(HEX$(2))
310 MSB=B1-48-(B1>64)*7:LSB=B2-48-(B2>
64)*7:BYTE=LSB+16*MSB:RETURN

```

### CHECKSUM DATA.

(see page 13)

```

110 DATA 974,80,604,86,382,92,337,776,
723,76,415,82,551,63,339,5580
260 DATA 623,472,31,113,924,887,408,34
58

```

### Listing 3. Assembly listing.

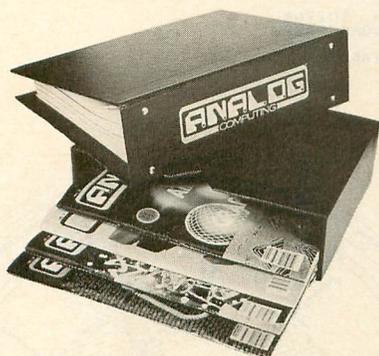
```

|-----|
|   ATARI CLOCK   |
| by Jonathan Buckheit |
|-----|
| Program Equates |
|-----|
| SETVBV  =  $E45C  | IVBLANK set
| SYVBV   =  $E45F  | IO.S. VBI
| DLISTL  =  $0230  | Display list
| DLSTH   =  $0231  | address
| DOBINI  =  $0C    | DOS init
| MEMLO   =  $02E7  | Low memory
| INITAD  =  $02E2  | Auto-Boot
| CRITIC  =  $42    | Critical I/O
| DOBVEC  =  $0A    | DOS Vector
| ORIGIN  =  $2200  | Change...
|-----|
| REBET Routine Follows |
|-----|

```

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# Atari Clock *continued*

```

    ** ORIGIN |Change...
LATCH .BYTE $FF |Clock ON/OFF
DOSII? .BYTE 0 |DOS II Flag
DOSHOLD .WORD 0 |DOSVEC Copy
RESET LDY # <VBI |Set up for an
      LDX # >VBI |immediate VBI.
      LDA #6
      JSR SETVBV
BOOT JSR BOOT |Boot DOS.
FIXMEMLO LDA # <NEWMEMLO |Move the Low
        STA MEMLO |Memory pointer
        LDA # >NEWMEMLO |over us.
        STA MEMLO+1
        RTS

```

## ----- Program Storage Areas

```

NEWDL .BYTE $70,$70,$42
      .WORD TEXT
      .BYTE $01
      .WORD 0
BACK .
TEXT .SBYTE " " TIME: "
SHOUR .SBYTE " : "
BMINUTE .SBYTE " : "
SSECOND .SBYTE " "
HOUR .BYTE 0
MINUTE .BYTE 0
SECOND .BYTE 0
HSECOND .BYTE 0
HSECOND .BYTE 0
CSECOND .BYTE 13

```

## ----- Vertical Blank Interrupt

```

VBI LDA LATCH |Lock out?
    BMI EXITVBI |Yes.
    LDA DLISTL |Do we need to
    CMP # <NEWDL |modify the
    BNE PUTDL |display list?
    LDA DLISTH
    CMP # >NEWDL
    BEQ CLOCK
    LDA DLISTL |Yes!
    CLC |Save address
    ADC #3 |of this DL
    STA BACK |for our DL.
    LDA DLISTH
    ADC #0
    STA BACK+1
    LDA # <NEWDL |Tell ANTIC
    STA DLISTL |where he can
    LDA # >NEWDL |find our DL.
    STA DLISTH
CLOCK DEC HSECOND |One second?
      BNE EXITVBI |No!
      INC HSECOND
      LDA #60 |Reset 60th of a
      STA HSECOND |second counter.
      LDA CRITIC |Critical code?
      ORA LATCH |Yes, turn off
      BEQ UPDATE |clock.
      JMP BYSVBV |Exit VBI.
EXITVBI
UPDATE DEC CSECOND |Since VBI is
      BNE NEXT |just under
      LDA #13 |1/60th second
      STA CSECOND |we must adjust
      DEC HSECOND |for this.
      BCD |Decimal mode.
NEXT LDA SECOND |Next second.
      CLC
      ADC #1
      STA SECOND
      CMP #60 |Overflow?
      BNE PRINT |No!
      LDX #0 |Reset seconds.
      STX SECOND
      LDA MINUTE |Next minute.
      CLC
      ADC #1
      STA MINUTE
      CMP #60 |Overflow?
      BNE PRINT |No!
      STX MINUTE |Reset minutes.
      LDA HOUR |Next hour.
      CLC
      ADC #1
      STA HOUR
      CMP #13 |Overflow?
      BNE PRINT |No!
      LDA #1 |Reset hours.
      STA HOUR
      DEC HSECOND
      BNE UPDATE
      LDA HOUR |Print HOURS.
      JSR CONVERT
      STY SHOUR
      STA SHOUR+1
      LDA MINUTE |Print MINUTES.
      JSR CONVERT
      STY BMINUTE
      STA BMINUTE+1
      LDA BSECOND |Print SECONDS.
      JSR CONVERT
      STY SSECOND
      STA SSECOND+1
      JMP BYSVBV |Exit VBI.

```

## ----- HEX to INTERNAL ATASCII

```

CONVERT PHA |Hold on to it.
        LSR A |Get the four
        LSR A |MSB bits.
        LSR A

```

```

        LSR A |Convert.
        JSR HEX
        TRY
        AND #$0F |Get the four
        CLC |LSB bits.
        ADC #00A |Convert nibble
        RTS |to internal.

```

## ----- DOS II Disable Routine

```

NEWDOS LDA DOSHOLD |Restore DOS Vector
        STA DOSVEC
        LDA DOSHOLD+1
        STA DOSVEC+1
        LDA BOOT+1 |Restore RESET Vector
        STA DOSINI
        LDA BOOT+2
        STA DOSINI+1
        LDY SVSVBV+1 |Restore Old VBI
        LDX SVSVBV+2
        LDA #006
        JSR SETVBV
        LDA # <ORIGIN |Restore MEMLO
        STA MEMLO
        LDA # >ORIGIN
        STA MEMLO+1
        JMP (DOSVEC) |Call DOS

```

## NEWMEMLO

## ----- Power-Up Routine (Deleted)

```

POWER LDA DOSINI |Save DOSINI
      STA BOOT+1 |value.
      LDA DOSINI+1
      STA BOOT+2
      LDA # <RESET |Include us
      STA DOSINI |in the SYSTEM
      LDA # >RESET |RESET chain.
      STA DOSINI+1
      LDY # <VBI |Set up for an
      LDX # >VBI |immediate VBI.
      LDA #6
      JSR SETVBV
      LDA DOSII? |DOS II?
      BNE DOSII |Yes!
      JMP FIXMEMLO

```

## DOSII

```

      LDA DOSVEC |Save DOSVEC
      STA DOSHOLD
      LDA DOSVEC+1
      STA DOSHOLD+1
      LDA # <NEWDOS |Point DOS vector
      STA DOSVEC |to our NEWDOS routine
      LDA # >NEWDOS
      STA DOSVEC+1
      JMP FIXMEMLO

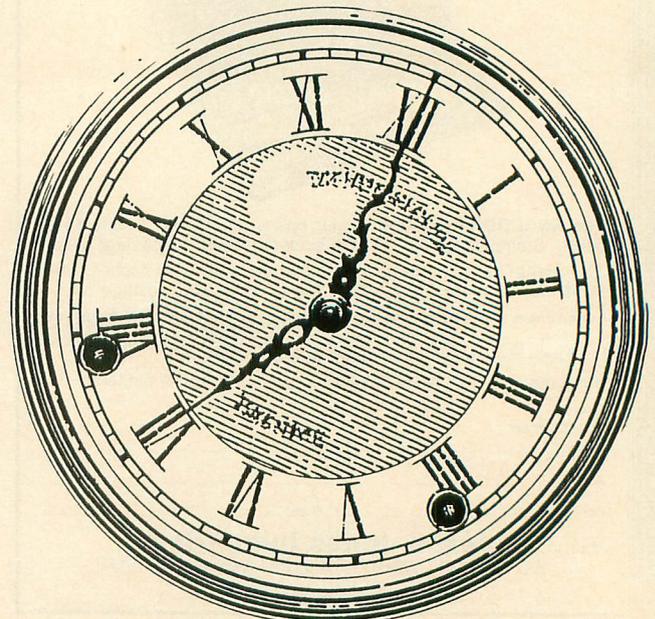
```

## ----- Auto-Boot

```

**= INITAD
.WORD POWER
.END

```



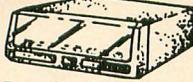


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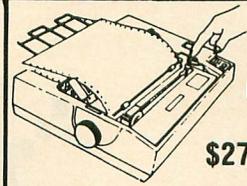
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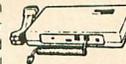
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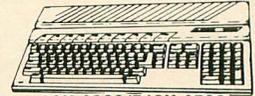


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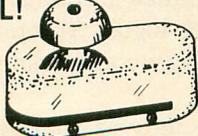


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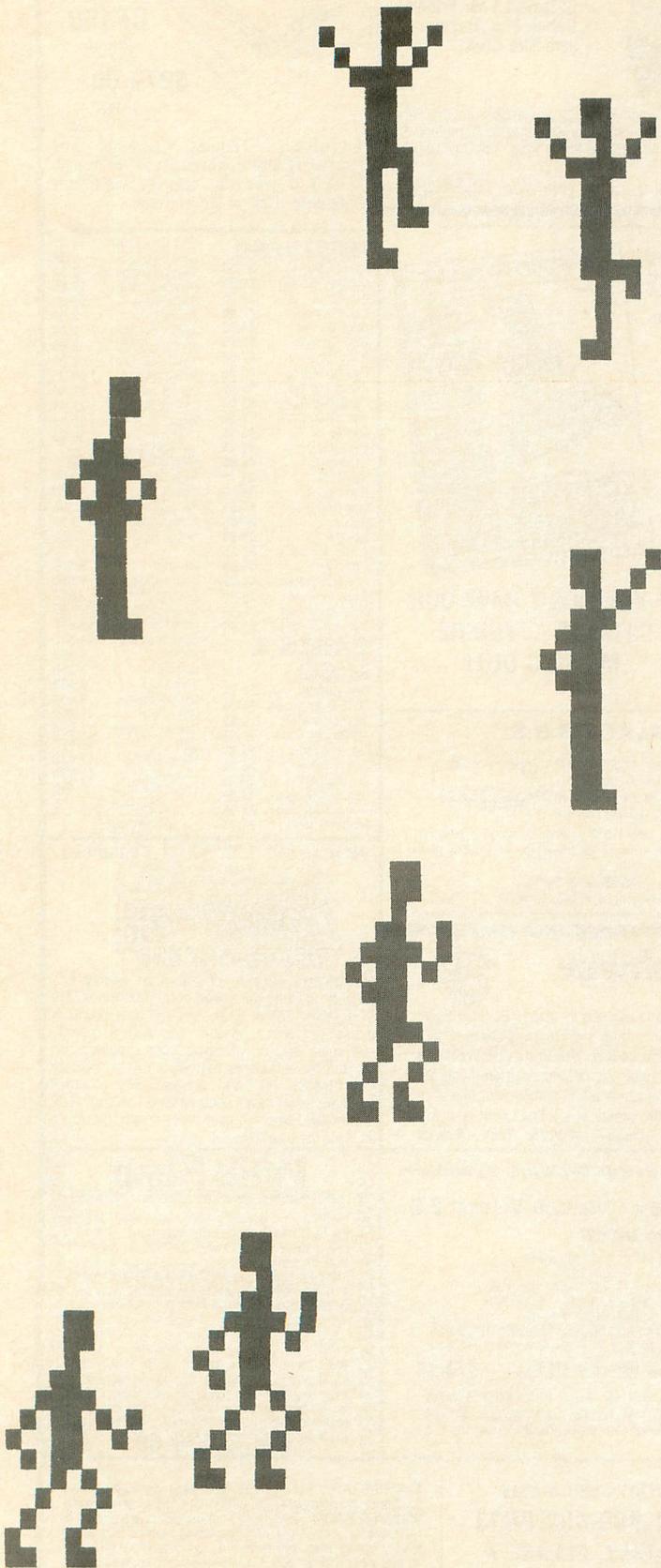


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# ATASCII

---

by Mark Comeau

---

**ATASCII Animation** allows you to take advantage of the powerful editing features and graphics characters of your Atari computer, using them for something that computers do well—animation.

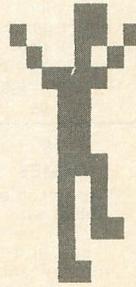
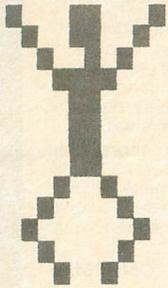
Fast, sometimes smooth graphics can be made easily and moved around quickly. Full graphics screens can be moved up and down with a few keystrokes. Any ATASCII character can be used in your creations, and any editing key can be used to move them.

Once you have created your animation, it can be sent over the modem and seen immediately by any Atarian. The file can also be used as a “logo” on a bulletin board system (BBS).

These logos usually include the name of the BBS, the phone number, the name or handle of the system operator (Sysop) and some nice graphics. If you can develop the art of making logos, Sysops may use yours on their BBS and allow you to use more BBS functions.

Type in the program exactly as it appears. Type all the control characters correctly; you’ll need practice with them if you don’t know your way around them well enough yet. It isn’t necessary to type in all of the REM statements, but don’t they *look nice*? Check your work with **Unicheck** (see page 13).

Once you type in **ATASCII Animation** correctly, type **RUN**. The menu will fade onto the screen. The first item on the menu is . . .



# Animation

## A. Continue/Make Screen.

When you press this, the menu will glide off the screen, and you'll see the cursor in the corner. This is where you type/make your logo. Try hitting CTRL and any letter key. If you're unfamiliar with the graphics characters, look up the keyboard layout in the user manual or BASIC manual.

For the sake of demonstration, I will make a nice logo for a friend. I'm going to type out *Sue + Frank* in large, friendly letters.

Now that you have some large letters on the screen (I have a very nice *Sue + Frank* on mine), try going to the top of the screen (CTRL-any arrow key a few times) and *SHIFT-INSERT/SHIFT-DELETE*. That will make all of it move down, then up. Wow! That was pretty neat. . . Well, maybe not *that* neat.

Now we want to go back to the menu (at least, I do), so press any of the console keys. Now, press 1 on the menu again, and you get to see your masterpiece again, moving down and up!

Notice how the menu fades down off of the screen when you select an option? To do this, go to the bottom of the screen, press CTRL-INSERT and CTRL-↑ over and over, until you reach the top. This will make it do the same thing as the menu. Try typing all kinds of keys and any editing key for animation, then go back to the menu for. . .

## C. Clear Graphics.

Already? This option deletes your logo from memory and sends it to, as my father says, "bit heaven."

Before you kill it off, the computer asks, *ARE you sure?* If you are, type Y and RETURN. I don't want to send *Sue + Frank* to bit heaven, so I press N and RETURN. Let's find out what else is on the menu.

## S. Save Graphics.

When you want to put your masterpiece onto the disk drive, this option is especially useful.

Just enter the filename as *FILESPEC.EXT*. The logo is saved on disk like a text file and can be manipulated as any other text file can be.

Please note that each logo has a clear screen (CHR\$(125)) character at the beginning, so, no matter where it's shown, the screen will always clear when your masterpiece is being shown.

If you want a disk directory, just press RETURN. If you really don't want to save anything right now, press CTRL-Q and RETURN to go back to the menu.

## L. Load Graphics.

This is just like Save Graphics, but you'll be taking it off the disk, instead. As it loads, it will be displayed, so you can see your masterpiece. If you are unsure of the many fine features of the Save option, review it immediately.

## T. Take Picture.

When you typed out those large, friendly letters, did you get it right on your first try? Or did you have to delete a lot of characters that you didn't want?

When you go back to look at your logo, you see every keystroke that you made. Your logo may have

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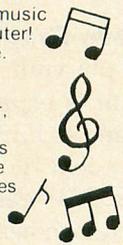
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CIRCLE #134 ON READER SERVICE CARD

# ATASCII Animation *continued*

a perfect picture after all the keystrokes are shown, but you really don't like those mistakes. "This is going to be seen by all my friends on the ultimate BBS," you say, "and I don't want them to see all of my mistakes." Well, don't despair. Take Picture can make it look as if you never made a mistake.

Let's try all of it. Press **T** and off we go. The computer says, *WHILE PICTURE IS BEING DISPLAYED, PRESS OPTION TO SPEED UP, PRESS SELECT TO SLOW DOWN OR PRESS START TO TAKE PICTURE.* I'll explain that later.

*DO YOU WANT IT TO COME UP FROM THE BOTTOM,* the computer asks. If you say **Y**, then a **CTRL-↑** will be added to the beginning of the picture, causing it to be displayed from the bottom, scrolling up from here on in. I want mine to, so I answer **Y**.

*TAKE PICTURE OF LAST FRAME?* comes up next. If, after the last character that you typed, you have a masterpiece you want to preserve forever in an

error-free fashion, press **Y. I**, for the sake of demonstration, do not.

The computer clears the screen and starts printing all the characters that I typed, the same way I typed them. The characters are coming out a little slowly, so I push **OPTION**, and things speed up a little.

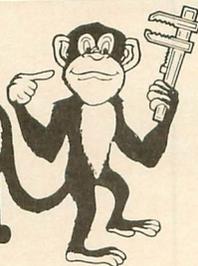
I see that the word *Sue* is about to finish printing out (in large, friendly letters). For the sake of demonstration, I only want this logo to say *Sue*, so I press **SELECT** and hold it down until the characters are coming out very slowly. The very last corner of the *e* comes out, and I press **START**. The screen turns black and gets lighter and lighter, until it's white. This takes a little time, but not much.

The Take Picture option has done its job, and it returns me to the menu. I press **A**, and *Sue* comes out from left to right, top to bottom. There are no mistakes, and it looks quite nice, if I do say so myself.

"But what happened to + *Frank*?" you ask. A few

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CIRCLE #135 ON READER SERVICE CARD

# ATASCII Animation *continued*

days ago, I saved them on disk without the Sue. This is perfect, because now I can show you how to . . .

## G. Append Graphics.

I know you don't have + *Frank* saved on disk, so you can just read this for the sake of demonstration. I hit G and something similar to "load screen" shows up. If you're unsure of what "load screen" is, review the L section immediately. I press RETURN, because I forgot what filename I used.

Okay, there it is: *ANDFRANK.LGO 024*. I type *ANDFRANK.LGO*. The computer appears to be loading in the logo like nothing out of the ordinary. But, actually, it has taken out the clear character—it takes the first character from the file and just sends it to bit heaven.

It has finished its job and sends me back to the menu, where I belong. In review, you could say that Append Graphics adds a logo onto the end of your logo from disk.

## K. 38/30 Column.

Some people like 38-column mode, but if you're like me, you want those two extra spaces for your masterpiece. You have a choice. Just press K and choose.

You may want to save your logos with an extender that reminds you of the column mode. For example, *SUENFRNK.40* or *RENEE.38*. A logo that was made in 40-column may or may not look so good in 38-column, and vice versa.

If you'd like to customize your program to be in 40-column without having to press K and choose the mode every day when you boot *ATASCII Animation*, this is what you do: change the variable in Line 130 to read *LM=CO*. That will make the left margin 0 instead of 2.

## D. Delete Last Character Typed.

This has absolutely nothing to do with 38/40 Column. If your current work is coming out well and, by mistake, you press = instead of CTRL-\*, you'll use this option.

Actually, any time you type a character that you don't want during Continue Make Screen, you can use D on the menu to erase forever the last character that you typed.

That concludes the menu options for today. Feel free to review any options that you don't quite understand.

## Making large, friendly letters.

I use *ATASCII Animation* a lot for making these letters. Once you get the hang of it, they're rather easy. They are mainly based upon the control characters.

QWE R (SHIFT =)  
ASD  
ZXC



Notice that they include every 90-degree angle and every straight line. With these, you can make any kind of square or letter.

Now, try this:

CTRL or SHIFT and  
Q R R E  
= = =  
= = = looks like  
= = =  
Z R X R C



The letter A. All of the large letters are based upon a square. If you want them to "connect" in the program listing REM statements, you may have to change the corner characters to look like they start the next letter.

It may take a bit of practice (even a byte), but it can be done! I always make them in inverse, so they stand out better.

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The arrows are made with miscellaneous CTRL characters.

### Be creative.

**ATASCII Animation** is not only for making large, friendly letters, but also for making just about anything you can type out with ATASCII characters. Cartoons can be fun... Just think: "The Adventures of AtariMan" or "Star Trek episode 83." Go wild!

The inverse video key can be useful for some situations, because it can change one character into a totally different character. Try it out.

If you're going to be using the TAB key to get to the other side of the screen in a hurry, be careful of the SHIFT-TAB and CTRL-TAB. If you press them, your tabs may not go exactly where you want them.

I have been making logos for BBSs for quite some time now. If you call New Jersey BBSs, you may have seen some of them. Hopefully, one of the ones I made—for the East Brunswick BBS (EBBBS)—is still up. It is privately owned and operated (not by me), 24 hours a day, and its number is (201) 254-6449. Give it a call and leave me a message.

I consider the error trapping in **ATASCII Animation** pretty good, and you may want to do something similar in your programs. There is a trap statement that sends the program to this section just about any time there is an error. At the beginning of every section of the program, a variable called *MODE\$* is set to the name of that particular mode.

When an error is encountered, you find out not only the error number, the mode it occurred in and the line it happened in, but also, in English, what the error is and if it is a common one. Take a look at Lines 1940-2030.

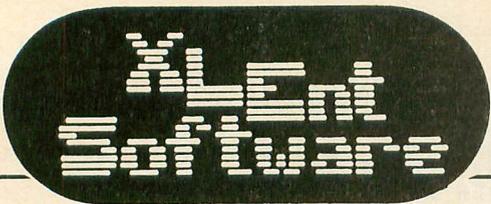
That concludes the explanation of **ATASCII Animation**. I hope you've found it both informative and amusing. Have fun and be creative! □

*Mark Comeau is a self-taught BASIC programmer, a junior high student in Piscataway, New Jersey. This is his third program published in ANALOG Computing. He has also just finished putting together an Atari computer payroll system that can handle two hundred employees, for a company in Pennsylvania.*

Listing 1.

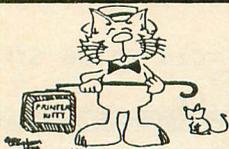
```
10 REM ATASCII ANIMATION
20 REM
30 REM BY: MARK COMEAU
60 REM
70 READ C1,C2,C3,C4,C5,C6,C7,C10,C14,C
15,C17,C18,C20,MENU,YES
90 GRAPHIC$ C0:POKE 709,C0:POKE 710,C0
:BF=FRE(C0)-2000:CN=C2
```

```
100 DIM A$(BF),F$(C20),HL$(110),SPRD$(
72),MODE$(10),PROMPT$(100):MODE$="SET
UP":TRAP 1940
105 FOR IT=C1 TO 100:READ C:PROMPT$(IT
)=CHR$(C):NEXT IT
110 OPEN #1,C4,C0,"K:"
120 SPRD$="4":SPRD$(72)=" ":SPRD$(3)=
5PRD$:SPRD$(37,38)="<":SPRD$(39)=5PRD
$(37):A$="K":LM=C2
140 REM
150 REM MENU
160 REM
170 MODE$="MENU":FOR IT=C14 TO C0 STEP
-C1:POKE 709,IT:NEXT IT
190 POKE 82,C2:POKE 752,C1
200 ? PROMPT$(73,81):" ATASCII ANIMATI
ON!!!!":PROMPT$(82,80)
210 POSITION C4,C1: ? PROMPT$(89,94):"
BY MARK COMEAU V#4.0":PROMPT$(95)
220 FOR IT=C0 TO C3:POSITION 12,IT+C3:
? PROMPT$(IT*C18+C1,IT*C18+C18):NEXT I
T:POKE 82,5: ?
280 ? " A. CONTINUE/MAKE SCREEN
": ? " C. CLEAR GRAPHICS
"
300 ? " S. SAVE GRAPHICS
": ? " L. LOAD GRAPHICS
"
320 ? " T. TAKE PICTURE
": ? " G. APPEND GRAPHICS
"
340 ? " K. 38/40 COLUMN
": ? " D. DELETE LAST CHARACTER TYPED
"
360 POKE 82,C2:COLOR 160:PLOT C3,C1:DR
AWTO C3,C17:DRAWTO 38,C17:DRAWTO 38,C1
: ? "
370 FOR IT=C0 TO C14:POKE 709,IT:NEXT
IT
380 POSITION C0,C0: ? "XXXXXXXXXX"
390 REM
400 REM KEYBOARD INPUT
410 REM
420 MODE$="KEYB INPUT"
430 GET #C1,C:G=C0:IF C>128 THEN C=C-1
28
440 IF C=ASC("A") THEN G=750
450 IF C=ASC("C") THEN G=590
460 IF C=ASC("5") THEN G=860
470 IF C=ASC("L") THEN LFL=C0:G=1050
480 IF C=ASC("T") THEN G=1300
490 IF C=ASC("G") THEN LFL=C1:G=980
500 IF C=ASC("K") THEN G=1810
510 IF C=ASC("D") THEN G=660
520 IF G=C0 THEN 420
530 FOR I=23 TO C0 STEP -C1:POSITION C
0,I: ? "0":SOUND C0,RND(C0)*C5,C14,C4
:NEXT I
540 POSITION C0,C0:FOR I=C0 TO 23: ? "0
":SOUND C0,I+I,C14,C4:NEXT I:SOUND C0
,C0,C0,C0
550 GOTO G
560 REM
570 REM CLEAR GRAPHICS
580 REM
590 MODE$="CLEAR GR"
600 ? "K->CLEAR GRAPHICS<-":SPRD$
610 ? : ? "ARE YOU SURE(Y/N)":GET
#C1,C:IF C=YES OR C=YES+128 THEN GOTO
MENU
620 A$="K":CN=C2:GOTO MENU
630 REM
640 REM DELETE CHARACTER
650 REM
660 MODE$="DELETE CHR"
670 CN=CN-C1:IF CN<C1 THEN CN=C1:POSIT
ION C0,C20: ? "X")>END OF FILE":GOTO 4
20
```



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CIRCLE #136 ON READER SERVICE CARD

```

680 POSITION C0,C20:? "▶▶▶DELETING---▶
E";A$(CN)
690 FOR V=255 TO C0 STEP -50: SOUND C0,
V,C14,C14:NEXT V: SOUND C0,C0,C0,C0
700 A$(CN)="":GOTO 420
710 REM
720 REM MAKE SCREEN
740 REM
750 MODE$="MAKE SCR"
760 POKE 752,C0:? "K":POKE 82,LM:? A$;
:POKE 764,255
770 P=PEEK(53279):IF P<>C15 AND P<>C7
THEN GOTO MENU
790 IF PEEK(764)=255 THEN 770
800 GET #1,C:? CHR$(C);:A$(CN)=CHR$(C)
:CN=CN+1:GOTO 770
820 REM
830 REM SAVE SCREEN
840 REM
850 MODE$="SAVE"
870 ? "K-->SAVE SCREEN<--";SPRD$:?
880 ? :? "FILENAME OR RETURN FOR DISK
DIRECTORY OR CONTROL-Q TO QUIT":? "SAV
E D:";
890 INPUT F$:IF F$="r" THEN GOTO MENU
900 IF F$="" THEN GOSUB 1220:GOTO 880
910 F=LEN(F$):HL$=F$:F$="":F$(C3,F+C3)
=HL$:F$(C1,C2)="D:"
920 OPEN #C2,8,C0,F$:? :? "SAVING..."
930 PRINT #2;A$;:CLOSE #C2:GOTO MENU
950 REM
960 REM APPEND FILE
970 REM
980 MODE$="APPEND"
990 ? "K-->APPEND FILE<--";SPRD$
1000 GOTO 1070
1010 REM
1020 REM LOAD SCREEN
1030 REM
1050 MODE$="LOAD"
1060 ? "K-->LOAD SCREEN<--";SPRD$
1070 ? :? "FILENAME OR RETURN FOR DISK
DIRECTORY OR CONTROL-Q TO QUIT":? "LO
AD D:";:INPUT F$
1080 IF F$="r" THEN GOTO MENU
1090 IF F$="" THEN GOSUB 1220:GOTO 107
0
1100 F=LEN(F$):HL$=F$:F$="":F$(C3,F+C3)
=HL$:F$(C1,C2)="D:"
1110 OPEN #C2,C4,C0,F$
1120 ? "K":POKE 82,LM
1130 IF NOT LFL THEN CN=C1:A$=""
1140 IF LFL=C1 THEN GET #C2,C
1150 TRAP 1170
1160 GET #C2,C:A$(CN)=CHR$(C):? A$(CN)
:CN=CN+1:GOTO 1160
1170 IF PEEK(195)<>136 THEN 1940
1180 CLOSE #C2:GOTO MENU
1190 REM
1200 REM DISK DIRECTORY
1210 REM
1220 OPEN #C2,C6,C0,"D:*. *":TRAP 1240
1230 INPUT #C2,F$:? F$:GOTO 1230
1240 TRAP 1940:CLOSE #C2:RETURN
1250 POKE 712,C0:POKE 752,C0:POKE 559,
34:BFL=C0:GOTO MENU
1260 REM
1270 REM TAKE PICTURE
1280 REM
1300 MODE$="TAKE PIC"
1310 ? "K-->TAKE PICTURE<--";SPRD$
1320 ? " WHILE PICTURE IS BEING DISPLA
YED:"
1330 ? " PRESS OPTION TO SPEED UP"
1340 ? " PRESS SELECT TO SLOW DOWN"
1350 ? " PRESS START TO TAKE PICTURE"
    
```

```

1360 ? :? :? "DO YOU WANT IT TO COME U
P FROM THE          BOTTOM(Y/N) ";
1370 INPUT F$:IF ASC(F$)=YES THEN ? "Y
E$":BFL=C1:GOTO 1400
1390 ? "NO":BFL=C0
1400 ? :? "DO YOU WANT IT TO TAKE LAST
FRAME(Y/N) ";
1410 INPUT F$:W=C10:?"K":POSITION C0,
C0:POKE 82,LM:IF ASC(F$)=YES THEN 1570
1440 REM
1450 REM DISPLAY PICTURE (SLOWLY)
1460 REM
1470 TM=C10:FOR I=C1 TO LEN(A$)
1480 ? A$(I,I);:P=PEEK(53279):IF P(<)C1
5 AND P(<)C7 THEN 1520
1500 FOR W=1 TO TM:NEXT W:NEXT I:GOTO
1560
1520 IF P=C3 THEN TM=TM-C10:IF TM<C0 T
HEN TM=C0
1530 IF P=C5 THEN TM=TM+C10
1540 IF P=C6 THEN 1650
1550 GOTO 1500
1560 POSITION C0,22:?"TAKE PICTURE OF
LAST FRAME(Y/N) ";:INPUT F$
1570 IF ASC(F$)=YES THEN ? "K":? A$;:P
OSITION C1,C1:GOTO 1650
1580 ? "DO IT AGAIN(Y/N) ";:INPUT F$
1590 IF ASC(F$)=YES THEN 1300
1600 GOTO MENU
1610 REM
1620 REM READ SCREEN
1630 REM
1650 A$="":CN=C1:POKE 752,C1:?">"
1660 A$(CN)=CHR$(125):CN=CN+C1:IF BFL=
C1 THEN A$(CN)="+":CN=CN+C1
1670 POKE 559,C0:FOR Y=C0 TO 23
1680 FOR PN=39 TO LM STEP -1:LOCATE PN
,Y,C:IF C(<)32 THEN 1700
1690 NEXT PN:GOTO 1750
1700 FOR X=LM TO PN:LOCATE X,Y,C:A$(CN
)=CHR$(C):CN=CN+C1:NEXT X
1710 POKE 712,Y/1.5
1750 IF PN<39 AND Y<23 THEN A$(CN)=CHR
$(155):CN=CN+C1
1760 NEXT Y:POKE 712,C0:POKE 752,C0:PO
KE 559,34:BFL=C0:GOTO 170
1780 REM
1790 REM 38/40 COLUMNS
1800 REM
1810 ? "K-->38/40 COLUMN<--":SPRD$
1820 MODE$="38/40 COL"
1830 ? :? "CURRENTLY IN ";40-LM;" COLU
MN":? :?
1840 ? "PRESS 1. 38 COLUMN"
1850 ? "      2. 40 COLUMN":GET #1,C
1870 IF C=49 OR C=177 THEN LM=C2
1880 IF C=50 OR C=178 THEN LM=C0
1890 GOTO MENU
1900 REM
1910 REM ERROR HANDLER
1920 REM
1940 CLOSE #C2:?"> :? :? "K-->ERROR IN "
;MODE$;"<--":SPRD$
1950 P=PEEK(195):?"ERROR- ";P;" AT L
INE ";PEEK(187)*256+PEEK(186)
1960 IF P=170 THEN ? :? "FILE NOT FOUN
D"
1970 IF P=C5 THEN ? :? "OUT OF MEMORY"
1980 IF P=162 THEN ? :? "DISK FULL"
1990 IF P=165 THEN ? :? "BAD FILE NAME
"
2000 ? :? "TRY AGAIN":?"PRESS ANY KEY
FOR MENU"
2010 TRAP 1940:GET #C1,C:GOTO MENU
3000 DATA 1,2,3,4,5,6,7,10,14,15,17,18
,20,170,89

```

```

3100 DATA 160,160,145,146,151,146,151,
146,146,151,146,151,151,146,151,133
3110 DATA 160,160,149,138,252,160,160,
160,252,160,146,132,160,160,252,160
3120 DATA 252,252,136,149,21,8,252,252
,160,252,252,160,146,132,252,160,252
3130 DATA 160,160,252,10,21,160,160,15
4,152,146,152,152,146,146,152,152,146
3140 DATA 152,146,146,131,160,160
3200 DATA 125,32,21,21,21,21,21,10,
8,21,21,21,21,21,21
3210 DATA 149,149,149,149,149,136,138,
149,149,149,149,149

```

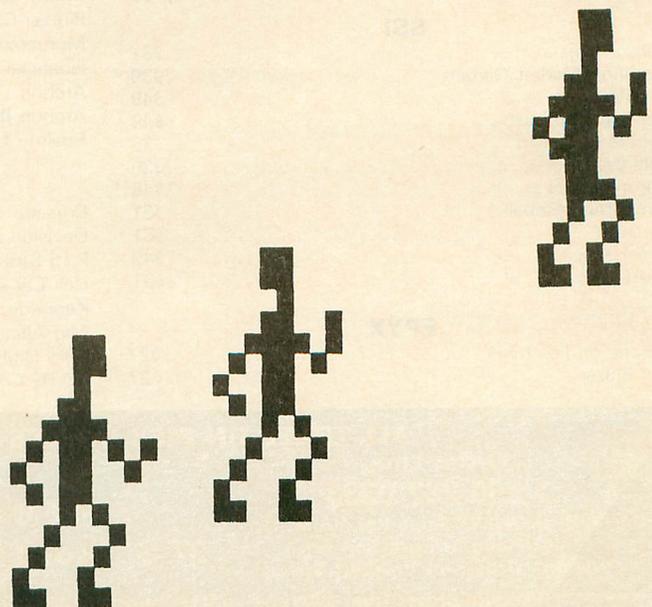
CHECKSUM DATA.

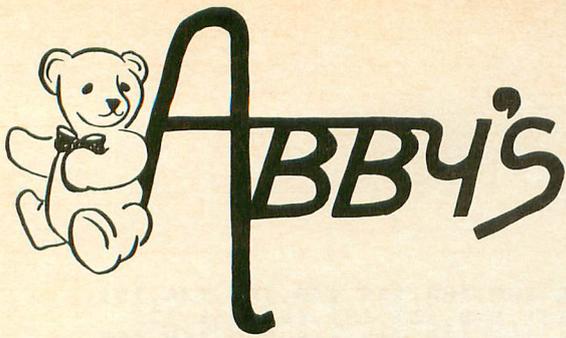
(see page 13)

```

10 DATA 463,586,329,261,204,554,715,11
8,879,109,86,362,92,71,234,5063
200 DATA 109,661,263,602,835,21,693,64
5,277,699,105,429,83,650,101,6173
440 DATA 580,583,608,456,425,266,401,6
5,461,355,959,713,100,414,106,6492
590 DATA 465,420,948,429,93,107,99,602
,260,218,701,888,89,73,98,5490
750 DATA 221,418,781,563,660,94,101,10
0,268,475,892,1,858,532,589,6553
930 DATA 736,105,123,111,81,468,710,27
6,433,278,155,679,344,521,627,5647
1100 DATA 765,683,600,59,579,682,716,5
84,204,287,713,282,435,738,99,7426
1250 DATA 30,287,800,289,907,48,779,28
9,194,529,148,448,224,625,531,6128
1440 DATA 291,540,293,137,837,721,139,
598,933,721,461,939,359,466,990,8425
1610 DATA 294,459,296,24,566,979,129,1
77,94,493,325,899,304,981,299,6319
1810 DATA 918,186,693,301,870,926,916,
5,302,176,304,682,104,132,749,7264
1980 DATA 208,711,281,467,140,734,711,
550,755,650,834,133,6174

```





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# ASK MR. FORTH

continued from page 24

dent; to make it work on the Atari requires numerous changes—more than space allows.

The calendar program will work on the Atari almost as presented in the book, with the following minor exceptions.

All variables should be defined as `0 VARIABLE` instead of `VARIABLE`.

There is a typographical error in his definition of `JAN1ST`, which returns the day of the week for the first of January in any given year. The error occurs on page 107 (Line 12 of Screen 100) where the sequence `2 B @ * -` should read `2 A @ * -` instead. The previous description that appears on page 104, however, is correct.

You will need to change `CREATE DPMTABLE 31 C`, (Screen 102 on page 108) to `0 VARIABLE - 2 ALLOT 31 C`, because of the differences between `CREATE` in the two versions of FORTH.

Winfield uses an error message followed by the word `ABORT` in two places (Screen 102, Line 15 and Screen 105, Line 4), which you may want to change to `QUIT`. The word `ABORT` is the FORTH word for a warm start (in contrast to `COLD` in fig-FORTH for a cold start, which resets the dictionary pointer), which resets the data and return stack pointers and prints the fig-FORTH message. `QUIT`, on the other hand, merely brings you back to the text interpreter. `QUIT` is the endless loop which keeps invoking `INTERPRET` (the text or outer interpreter) and is the real operating system in FORTH.

Throughout the book, Winfield uses lower case letters to define new words and follows this practice in his concluding examples. This distinction makes it easy for the reader to differentiate his additions from the FORTH standard vocabulary. Lower case for new words will work in FORTH just as well as upper case, but the two are not interchangeable. Your FORTH will not recognize a name defined in lower case if you happen to type it in lower case. If you think this will impose an added mental burden, you may want to stick to upper case throughout.

The calendar program will give the day of the week for any date, or print a monthly or yearly calendar.

Here are answers to some of the questions your students are likely to ask:

*What is the difference between fig-FORTH and FORTH-79?*

Always remember that FORTH-79 is a subset of fig-FORTH, inasmuch as fig-FORTH includes nearly 300 core words, but FORTH-79 only has 121. "This does not mean that FORTH-79 is less useful or powerful than fig-FORTH," according to C. Kevin McCabe

(Forth Fundamentals) in his new book.

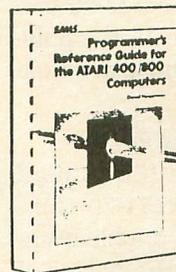
"It is mainly a difference in philosophy. Fig-FORTH includes many words for stack initialization, text parsing and other system functions. FORTH-79 does not include many system-level words, since there is little need for words to alter the text interpreter or change the manner of stack initialization. As a result, FORTH-79 is easier for a novice or end-user to comprehend, but less useful for system-level programming. . .

"Fig-FORTH does not restrict user access to any part of the dictionary. All fields may be inspected and (with necessary precautions) may be changed at will. FORTH-79 applications that access the dictionary are allowed to address only the parameter fields of variables, constants, and words compiled by user-created defining words, and dictionary space that has been left by `ALLOT`; all other parameter fields, and the name, code, and link fields of all words, must not be accessed. . .

(continued on next page)

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## ASK MR. FORTH *continued*

"In general, many of the 'bare bones' of FORTH, such as stack pointer values and initializers, are hidden and inaccessible to the user of FORTH-79. The philosophy of FORTH-79 is to provide all necessary high level operations, such as DEPTH, but not some of the more fundamental operations used primarily to construct the equivalent fig-FORTH operations. This makes FORTH-79 less complex and more oriented to the novice programmer or end-user, while fig-FORTH is more useful to the experienced or system-level programmer."

*Where can we find detailed instructions to convert a fig-FORTH system to the FORTH-79 standard?*

A 22-page booklet *FORTH-79 Standard Conversion* (\$10.00 from Mountain View Press, P.O. Box 4656, Mountain View, CA 94040) has complete colon definitions and assembler code listings for several types of computers.

*Why was this book chosen instead of Starting Forth by Leo Brodie?*

Brodie's book is oriented toward polyFORTH which (1) is intended for professionals, and (2) features multitasking and multiprocessing, which do not exist on FORTHS for the Atari (because they are specifically designed for weekend hackers like you and me). The differences between fig-FORTH and FORTH-79 can be covered in a few pages, as you have seen; the polyFORTH differences would require almost a whole book.

*What has been covered in this lecture?*

Winfield's book is complete only in the limited sense that he covers the complete FORTH-79 standard vocabulary, but omits the extension double number word set. Winfield actually covers the basics of the program development layer.

*What has not been covered?*

Winfield omits the other three FORTH layers such as applications, the operating system and the assembler, as well as floating point routines for program development.

*What is the vocabulary of the extension double number word set?*

It consists of: `D- D0= D= DMAX DMIN DU < 2CONSTANT 2VARIABLE D. D.R 2! 2@ 2DROP 2DUP 2OVER 2ROT and 2SWAP.`

*What is the difference between FORTH-79 and the new FORTH-83 standard?*

Eleven words have been renamed or removed, and twenty new words have been added. McCabe's article in the August, 1984 *Byte* has the details (but no fig-FORTH colon definitions).

*What have we accomplished today?*

We now have the best of three worlds: system-level fig-FORTH, plus the popular contemporary FORTH-79, plus access to Atari's arcade-type graphics.

*Where can we go from here?*

A 250-page book by Leo Scanlon on *Forth Programming* covers FORTH-79 in greater detail and includes the double number word set, with their colon definitions as well as several applications, such as use of sines and cosines, bubble and insertion sorts, and how to create a list of phone numbers.

*Is it all right to reproduce the detachable FORTH-79 handy reference card?*

Forth Interest Group publications have been placed in the public domain to insure the widest possible dissemination of the language, and may be freely reproduced.

*How did you prepare for this lecture?*

On a blank disk, I copied the two screens of error messages for my fig-FORTH. Then I copied all the statements from the book, chapter by chapter, with the necessary additions to convert fig-FORTH to FORTH-79. Each screen ended with `;S` so they could be loaded one at a time. My friendly assistant here at the console called up the screens on request, and I just followed Alan Winfield's well-written script, page by page. □

---

*Donald Forbes, Chartered Financial Analyst, is a computer systems analyst with a leading worldwide bank. He has been involved with large mainframes since 1958. His current interest is converting IBM, Wang and Atari microcomputers into FORTH virtual machines. As a hobby, he's writing a book on the mathematics of mathematics. He lives in New Jersey with his wife Judy and their children.*

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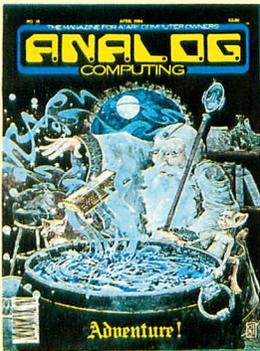
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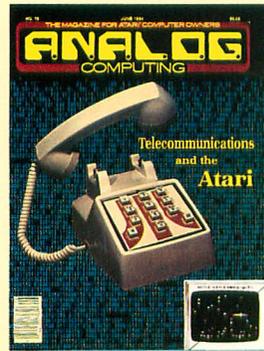
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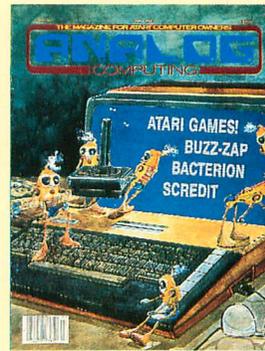
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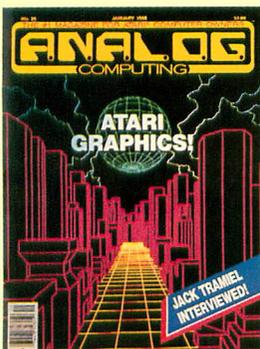
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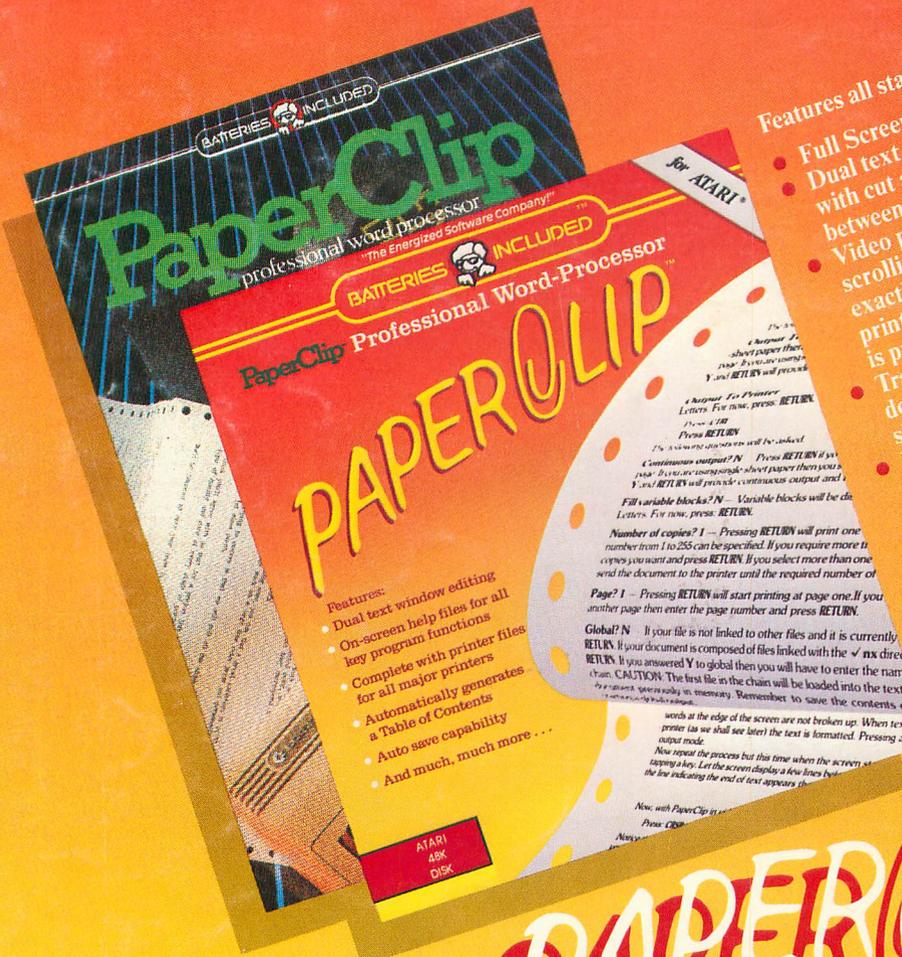
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