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THE #1 MAGAZINE FOR ATARI® COMPUTER OWNERS

ANALOG

COMPUTING

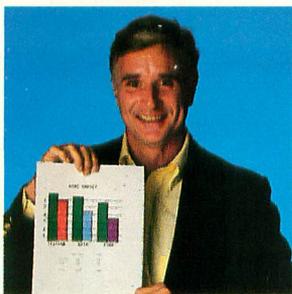
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ATARI
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**Tom Hudson's
Adventure at
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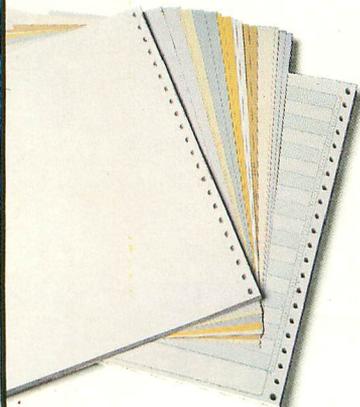
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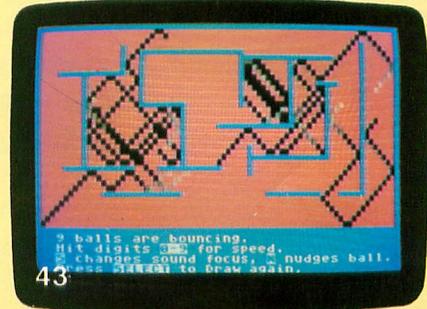
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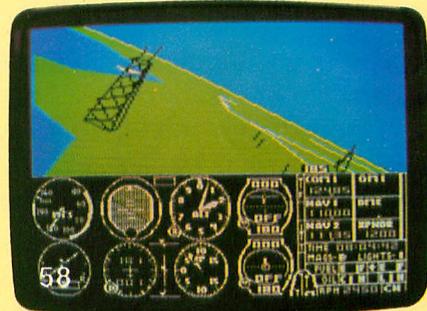
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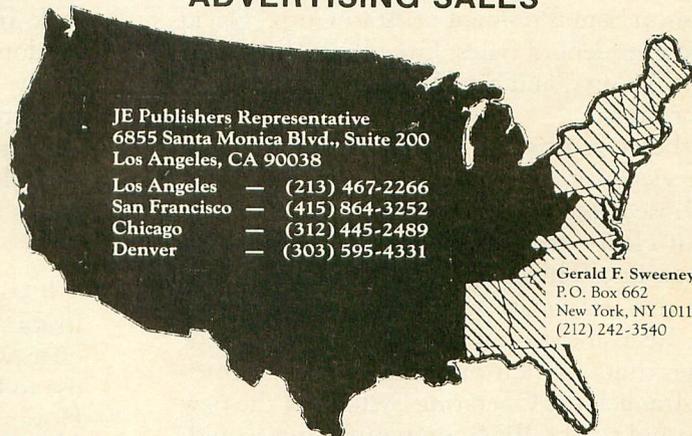
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Editorial

by Jon A. Bell

Last issue, we presented both a short summary of Atari Corp.'s first press conference and an interview with Jack Tramiel, Chairman of the Board. Through hard work and slightly insane scheduling, we managed to publish the information a scant two weeks after the events, making us the first monthly magazine in the country to present the information. There are still details that readers have been wondering about, so we thought we'd clear up some of them this issue.

At the press conference, James Copland, Vice President of Marketing, read a statement on Atari's current plans and future goals. After the meeting, reporters questioned the attendees: James Copland; Jack Tramiel; his son Sam, President of Atari Corp.; David Harris, Vice President of Sales; Greg Pratt, President of Atari (U.S.) Corp.; and Sig Hartman, President of Software for Atari.

Many of the questions that Lee and I had prepared for the interview were answered at the conference—including those about the new computers. Atari officials made it clear—they'd only reveal a few details about the new line. Thus, Lee and I didn't harass Jack Tramiel for that information during our interview.

However, I can mention a few other details about the machines that were left out of last issue. According to Sam Tramiel, the Operating Systems of the new machines would not be IBM-compatible, but would, instead, be developed in-house by Atari. Also, the machines would feature GEM (Graphics Environment Manager), by Digital Research. This will enable the computer to use such Macintosh-like features as icons, pull-down menus and windowing. The 16-bit machines (to be shown, we hope, at the January CES) will use the Motorola 68000 chip. (Although the 68000 chip is touted as a 32-bit microprocessor, it's actually a 32-bit chip with a 16-bit address bus.) Specs on the 16-bit machines have already gone out to software developers. Atari's 32-bit machine will be using the National Semiconductor's 32032 chip as its microprocessor.

I brought up the matter of the 32032 to Tony Messina, our expert in the world of high-technology chips. The next day, he provided me with a pamphlet on the chips, which stated, "the NS32032 functions as a central processing unit (CPU) in National Semiconductor's NS16000™ microprocessor family." The chips feature "32-bit architecture and implementa-

tion, a 32-bit data bus," and "16-megabyte uniform addressing space." The 32-bit machine is scheduled to be shown at the huge European electronics fair in Hanover, West Germany in April—and, yes, we'll be covering it.

The prices of 800XLs and 1050 disk drives have dropped to levels that ought to make Commodore quake. One can now get 800XLs for \$119.00 or less, and 1050 disk drives for \$179.00—making a powerful home computer system available for only \$300.00. Also, for those readers who can't resist getting in a dig at Atari's competition, Commodore is eating warehouses of their Plus-4 computer (a machine which Jack Tramiel vigorously opposed while still at Commodore), and sales of the 64, although strong, are actually lower than this time last year. An industry insider who knows Commodore quite well said, "they are betting everything they have on the Amiga. They can't live forever on Commodore 64 sales." Or, as James Copland put it, "short gain, long fall."

Notice to subscribers.

If you subscribe to **ANALOG Computing**, you're in for a treat. In the next six months, we're going to offer two bound-in supplements that should be of great use to both fledgling programmers and Atari veterans. However, these will only be available to subscribers.

If you already subscribe, you're in luck. If you don't, then what are you waiting for? As an added incentive, whether you're a first-time subscriber or simply renewing, you'll be receiving one of two free Atari books: *ABCs of Atari Computers* by David E. Mentley, or *Atari Roots* by Mark Andrews. (If you subscribe for two or more years, you'll receive both books.) As they say in the cereal commercials: offer good while supply lasts.

Errata.

We'd like to advise you of a few corrections for the **Atari Stocking Stuffers** article (**ANALOG Computing** issue 25). The correct phone number for At-A-Glance and Gemini Enterprises is 201-267-0988. The phone number for Amiable Computer Enhancements, maker of a cartridge for use with the ATR-8000, is 517-393-1357. Ask for Lance Ward. Also, the price for the **Graph-Fix** keyboard labels is \$5.95, not \$4.95 as reported. And, finally, **Solo Flight** is by MicroProse Software, not MMG. □

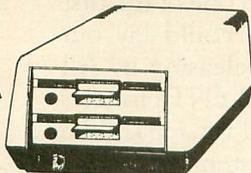
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READER COMMENT

BBS update.

We are writing to bring you up-to-date on the S.P.A.C.E. BBS we run here in St. Petersburg. If you recall, you published the article we wrote, **So, you want to be a SYS-OP**, last May/June (issue 19). Well, since the article was published, the board has gone crazy!

We have received calls from all over the world! **ANALOG Computing** truly is *the* magazine for Atari computer owners. We have received calls from every state in the U.S.A., every province in Canada, and even some from Guam, Puerto Rico, England and Spain. Needless to say, we are very happy for the opportunity to have had an article in **ANALOG Computing**.

One significant thing has happened in the last few weeks—we have moved, and the number for the BBS has changed.

The new number is: 813-596-4437. We are still up during the same hours: noon to midnight EST, every day. Also, since the article was published last spring, we have been offering the BBS software to those wishing to start their own BBS system. The programs necessary to run a BBS are available every weekend on S.P.A.C.E. BBS, in the (D)ownload section, or they may be received by mail if you send a disk and \$10.00 to cover return postage/handling.

Thank you,
Kim and Noel Thomas
Seminole, FL

A few words from XLENT.

I recently ran across a comment about **MegaFont**, published in your review of **XL BOSS** from Allen Macroware. The review stated that **MegaFont** does not work on the XL series of computers.

MegaFont was released prior to

the Atari 800XL's introduction. We tested **MegaFont** on one of the first Atari 1200XLs we could lay our hands on, before releasing it. All released copies of XLENT products work on all released versions of the Atari operating system.

As any Atari enthusiast knows, there are hundreds of combinations of printers, interfaces, disk drives and computer combinations that are available to the Atari user.

XLENT Software's most difficult task continues to be supporting the world of so-called compatible peripherals. Randy and Richard (the authors of **MegaFont**, **MegaFont][** and **MegaFont][+**) have spent more than a year adapting **MegaFont** to work with nearly every combination of devices available to the Atari user.

MegaFiler had to be changed, when we discovered that the **Ape Face** interface did not have the same bug that the Atari 850 had associated with the use of the TAB on the Atari computers.

While the Panasonic, Mansman Tally, Epson and Gemini printers are all compatible, Richard and Randy have had to rewrite code for each printer, each time we add a feature.

The C.Itoh printer has appeared in two versions, the 8510 AP and the 8510 FP. As you might guess, the code for each had to be rewritten to make them both compatible. Additionally, the NEC 7510 is only partly compatible.

Perhaps the effort that we have put forth to make our programs available to the largest number of Atari users is the reason that we are so sensitive to the type of statements we read in your review of **XL BOSS**.

XLENT Software is very pleased with the positive reviews that our products, **MegaFont][** and **Mega-**

Filer, have received in your magazine.

Linda K. Kubota-Barnes
President, XLENT Software
Springfield, VA 22152
(703) 644-8881

Bopotron! variations.

Bopotron! became an instant hit in our home, but I had to make these two changes to satisfy the younger players.

To simplify choosing the starting level, add:

```
155 ? "K":POKE 752,1
156 POSITION 2,5:" " FOR 5
TART LEVEL PRESS 1-5":OPEN
#1,4,0,"K:"
157 GET #1,STARTLVL:IF (ST
ARTLVL<49) OR (STARTLVL>53
) THEN 157
158 STARTLVL=STARTLVL-48:C
LOSE #1
```

To increase the "shock effect" of each screen:

```
325 Q=PEEK(559):POKE 559,0
330 GOSUB 4000:GOSUB 5000:
GOSUB 6000:GOSUB 7000:GOSU
B 8000:GOSUB 2000:GOSUB 30
00:POKE 559,Q:POKE 54286,1
92
```

Your readers may be interested in these amendments.

Although not a subscriber, I have never failed to buy **ANALOG Computing**, since acquiring our Atari in December, 1983, and find it indispensable. Also, I'd like to hear from any other Atari users.

Yours sincerely,
Robert Hume
Dartmouth, Nova Scotia, CAN

UNICHECKing.

I have had no luck trying to use **UNICHECK**. Each time I try it, I get an ERROR-130 message. Any suggestions on where I went wrong?

The instructions for the care and feeding of my 1050 disk drive warn against placing the drive any closer than 12 inches from the TV. When I see so many of the PCs on the

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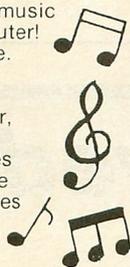
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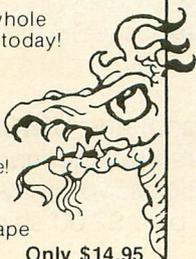
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THE BEAN MACHINE by Steve Robinson is an Award Winning Arcade game that will drive you crazy balancing a series of beams while trying to get all the beans to roll down, without touching, all the while avoiding 'strange creatures' who drop in to steal the beans. It's addicting!

\$24.95 list

LotsaBytes price: \$12.95

DIGGERBONK, another Award Winning game by Steve Robinson, challenges you to find your way through a continuously scrolling maze while avoiding some really strange creatures. Along the way you will need to Bonk some of them, but watch out for the bombs.

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CIRCLE #104 ON READER SERVICE CARD

market with built-in drives, I wonder if this caution is valid. Obviously, the built-ins are not a foot from the monitor. Where space is limited, this extra foot can be asking for a lot.

Very truly yours,
Bill Permer
Ft. Collins, CO

UNICHECK should work as it's listed. The ERROR-130 indicates that the U: device wasn't initialized properly, which means the AUTORUN.SYS program is not being executed. Be sure the filename is spelled correctly.

Finally, manually check the values in Lines 150 and 190. These are the load header bytes for the disk, and tell the computer where to load the file and where to run it.

As for the disk drive space problem, I concur with your 1050 manual. Unless a disk drive is heavily shielded, the magnetic field generated by a TV or

monitor can wipe out data. My old CompuColor II computer, with its built-in drive, wiped out more than one of my disks when I left the computer on for extended periods of time.
—T.H.

Minicomp-lications.

Help! I need to know how to save my object files made by **Minicomp**.

I have DOS3. I loaded everything just as your issue 23 says. Then I typed GOTO 1000, and everything worked fine.

Then I loaded DOS3 and pushed S (for SAVE), 3000 (for starting), 318F (for ending), 0 (for optional init.), and 3000 (for optional run). It saved under D1:TEST, Y, and Y. Then it said, "Loading D1:TEST . . . —and then it froze up!

I turned off the computer and repeated everything except for Run this file (Y/N)? I typed N, then I

typed G (go at hex addr.), 3000 for run. And then it froze up again!

What can I do?

David Nichols
Spokane, WA

P.S. I really like your magazine!

If you're using **Minicomp** with DOS2.0S or DOS3, you need to have a MEM.SAV file on your disk to save the object code from the DOS. Also, if you're saving from DOS, do not enter an INIT ADDRESS. For example, to save a file from address range \$3000-3140 with a run address of \$3000, you should type: D:FILENAME.EXT, 3000, 3140,,3000.

Here's a modification for **Minicomp** that will save your object code files for you. After compiling, stop the program with the BREAK key and type GOTO 9000. Then, simply enter the starting, ending and run addresses (in decimal), and the filename to save the program under.

The computer will save the object code to disk and give you the READY

New . . . Improved WHAT IS CHECKSUM DATA?

Most program listings in **ANALOG Computing** are followed by a table of numbers appearing as DATA statements, called "CHECKSUM DATA." These numbers are to be used in conjunction with **D:CHECK** and **C:CHECK** (which appeared in **ANALOG Computing** issue 16 and the **ANALOG Compendium**) or with **UNICHECK** (from issue 24).

D:CHECK and **C:CHECK** (written by Istvan Mohos and Tom Hudson) and **UNICHECK** (by Tom Hudson) are designed to find and correct typing errors when readers are entering programs from the magazine. For those readers who would like copies of these articles, you may send for back issue 16 or 24 (\$4.00 each) or the **ANALOG Compendium** (\$14.95 plus \$2.00 shipping and handling from:

ANALOG Computing
P.O. Box 615
Holmes, PA 19045

prompt. To execute the program just go to DOS and load the file with the L option.

```

9000 ? "MINICOMP OBJECT CODE SAVER":?
9010 TRAP 9020:DIM FN$(20)
9020 TRAP 9020:?"ENTER START ADDRESS":;INPUT STAD
9030 TRAP 9030:?"ENTER END ADDRESS":;INPUT ENAD
9040 IF STAD>=ENAD THEN ? "BAD ADDRESS RANGE":? :GO TO 9020
9050 TRAP 9040:?"ENTER RUN ADDRESS":;INPUT RAD
9060 ? "OUTPUT FILENAME":;INPUT FN$
9070 OPEN #1,8,0,FN$:PUT #1,255:PUT #1,255
9080 5TH=INT(STAD/256):STL=STAD-5TH*256:PUT #1,STL:PUT #1,5TH
9090 ENH=INT(ENAD/256):ENL=ENAD-ENH*256:PUT #1,ENL:PUT #1,ENH
9100 RAH=INT(RAD/256):RAL=RAD-RAH*256
9110 FOR X=STAD TO ENAD:PUT #1,PEEK(X):NEXT X
9120 PUT #1,224:PUT #1,2:PUT #1,225:PUT #1,2:PUT #1,RAL:PUT #1,RAH:CLOSE #1:END
    
```

For example, the *Androton* program from issue 25 may be saved using these parameters:

```

START ADDRESS = 11776
END ADDRESS = 22248
RUN ADDRESS = 12288
    
```

—T.H.

Math Attack for two.

Gentlemen, I need help. I put *Math Attack* (issue 22) into the computer and on disk, printed it out and double proofed it. I'm fairly certain that there are no errors in the program entered on disk.

When RUN command is given, the preliminary requests for command work, graphics for the man, the first problem and the bomb appear on my monitor. But, from that moment on, nothing moves. There is no action.

I am using an 800XL and suspect that the problem may be there, because the program was written for a 400 or 800. I have a translator disk, but it is of no help without a self-boot disk—and *Math Attack* is not set up to self boot.

Do you have any suggestions, or are there corrections which will appear in a later issue? I would certainly appreciate your help. This is a program which would appear to work well in a teaching situation, and I really want to use it.

M.I. Houser
Columbus, KS

Math Attack should run fine in the one-player mode, as listed. However, the program does not operate properly in the two-player mode on the XL series. The following:

```

330 DATA 104,169,15,205,120,2,208,5,169,1,141,244,6,169,15,205,121,2,208,5,169,1,141,245,6,169
350 DATA 169,80,145,203,76,92,6,177,203,170,232,138,145,203,169,14,205,121,2,208,34,169,1,205,245,6
370 DATA 138,145,207,173,248,6,205,132,2,208,6,169,1,141,246,6,96,173,249,6,205,133,2,208,6,169
    
```

should correct this problem for you.
—T.H.

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VERSION 2

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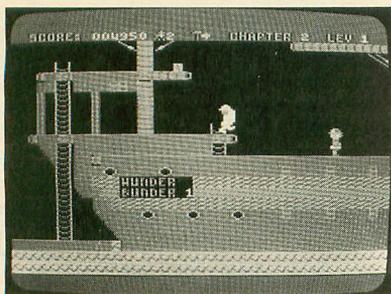
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CIRCLE #107 ON READER SERVICE CARD

NEW PRODUCTS

by Lee Pappas

ARCADE ACTION AND STRATEGY BY BRODERBUND



Whistler's Brother is absent-minded and bumbling, but, with your help, maybe the two of you can rediscover his lost treasures in the rain forest of South America.

You see, your brother is Professor Fenton Q. Fogbank, and right after he finagled a Ph.D. in archeology, he set out for the jungles, using the university's tools. But, after a year there, he returned without treasure (or the tools he'd borrowed). Being somewhat hazy in the noodle, he forgot where he left the tools—or the rare artifacts he found, for that matter.

So you set out with Fenton to find the valuable stuff, but it seems you'll spend half the time keeping him out of trouble. He's constantly reading his map when he should be looking ahead, but a whistle from you will bring him in the right direction. However, if Fenton goes too far, he'll turn white with fear, and both of you will be more vulnerable to all kinds of nasty things.

As you journey through the thirteen chapters, you'll encounter thunderstorms, natives, treacherous trails, caves, a mummy and more. It will also become apparent that Fenton is such a pinhead that you probably *should* let the natives have him!

Along the way, you'll find (and need) your brother's lost tools. Lucky for you, instead of

just *studying* in college, you learned to dance . . . so well that you're now a whirling dervish and can whirl yourself out of danger when the need arises.

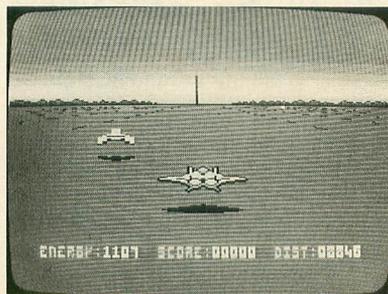
Also by Broderbund is **Stealth**, and, while not the kind of game you'd play many times, it exemplifies what the Atari computer is capable of in the graphics department. You find yourself piloting a Stealth Starfighter along the surface of a remote world, bent on seeking out and destroying the Dark Tower.

As you buzz over positive energy fields, your power level will increase (and, of course, decrease over negative fields). Volcanoes, both active and dormant, add to the tension.

Enemy defenses will try to prevent you from reaching the tower, at all costs. These defenses consist of scout planes, tanks, fighter planes, bunkers and missiles.

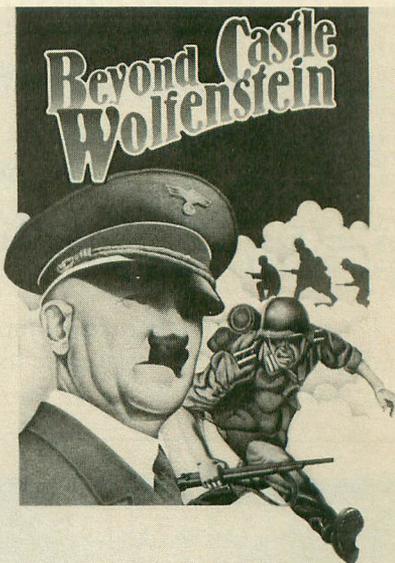
The color, sound and action are top notch, but, once you've accomplished your mission, you're not likely to try more than another mission or two, even at the higher skill levels—**Stealth** doesn't vary enough from attack run to attack run (as **Star Raiders** does).

Whistler's Brother and **Stealth** are one-player games and require a joystick, 48K and disk drive. Retail is \$29.95 each, Broderbund Software, 17 Paul Dr., San Rafael, CA 94903 — (415) 479-1170.



STOP THE FUEHRER

. . . is the motto in **Beyond Castle Wolfenstein**, MUSE Software's sequel to its popular **Castel Wolfenstein**. Since the time you escaped torture in the first game, your life has been in big demand by the Nazis.



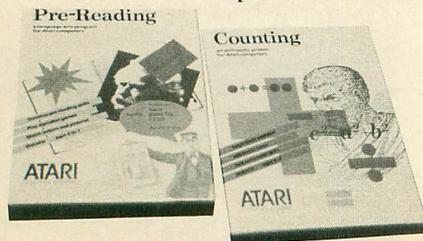
Now your commander needs a favor. . . He wants you to deliver a package to Adolf. Your mission (should you decide to buy the game) is to find the briefcase left by the underground in a closet inside Hitler's bunker, then move on to a secret conference room, set the bomb timer and scam. Keep your wits about you, though—the place is *crawling* with troops.

Beyond Castle Wolfenstein is a graphics game requiring 32K, disk drive and a joystick.

From MUSE Software, 347 N. Charles Street, Baltimore, MD 21201 — (301) 659-7212.

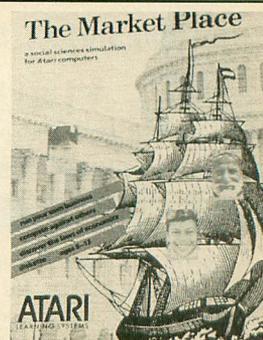
EXPOSED! UNRELEASED ATARI SOFTWARE

The "old" Atari had always acquired and developed software that never saw the light of day, and it appears that the new Atari Corp. now has to decide whether to release some of it, or not.



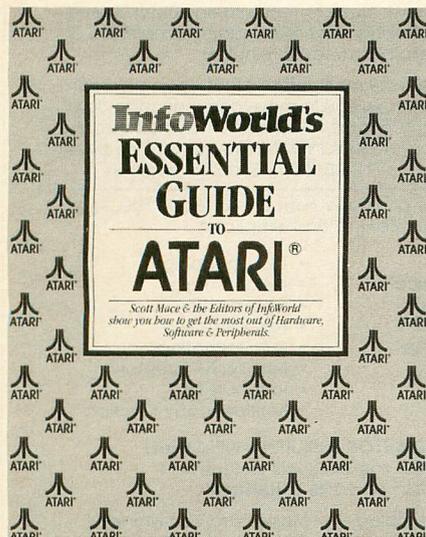
These three educational pieces were spotted in their "ready to go" packages, but their destination—the market or the scrapper—may be announced in January, at the Winter CES (Las Vegas).

The Market Place, for 8- to 13-year-olds, is a social studies simulation where you "run your own business," competing and learning the laws of economics. In **Pre-Reading**, youngsters 4 to 7 are taught pre-reading skills through alphabet games—matching letters and pictures. **Counting**, also for 4- to 7-year-olds, teaches basic addition.



NEW FROM INFOWORLD

InfoWorld's Essential Guide to Atari Computers starts with a history of the Atari computer line, then leads into Atari software and hardware, and the fine points of buying and setting up your computer. Section two covers Atari BASIC and Logo, touching on machine language and Action!



A chapter on applications software has brief sections on word processors and spelling checkers, educational software, communications, database management and spreadsheets, accounting, music and home finance. Games get their own (fairly short) chapter, and fifteen pages are devoted to peripherals. Section three is fairly brief, skimming through service and maintenance, user's groups, and the future of Atari.

Part two of the book consists of reviews of many popular non-game software products (reviewing computer games is an *InfoWorld* no-no). The reviews are divided into categories, covering word processors, finance/spreadsheets, data, education, sound, graphics, programming (languages and utilities), and peripherals. The last looks at a wide range of products. The book finishes with a list of companies and their addresses, a glossary, and a list of user groups.

The reviews are very well done and make the book worthwhile. Other than that, *The Essential Guide* really isn't what its title implies.

By Scott Mace and the editors of *InfoWorld*, softbound, \$16.95, 292 pages. Harper & Row, publishers.

OTHER NEWS

Datasoft has acquired the licensing rights to market *PacMan*, *DigDug* and *Pole Position*. All three were previously sold by Atari, which recently lost the marketing privileges.

The games are identical to the previous computer versions, with only slight alterations to the graphics. All are shipped with a cassette and disk in the same box, to allow for easy upgrade, should you move up to a disk drive.

Retail for each game is \$29.95, from Datasoft, 19808 Nordhoff Place, Chatsworth, CA 91311 — (818) 701-5161.



The *US Doubler* is a two-chip set for the 1050 disk drive, which, when installed, gives full 180K double density capability, while still maintaining compatibility with all software and Atari DOSs. No soldering is necessary.

The cost is \$69.95 from ICD, Inc., 828 Green Meadow Avenue, Rockford, IL 61107 — (815) 229-2999.

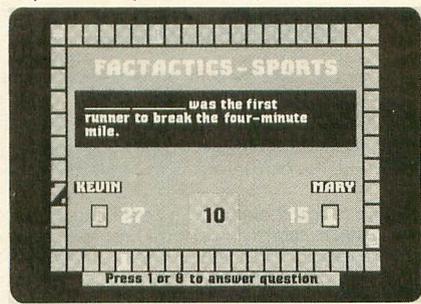


The Educational Computer Software Catalog provides an excellent source of hand-picked, quality programs. Most of the descriptions are accompanied by a full color screen photo and an age recommendation. All of the programs described herein are available by phone or order blank.

From Enriching Software Products, Inc., P.O. Box 183, Glencoe, IL 60022 — (312) 679-3475.

WHO WAS THE FIRST RUNNER TO BREAK THE 4-MINUTE MILE?

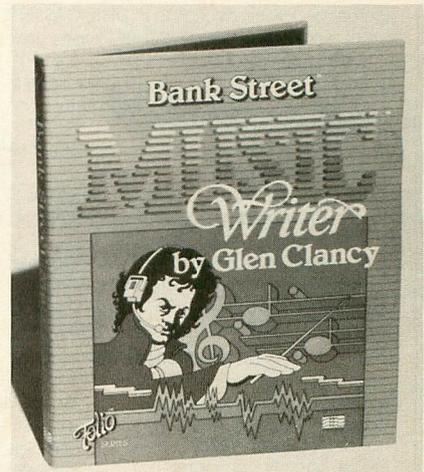
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Mindscape calls its latest offering, **MusicWriter**, "the easiest and most professional tool available for composing, playing and printing out music."

Using word-processor-like keystrokes, you can compose, arrange and edit music in four voices on the Atari, while changing melody, rhythm or harmony. Designed for ages 9 years through adult, **MusicWriter** by Glen Chancy is part of Mindscape's Folio software line of productivity/utility programs.



MusicWriter retails for \$49.95; contact Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062 — (312) 480-7667.

is their new trivia game, which tests you on topics ranging from the '84 Olympics to rock 'n roll. It includes TV, movies and Americana.

Players can compete with one another, in teams, or against the computer. Each question consists of a statement with one fact missing, which you fill in from a multiple-choice list. Features include color graphics, countdown timer and "jingles."

Cost is \$29.95, Daystar Learning Corp., 525 University Avenue, Palo Alto, CA 94301 — (415) 323-3567.

MONITOR TAKES ADVANTAGE OF ATARI'S SPECIAL GRAPHICS

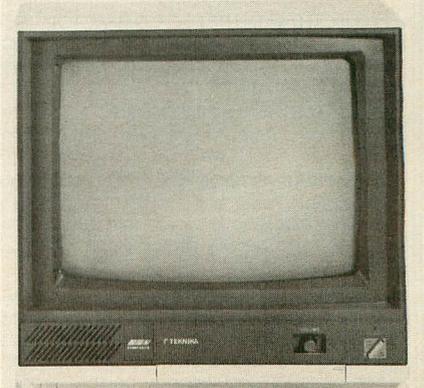
Teknika's new **MJ-10** 13-inch color monitor (which rests over my 800 now) features separate video inputs. The benefit is higher resolution.

Because the 800 and 800XL have separate video outputs, consisting of chroma (color) and luminance (brightness), the **MJ-10** can utilize these, giving you a sharper image for graphics and text.

The **MJ-10** cabinet is matched to the XL color scheme, in a contemporary design with power switch, volume and on-indicator on the front. Controls for the usual screen adjustment functions are beneath a panel hidden below.

The instruction manual clearly describes how to attach the monitor to an Atari computer, using the special Atari-compatible cable included, which also gives you sound through the built-in speaker.

Suggested retail, \$299.00. Teknika Electronics Corp., 1633 Broadway, New York, NY 10019.





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OPERATION: The "IMPOSSIBLE" consists of a disk program (**unprotected** so you can make as many backups as you wish) and a 4K STATIC RAM pack which is inserted into your computer (no soldering!) The "IMPOSSIBLE" will read your program disk and then **re-write it in an unprotected format!** You may make additional backup copies using a sector copier or even regular DOS! Because your backup copy no longer has BAD SECTORS or EXOTIC FORMATS, the program data can now be manipulated into DOS compatible files (even double density!), transferred to cassette, etc. (with the aid of our Satellite programs!) No user programming knowledge required. A few programs require logical thinking.

- FEATURES:**
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 6. Expands computer memory to 52K usable
 7. Simple NO SOLDER installation
 8. Satellite expandable

PROJECTED SATELLITES: A "COMPACTOR" program which will convert your program into DOS compatible files (double density compatible!) for the storage of several programs on one disk. A "COLUMN 80" program for Word Processing, etc. It allows 80 columns on the screen! The "XL-MATE" will allow programs made with your 400/800 "IMPOSSIBLE" to now play on your XL Computer! The **METAMORPHOSES II** program will allow you to convert your **protected CASSETTES** into disk DOS files and vice-versa. All satellite programs must be used with inconjunction with The "IMPOSSIBLE"!

REQUIREMENTS: The "IMPOSSIBLE" diskette, the 4K STATIC RAM pack, a 400 or 800 computer (please specify!) with 48K and "B" Rom's. NOTE! The very old ATARI computers were shipped with "A" Rom's which had some serious "Bugs". Even if you don't own an "IMPOSSIBLE", you should upgrade to "B" Rom's (simple to install!) We have them available at a very inexpensive price. CALL US! "XL" version available soon!

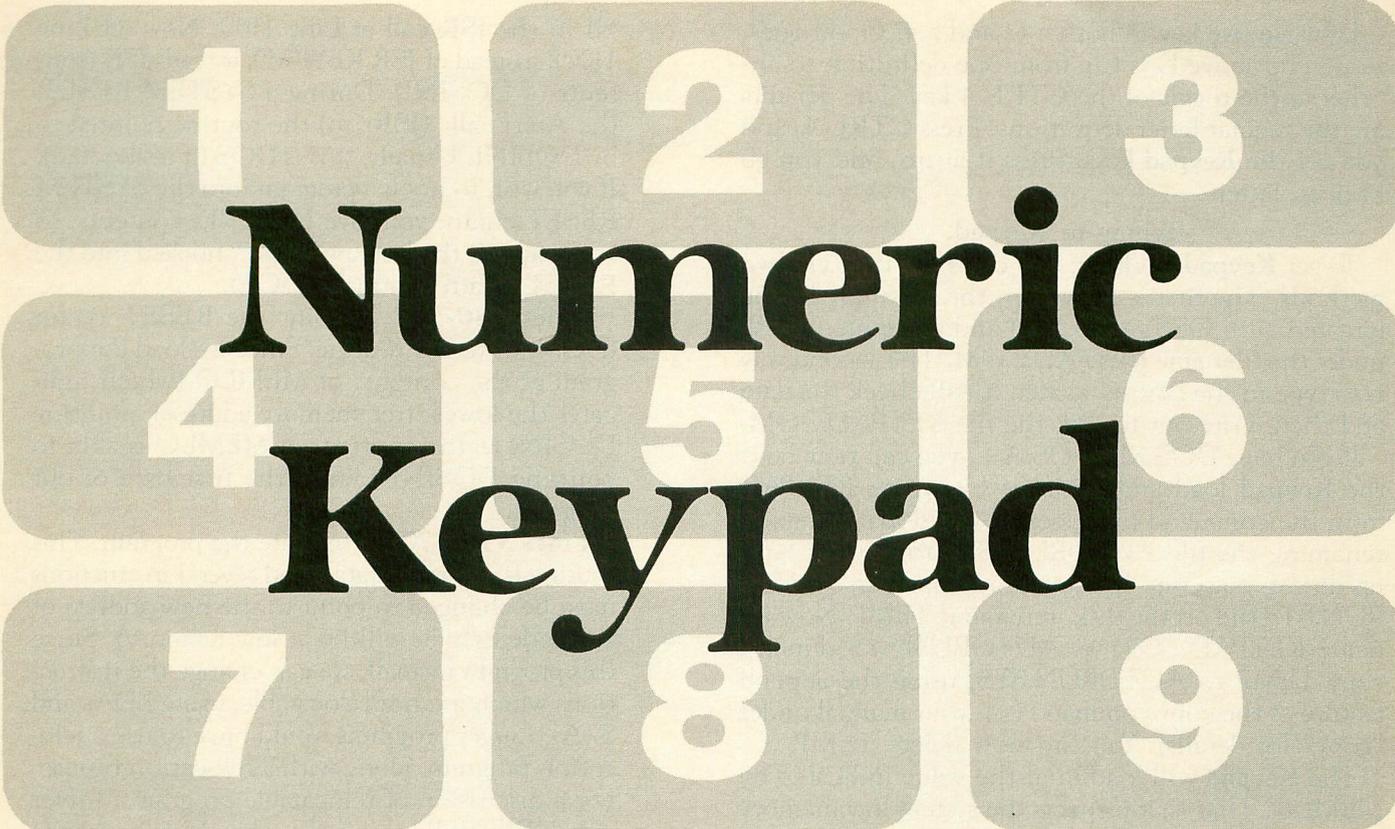
NOT A PIRATING TOOL: We at C.S.S. did not design The "IMPOSSIBLE" to put Software Manufacturers out-of-business overnight! Nearly all of our products have been "ripped-off" by industry parasite who have little or no ability to develop a product of their own so we can sympathize with their dilemma. All C.S.S. products have built-in safe guards which prohibit their use for flagrant pirating. The "IMPOSSIBLE" is no exception! While The "IMPOSSIBLE" backup-up the most heavily protected programs, it also checks to see that the 4K STATIC RAM pack is installed before allowing the backup copy to execute!

EXAMPLES: The "IMPOSSIBLE" has been tested on 300 of the most popular and heavily protected programs we could find. With nearly 4000 programs for Atari, we DO NOT guarantee that it will backup all programs in the past-present-and future! We will supply updates at \$6 each (non-profit!) if and when necessary. Programs we have successfully backed up include: Blue Max, Visi-cal, Archon, Mule, File Manager 800 +, Syn Calc, Syn File, One on One, 7 Cities of Gold, Super Bunny, Load Runner, Drol, and Gumball just to name a few!

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Numeric Keypad

24K Disk

by Jonathan Buckheit

While Atari offers a plethora of features not found on “professional” systems, one feature lacking is a numeric keypad. This was a perfect candidate for inclusion on the new XL lines; sadly, it wasn’t included.

In brief, a numeric keypad streamlines the entry of digits. Instead of having the keys on the top row of the keyboard, a group of keys are off to the side of the keyboard itself. Another solution is to have keys on the keyboard toggle from a certain function to serve as keypad keys. Many of the portable systems implement this.

For the Atari owner who wishes to have this feature, there are several routes. One is to buy Atari’s add-on keypad. This is expensive, and the required software uses the infamous page 6, destined to get in the way of *a lot* of software. Another solution is to buy a new keyboard! Some manufacturers of add-on keyboards offer this feature. This may be good for the Atari 400 owners out there, but why should the owner of another Atari computer—who has a perfectly good and usable full-stroke keyboard—buy another?

You can choose to implement a numeric keypad through software. This seems like a perfect solution and, if implemented correctly, it comes close. Note that I do consider a BASIC program which converts the keys unacceptable; you can only use the keypad within the realm of that BASIC program.

If you read the title of this article, you can see that the solution is a couple of paragraphs away. . .

How to design the “perfect” keypad.

When you press a keyboard key, an IRQ interrupt is requested. The Atari is interrupted and, for a few fractions of a second, it takes care of the interrupt. Think of it as someone tapping you on the shoulder. You run off to perform another task and then return to do what you were doing previously.

This process is beautifully illustrated by Chris Crawford on the Atari Video Visits Tapes (circulated by some user groups). In the case of a keyboard interrupt, the Atari goes to the address pointed to by VKEYBD at 520 (\$208).

What would happen if we changed VKEYBD to point to our custom routine? Well, we would have almost full control of the keyboard! We can even implement a keypad routine.

Now it’s a piece of cake. We handle the keys just like the OS routine does, with one exception: if the **Numeric Keypad** is on, we replace certain keys with their **Keypad** counterparts!

If you haven’t guessed by now, that’s what I implemented. The following keys are redefined:

789	---->	789
UIO	---->	456
JKL	---->	123
M	---->	0

How can we key in both a *U* and a *4*? Good question. The above keys flip from one definition to another at the toggle of the CTRL-4 key. The defaults are the regular letter definitions. Press CTRL-4, and you get the **Keypad** keys. Press it again, and you go back to letters.

Typing in Keypad.

To get **Keypad** working, you can type it in via two methods. The first is to type in the assembly listing (created with OSS's MAC/65) and assemble to disk under the filename KEYPAD.COM. The second way is to type in the BASIC loader. It will check the data and then write out to disk the file KEYPAD.COM.

If you have DOS XL or OS/A+, you can now have the **Keypad** load and initialize by typing KEYPAD from the command processor. If you don't, I suggest renaming the file AUTORUN.SYS to have it boot up during powerup. If you already have an AUTORUN.SYS file on the disk, rename it TEMP. Now rename KEYPAD.COM as AUTORUN.SYS. Finally, copy TEMP to AUTORUN.SYS, using the append feature of the copy command (see your manual under "copy" for details). You can now delete TEMP.

The **Keypad** will load in at the value indicated by MEMLO. That is, it inspects the system low memory pointer and loads the routine at that location (by relocating itself). Next, it raises the low memory pointer to protect itself. See the source code for details. What this boils down to is that loading **Keypad** will wipe out any program already in RAM.

Naturally, **Keypad** is protected against SYSTEM RESETs, so you don't have to type in a USR call or a GOTO address after every RESET. If you want to disable **Keypad** (to go to Atari DOS, etc.), hold down OPTION while you press SYSTEM RESET.

Assembly code documentation.

Often even a commented assembly code listing cannot really inform the reader of what's going on. Here then, is a line-by-line description of the code.

Lines 100-340 — These lines contain the program's title (110-140) and the program equates (200-340). I prefer to equate most addresses, because it keeps things clear in my head and makes for very readable assembly code.

Lines 400-1030 — Coldstart (powerup routine). This routine is executed during powerup only. Powerup does not necessarily mean rebooting the computer. It is more proper to say that this routine is executed during the load process of the **Keypad** only.

Line 400 — Sets the origin of this routine. Location \$4000 (16384 decimal) is where the program loads initially; it is out of most everyone's way. Putting this code lower in memory might interfere with DOS and/or various other routines placed in low memory.

Lines 430-460 — Save the contents of DOSI-

NI in the JSR call at Line 1100. Now (at Line 1100), instead of JSR KEYPAD, it reads JSR (contents of DOSINI). During a SYSTEM RESET, the Atari calls (JSRs to) the routine pointed to by DOSINI. Usually, this is DOS (if it's booted). If you wish to hook a program into the SYSTEM RESET chain, you save DOSINI's contents, so you may call the last application hooked into the RESET chain (normally DOS).

Lines 480-510 — Point the RESET vector (DOSINI) to our routine. Since we load our program at the contents of MEMLO (which indicates the lowest free memory address), pointing DOSINI to the contents of MEMLO is akin to pointing DOSINI toward the first byte of our program.

Lines 530-870 — Relocate the program. This routine is not relocatable, and several instructions must be changed to point to the new address of the code (which will be at low memory). Since this program is small, we can change the instructions which are not relocatable, using LDAs and STAs. Larger programs would have to use a relocation program, along with a relocation bitmap. For a discussion of relocatable programs, I refer you to Bill Wilkinson's "Insight: Atari" columns in *Compute!* magazine (July 1983, August 1983, September 1983 and January 1984).

Lines 890-1010 — Move the relocated code to the contents of MEMLO (low memory).

Line 1030 — Calls the setup routine.

Lines 1090-1440 — Are the RESET routine. This routine is called each time SYSTEM RESET is pressed and at the initial load of the routine.

Line 1100 — Boots the last application (see above).

Lines 1120-1210 — Check to see if OPTION is pressed. If it is, the routine is "unhooked." It is removed from the SYSTEM RESET chain, and the setup routine is not called.

Line 1240 — Disables IRQ interrupts. We do this because of a problem on all 6502 computers: you can only change one byte of a two-byte vector at a time. If we've changed one byte, and the user causes an IRQ interrupt before we change the second byte, terrible things might happen. VBIs follow the same principle.

Lines 1270-1320 — Point VKEYBD to our routine. Now all key presses will cause the computer to call our routine instead of its own.

Line 1340 — Enables IRQ interrupts. Since we have changed the vector, it's safe for them to function again.

Lines 1360-1440 — Move the low memory pointer over our routine, so we will not be overwritten. Most programs (if not all), such as BASIC, use MEMLO to determine where to place their programs. Since we are under where the

Atari thinks low memory is, we won't be overwritten. The routine then exits with an RTS instruction.

Lines 1500-2410 — Contain the replacement keyboard routine. This routine replaces the OS keyboard handler.

Lines 1510-1520 — Save the Y register onto the stack. We must save all registers that we use, except the accumulator, which is saved by the OS IRQ handler.

Lines 1540-1580 — Check to see if the same key is pressed as the last one. If it is, we check to see if the key delay (KEYDEL) timer has expired. Only if it has do we accept the key. This is what causes the delay between keys that are auto-repeating.

Lines 1610-1670 — Check to see if CTRL-1 is pressed. If it is, SSFLAG is toggled from on to off, or vice versa. Many OS routines check for SSFLAG. If it's on, they wait until it's turned off before they will function (also known as a "pause").

Lines 1700-1800 — Check to see if CTRL-4 is pressed. If it is, TOGGLE is toggled (like an SSFLAG). Thus, **Keypad** knows whether it must convert keys or not, by checking TOGGLE.

Lines 1850-1860 — Check to see if TOGGLE is set. If it isn't, keys are converted.

Lines 1930-1970 — Replace certain keys with their **Keypad** counterparts.

Lines 1990-2010 — Report the key as pressed.

Lines 2030-2040 — Set KEYDEL. If you want to change this parameter (for an explanation of what it does, see above), change the LDA #03 to another value.

Lines 2060-2070 — Cancel the attract mode (when the monitor starts changing colors). As the manuals state, when a key is pressed, attract mode stops.

Lines 2100-2110 — Set the auto-delay rate (the delay between when you press a key and when it starts to repeat). If you change the LDA #30 to another value, you can change the auto-delay rate without using Sammie McCaa's **Fast Repeat Key** from **ANALOG Computing** issue 16.

Lines 2140-2170 — Retrieve the Y register (which we saved) and the accumulator (which the OS saved) from the stack.

Line 2190 — Exits the IRQ interrupt.

Lines 2210-2250 — Get the replacement key for the key just pressed from the key table.

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2310-2340 — are the tables of which keys should be replaced, and with which keys. They are not ATASCII, but internal code. See ANALOG Computing issue 15 for a table of these values.

Lines 2400-2410 — Hold the TOGGLE switch value.

Lines 2470-2480 — Set up the auto-boot. This enables our routine to execute when it is loaded. I chose to INITialize the routine instead of RUNning it.

The Numeric Keypad is certainly a workable solution to the keypad problem. It works with nearly all software. And, best of all, for typing in mammoth program listings with lots of DATA statements (you know the ones; a lot are printed here in ANALOG Computing), it can't be beaten for accuracy and quickness. Just think, the Keypad is the last program you'll ever have to type in using the old method! □

Listing 1.
BASIC listing.

```

100 REM *****
110 REM *   KEYPAD CREATE   *
120 REM * by Jonathan Buckheit *
130 REM *****
140 REM
150 GRAPHICS 0:POKE 752,1:? "↓↓↓Reading
DATA":DIM BUF$(294)
160 ? "↓Reading Line: ";LINE=330
170 POSITION 16,5:? LINE
180 TRAP 220:FOR I=1 TO 25-6*(LINE=440
):READ A:SUM=SUM+A:BUF$(LEN(BUF$)+1)=C
HR$(A):NEXT I
190 IF PEEK(183)+256*PEEK(184)(>)LINE T
HEN 300
200 READ CKSUM:IF SUM=CKSUM THEN LINE=
LINE+10:GOTO 170
210 GOTO 290
220 IF PEEK(195)(>)6 THEN 290
230 ON LEN(BUF$)(>)294 GOTO 190:? "K↓DA
TA lines O.K.":? "↓Insert a DOS disk,
press START."
240 IF PEEK(53279)(>)6 THEN 240
250 TRAP 310:OPEN #1,8,0,"D:KEYPAD.COM
"
260 POKE 850,11:ADDR=ADR(BUF$):POKE 85
2,ASC(CHR$(ADDR)):POKE 853,INT(ADDR/25
6):POKE 856,38:POKE 857,1
270 X=USR(ADR("hhhLUV"),16):IF PEEK(8
51)(>)127 THEN 310
280 ? "↓File Written.":POKE 752,0:END
290 ? "↓Incorrect DATA at line ";LINE:
LIST LINE:POKE 752,0:END
300 ? "↓Line ";LINE;" is missing!":POK
E 752,0:END
310 ? "↓Disk WRITE error.":POKE 752,0:
END
320 REM * ML DATA FOLLOWS *
330 DATA 255,255,0,64,251,64,165,12,14
1,125,64,165,13,141,126,64,173,231,2,1
33,12,173,232,2,133,2996
340 DATA 13,173,231,2,24,105,48,141,14
7,64,173,232,2,105,0,141,152,64,173,23
1,2,24,105,153,141,5642
350 DATA 209,64,141,214,64,141,220,64,
173,232,2,105,0,141,210,64,141,215,64,
141,221,64,173,231,2,8938
360 DATA 24,105,139,141,227,64,173,232
,2,105,0,141,220,64,173,231,2,24,105,1
46,141,3,65,173,232,11878
370 DATA 2,105,0,141,4,65,173,231,2,13
3,212,173,232,2,133,213,160,0,185,124,
64,145,212,200,192,14981
    
```

```

380 DATA 154,208,246,240,21,32,124,64,
173,31,208,201,3,208,11,173,125,64,133
,12,173,126,64,133,13,17921
390 DATA 96,120,169,172,141,8,2,169,64
,141,9,2,88,173,231,2,24,105,154,141,2
31,2,144,3,238,20550
400 DATA 232,2,96,152,72,173,9,210,205
,242,2,208,5,173,241,2,208,62,173,9,21
0,201,159,208,10,23814
410 DATA 173,255,2,73,255,141,255,2,17
6,45,201,152,208,11,173,21,65,73,255,1
41,21,65,173,9,210,26969
420 DATA 172,21,65,240,10,160,7,217,7,
65,240,27,136,16,248,141,252,2,141,242
,2,169,3,141,241,29934
430 DATA 2,169,0,133,77,169,48,141,252
,64,21,65,43,2,104,168,104,64,185,14,6
5,208,227,37,1,32297
440 DATA 5,0,11,13,8,50,31,30,26,24,29
,27,0,226,2,227,2,0,64,33072
    
```

CHECKSUM DATA.
(see page 8)

```

100 DATA 526,13,472,535,86,380,490,251
,121,625,554,717,622,843,830,7065
250 DATA 19,479,381,276,953,830,851,61
3,452,140,275,264,413,729,2,6677
400 DATA 990,449,984,1,969,3393
    
```

Listing 2.
Assembly listing.

```

-----
| NUMERIC KEYPAD
| by Jonathan Buckheit
|-----
| Program Equates
|-----
CH1      =  $02F2
ATTRACT  =  $4D
CH       =  $02FC
CTRL4    =  $98
CTRL1    =  $9F
KEYDEL   =  $02F1
KBCODE   =  $D209
SBFLAB   =  $02FF
BRTIMR   =  $022B
VKEYBD   =  $020B
DOBINI   =  $0C
INITAD   =  $02E2
ZPAGE    =  $D4
MEMLO    =  $02E7
CONSOL   =  $D01F
|-----
| Coldstart (Relocate) Routine
|-----
|
|          *=  $4000  |Relocate...
COLD      LDA  DOSINI  |Save address
          STA  KEYPAD+1 |of the last
          LDA  DOSINI+1 |application so
          STA  KEYPAD+2 |we may boot it
          LDA  MEMLO   |Point the RESET
          STA  DOSINI   |vector to
          LDA  MEMLO+1 |our routine
          STA  DOSINI+1
          LDA  MEMLO   |Relocate...
          CLC
          ADC  #KEYIRQ-KEYPAD
          STA  R1+1
          LDA  MEMLO+1
          ADC  #00
          STA  R2+1
          LDA  MEMLO   |Relocate...
          CLC
          ADC  #TOGGLE-KEYPAD
          STA  R3+1
          STA  R4+1
          STA  R5+1
          LDA  MEMLO+1
          ADC  #00
          STA  R3+2
          STA  R4+2
          STA  R5+2
          LDA  MEMLO   |Relocate...
          CLC
          ADC  #OLDKEY-KEYPAD
          STA  R6+1
          LDA  MEMLO+1
          ADC  #00
          STA  R6+2
          LDA  MEMLO   |Relocate...
          CLC
          ADC  #NEWKEY-KEYPAD
          STA  R7+1
    
```

```

LDA MEMLO+1
ADC #000
STA R7+2
LDA MEMLO      ;Move contents
STA ZPAGE      ;of MEMLO to
LDA MEMLO+1    ;Page Zero
STA ZPAGE+1
LDY #000
LDA KEYPAD,Y  ;Move Keypad
STA (ZPAGE),Y
INY
CPY #TOGGLE-KEYPAD+1
BNE MOVE      ;We have more!
BEQ NOIRQ     ;Init Keypad

;-----
;RESET Button Routine
;-----
KEYPAD JBR KEYPAD ;self modified
        LDA CONSOL ;Console Keys
        CMP #003   ;OPTION hit?
        BNE NOIRQ  ;No!
        LDA KEYPAD+1 ;Reset the
        STA DOSINI ;RESET vector
        LDA KEYPAD+2
        STA DOSINI+1
        RTS        ;Return

;
NOIRQ   SEI        ;Disable IRQ's
R1      LDA #<KEYIRQ ;Insert new
        STA VKEYBD ;kbd routine
R2      LDA #>KEYIRQ
        STA VKEYBD+1
        CLY
        LDA MEMLO  ;Move MEMLO ptr
        CLC
        ADC #TOGGLE-KEYPAD+1
        STA MEMLO
        BCC RETURN
        INC MEMLO+1
RETURN  RTS        ;Exit

;-----
;New Keyboard Routine Follows
;-----
KEYIRQ  TYA        ;Save Y Register
        PHA
        LDA KBCODE ;Get key
        CMP CH1    ;Same as last?
        BNE PROCESS ;No.
        LDA KEYDEL
        BNE EXIT

;
PROCESS LDA KBCODE ;Get key
        CMP #CTRL1 ;Is it CONTROL-1
        BNE NOPAUSE ;No!
        LDA SSFLAG ;Toggle pause
        EOR #0FF
        STA SSFLAG
        BCS EXIT

;
NOPAUSE CMP #CTRL4 ;CONTROL-4?
        BNE NOTOGGLE ;No!

;
R3      LDA TOGGLE ;Keypad flag
        EOR #0FF   ;Toggle it

;
R4      STA TOGGLE
        LDA KBCODE ;Restore keycode

;
NOTOGGLE
R5      LDY TOGGLE ;Keypad on?
        BEQ NONUM  ;No!
        LDY #007   ;Change 7 keys

;
LOOP
R6      CMP OLDKEY,Y ;Keypad key?
        BEQ SETNUMKEY ;Yes!
        DEY
        BPL LOOP   ;We have more!

;
NONUM   STA CH      ;Key pressed
        STA CH1    ;Last pressed
        LDA #003   ;Debounce rate
        STA KEYDEL
        LDA #000   ;Poke attract
        STA ATTRACT

;
EXIT    LDA #030   ;Auto-delay rate
        STA BRTIMR
        PLA
        TAY
        PLA
        RTI

;
SETNUMKEY
R7      LDA NEWKEY,Y ;Replacement
        BNE NONUM

;-----
;Table of Keys
;-----
OLDKEY  .BYTE #25,#01,#05
        .BYTE #00,#0B,#0D,#0B
NEWKEY  .BYTE #32,#1F,#1E
        .BYTE #1A,#1B,#1D,#1B

;-----
;Toggle Switch
;-----
TOGGLE  .BYTE #00

;-----
;Auto-Boot
;-----
        *= INITAD
        .WORD COLD

;-----
;End of Program
;-----
        .END
    
```

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by Angelo Giambra

How would you like to instantly renumber any BASIC program by merely pressing the START key on your computer console? **Instant Renumber** will load into your computer a machine language renumber utility, which will jump into action every time you press the START key. Here's how to use it.

Loading it in.

First, key in **Instant Renumber**, making sure to key the DATA statements accurately. Save it to cassette or disk before running it. There are two reasons for this: first, if you made any errors keying in the DATA statements, your system will probably lock up when you run the program. Second, after the program runs correctly, it self-destructs. I'll explain why later.

After you've saved the program, run it. Your screen will go black for about thirty seconds while the DATA statements are being read into memory. Finally, you will see a message similar to the following on your screen:

```
RENUMBER INSTALLED
AT DECIMAL ADDRESS
7292
```

On your computer, this number may differ. Jot this address down on a piece of paper for reference. I'll explain why later in this article.

Instant Renumber is now resident. It will remain on the job until you press SYSTEM RESET or turn off your computer.

Using it.

To activate it, load any BASIC program into memory. List a few lines of it on your screen. Now press the START key on your console. The message **INSTANT RENUMBER** appears on your screen, and a second later the **READY** prompt appears. Your program has just been renumbered in increments of ten.

This renumber utility resolves all references to line numbers in statements such as GOTO, GOSUB, IF ... THEN, etc.

If the utility encounters no problems, it simply ends with the **READY** prompt. Otherwise, after resequencing your program, it reports problems to you in the following manner. Suppose you have this program line:

```
50 GOSUB 1000
```

If Line 1000 is nonexistent, **Instant Renumber** reports it this way:

```
NF 50
```

This means that, on Line 50, the target address (1000) was not found. You must correct incorrect line numbers manually.

Symbolic references are handled in a similar manner. Consider this line of BASIC:

```
20 GOTO NEXTLINE
```

Instant Renumber will report this as follows:

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SR 20

This means that, on Line 20, there is a symbolic reference. You'll have to adjust these yourself.

Not all messages indicate an error. Sometimes we turn off the TRAP statement by assigning it to a non-existent number, such as TRAP 40000. The **Instant Renumber** program will report lines which use this convention with an *NF* message, although they are not truly errors.

Never activate **Instant Renumber** until you have listed the program to the screen. It is not necessary to list the entire program. Just type in *LIST*, press *RE-TURN*, then immediately press the *BREAK* key. You must do this, because BASIC keeps a set of internal pointers which tell it where program lines begin and end. When you add or delete lines, BASIC sometimes does not update its pointers until several changes have been made. **Instant Renumber** needs these pointers to be current. Listing the program forces BASIC to do an update.

Sometimes you may want to renumber your program in increments other than ten. **Instant Renumber** may be activated manually. Earlier, I told you to jot down the decimal address that appears on the screen after the utility installs itself. To manually run it, key in a *USR* statement like the following:

```
X=USR(7292,100,5)
```

In this example, 7292 represents the decimal address you jotted down. Remember, your number may differ. The next number, 100, is the base number. It tells **Instant Renumber** that you want your first program line to be resequenced as Line 100. The last number, 5, tells the utility to increment each successive line by 5.

How it works.

Here's how the program works. It first installs **Instant Renumber** in low memory. This varies on different systems, depending on—among other things—whether you have cassette or disk. It protects the utility by altering the *LOMEM* pointer to point to the end of the machine language code. That way, BASIC will never use the memory occupied by **Instant Renumber**. That's why the program vanishes after you run it. Altering the *LOMEM* pointer forces BASIC to realign all of its internal pointers, and it loses track of where the current program is!

Next, the program activates a vertical blank interrupt routine, which also resides in low memory. A *VB* interrupt routine is a series of instructions your computer executes every sixtieth of a second. You don't know it's running, but it is always there. The *VB* interrupt is constantly checking to see if you have pressed the *START* key. If you have, it activates **Instant Renumber**.

One final note for those of you with disk drives. When you key in *DOS*, the *DUPSYS* file begins to load into the same area of memory occupied by the

VB interrupt routine. Normally, this would cause the system to lock up. The program guards against this, by providing for an automatic *SYSTEM RESET* the first time you key in *DOS*. Instead of going to the familiar *DOS* menu, your screen will flicker, and you will remain in *BASIC*. Simply key in *DOS* again to get to the *DOS* menu.

Fast relief.

Because **Instant Renumber** is written entirely in machine language, it is incredibly fast. Even programs which exceed 500 lines are renumbered in less than two seconds.

I think you'll find **Instant Renumber** an invaluable tool. Renumbering your *BASIC* programs was never so easy! □

Listing 1.

```
100 REM ASSEMBLER RENUMBER UTILITY
110 REM BY ANGELO GIAMBRA
120 REM
130 REM SINCE THE RENUMBER UTILITY IS
140 REM NOT FULLY RELOCATABLE, BASIC
150 REM LOOKS FOR THE JSR'S AND FIXES
160 REM THE ADDRESSES
170 REM
180 I=794:REM START OF HANDLER TABLE
190 IF CHR$(PEEK(I))(">"E" THEN I=I+3:G
010 190
200 ADDR=PEEK(I+1)+PEEK(I+2)*256+6:REM
GET EDITOR PUTBYTE ADDRESS
210 ADDR1=PEEK(ADDR)+PEEK(ADDR+1)*256+
1:REM COPY EDITOR PUTBYTE ADDRESS
220 AD2=INT(ADDR1/256):AD1=ADDR1-AD2*2
56
230 LET LOMEM=PEEK(743)+PEEK(744)*256:
POKE 559,0:AMOUNT=25000
240 HIMEM=(PEEK(106)-16)*256:I=HIMEM
250 FOR Q=0 TO 702:READ A
260 IF COUNT=15 OR COUNT=84 OR COUNT=2
08 OR COUNT=247 OR COUNT=252 OR COUNT=
257 THEN GOSUB 300:GOTO 260
270 IF COUNT=260 OR COUNT=403 OR COUNT
=408 OR COUNT=413 OR COUNT=428 THEN GO
SUB 300:GOTO 260
280 IF COUNT=444 OR COUNT=451 OR COUNT
=459 OR COUNT=480 OR COUNT=518 THEN GO
SUB 300:GOTO 260
290 POKE I,A:I=I+1:COUNT=COUNT+1:NEXT
Q:GOTO 340
300 POKE I,A:I=I+1:READ LO:READ HI
310 IF LO=0 AND HI=0 THEN LO=AD1:HI=AD
2:GOTO 330
320 ADDR=LO+256*HI:OFFSET=ADDR-AMOUNT:
HI=INT((LOMEM+OFFSET)/256):LO=LOMEM+OF
FSET-HI*256
330 POKE I,LO:I=I+1:POKE I,HI:I=I+1:CO
UNT=COUNT+3:READ A:Q=Q+3:RETURN
340 Q=I:TRAP 300:COUNT=0
350 READ A
360 IF COUNT=193 OR COUNT=242 OR COUNT
=264 THEN GOSUB 440:GOTO 360
370 POKE Q,A:Q=Q+1:COUNT=COUNT+1:GOTO
350
380 INSTALL=PEEK(743)+PEEK(744)*256:?"
"
390 POSITION 10,7:?"RENUMBER INSTALLE
D":POSITION 10,8:?"AT DECIMAL ADDRESS
"
400 POSITION 16,10:?"INSTALL:POSITION
0,23
410 POKE 559,34
420 X=USR(I,HIMEM,I)
430 END
440 POKE Q,A:Q=Q+1:READ LO:READ HI
450 POKE Q,AD1:Q=Q+1:POKE Q,AD2:Q=Q+1:
COUNT=COUNT+3:READ A:RETURN
```

460 DATA 104,201,2,240,20,170,240,5,10
 4,104,202,208,251,169,253,32,0,0,169,3
 ,133,185,76,64
 470 DATA 185,104,133,232,104,133,231,1
 04,104,133,233,165,136,133,203,165,137
 ,133,204,165,231,133,229,165
 480 DATA 232,133,230,160,0,177,203,133
 ,205,200,177,203,133,206,56,165,203,22
 9,138,165,204,229,139,240
 490 DATA 54,200,177,203,133,207,200,17
 7,203,133,208,200,32,43,98,165,208,197
 ,207,208,28,165,203,24
 500 DATA 101,207,133,203,165,204,105,0
 ,133,204,165,229,24,101,233,133,229,14
 4,2,230,230,160,0,240
 510 DATA 188,164,208,169,0,240,208,169
 ,0,240,35,177,203,201,10,240,31,201,11
 ,240,27,201,12,240
 520 DATA 23,201,13,240,19,201,35,240,1
 5,201,30,240,5,201,7,240,3,96,240,71,2
 40,71,240,73
 530 DATA 200,177,203,201,20,240,68,201
 ,22,240,64,201,14,208,62,200,132,227,1
 77,203,133,212,200,177
 540 DATA 203,133,213,200,177,203,133,2
 14,200,177,203,133,215,136,136,136,32,
 221,99,165,235,56,229,205
 550 DATA 165,206,240,11,165,236,176,5,
 56,233,1,144,39,229,206,144,35,176,61,
 240,53,240,53,144
 560 DATA 184,240,45,200,96,169,83,32,0
 ,0,169,82,32,0,0,169,32,32,0,0,32,72,9
 9,165
 570 DATA 227,168,200,96,165,136,133,22
 0,165,137,133,221,165,231,133,218,165,
 232,133,219,169,0,240,24
 580 DATA 240,103,240,103,240,103,144,1
 99,165,203,133,220,165,204,133,221,165
 ,229,133,218,165,230,133,219
 590 DATA 165,220,56,229,138,200,165,22
 1,229,139,240,77,160,0,165,235,56,241,
 220,133,223,200,165,236
 600 DATA 176,5,56,233,1,144,58,241,220
 ,133,224,144,52,165,223,201,0,208,6,16
 5,224,201,0,240
 610 DATA 28,165,218,24,101,233,133,218
 ,144,2,230,219,165,220,24,160,2,113,22
 0,133,220,144,2,230
 620 DATA 221,169,0,240,179,169,0,240,8
 7,240,77,240,77,240,77,144,149,169,78,
 32,0,0,169,70
 630 DATA 32,0,0,169,32,32,0,0,169,1,13
 3,228,165,229,133,218,165,230,133,219,
 32,241,99,32
 640 DATA 230,216,160,0,132,223,177,243
 ,16,9,41,127,32,0,0,169,32,208,8,32,0,
 0,164,223
 650 DATA 200,208,233,32,0,0,165,227,16
 8,200,200,200,200,200,200,96,240,59,24
 0,17,240,58,144,175
 660 DATA 32,241,99,165,227,168,200,200
 ,200,200,200,200,96,200,177,203,201,23
 ,240,17,201,24,240,13
 670 DATA 201,14,208,5,152,24,105,6,168
 ,169,0,240,232,200,32,81,98,177,203,20
 1,20,240,8,201
 680 DATA 22,240,4,208,240,240,48,96,20
 0,177,203,201,27,240,13,201,14,208,5,1
 52,24,105,6,168
 690 DATA 169,0,240,236,200,152,197,208
 ,176,2,144,170,96,169,0,133,216,133,21
 7,32,210,217,165,212
 700 DATA 133,235,165,213,133,236,96,24
 0,47,165,218,133,212,165,219,133,213,3
 2,170,217,165,228,201,1
 710 DATA 240,25,165,227,168,165,212,14
 5,203,200,165,213,145,203,200,165,214,
 145,203,200,165,215,145,203
 720 DATA 200,200,200,169,0,133,228,96,
 165,136,133,203,165,137,133,204,165,23
 1,133,229,165,232,133,230
 730 DATA 165,203,56,229,138,165,204,22
 9,139,240,43,160,2,177,203,133,223,165
 ,229,24,160,0,145,203
 740 DATA 165,230,200,145,203,165,229,1
 01,233,133,229,144,2,230,230,24,165,20
 3,101,223,133,203,144,2

750 DATA 230,204,169,0,240,202,96
 760 DATA 169,0,133,8,133,2,165,9,240,8
 ,169,116,133,10,169,228,133,11,104,104
 ,133,208,104,133
 770 DATA 207,104,133,206,104,133,205,5
 6,173,231,2,133,203,233,1,133,0,173,23
 2,2,133,204,233,0
 780 DATA 133,1,160,0,177,207,145,203,2
 4,165,203,105,1,133,203,144,2,230,204,
 24,165,207,105,1
 790 DATA 133,207,144,2,230,208,165,208
 ,197,206,208,224,165,207,197,205,208,2
 18,24,165,207,105,149,133
 800 DATA 207,165,208,105,0,133,208,160
 ,0,165,203,133,4,165,204,133,5,177,207
 ,145,203,200,192,158
 810 DATA 208,247,24,165,203,105,158,14
 1,231,2,165,204,105,0,141,232,2,169,7,
 164,203,166,204,32
 820 DATA 92,228,76,0,160,173,31,208,20
 1,7,208,6,169,0,133,2,240,117,201,6,20
 8,113,165,2
 830 DATA 208,109,73,1,133,2,160,0,24,1
 65,4,105,133,133,203,165,5,105,0,133,2
 04,132,3,177
 840 DATA 203,32,0,0,164,3,200,192,18,2
 08,242,24,165,4,105,90,133,6,165,5,105
 ,0,72,165
 850 DATA 6,72,169,10,72,169,0,72,169,1
 0,72,169,0,72,169,2,72,165,1,72,165,0,
 72,96
 860 DATA 169,155,32,0,0,160,0,24,165,4
 ,105,151,133,203,165,5,105,0,133,204,1
 32,3,177,203
 870 DATA 32,0,0,164,3,200,192,6,208,24
 2,169,143,141,252,2,76,98,228,125,201,
 206,211,212,193
 880 DATA 206,212,32,210,197,206,213,20
 5,194,197,210,155,82,69,65,68,89,155

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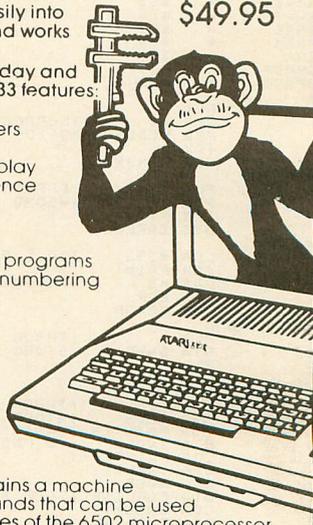
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CMP #0
BNE CONTINUE
LDA TEMP2
CMP #1
BEQ FOUNDITA
LDA FUTLINE ;KEEP LOOKING
CLC
ADC INCR ;INCREMENT FUTURE LINE
STA FUTLINE
BCC @FAHEAD
INC FUTLINE+1
@FAHEAD
LDA SINDEX ;POINT SINDEX TO
CLC ;NEXT LINE
LDY #2
ADC (SINDEX),Y
STA SINDEX ;ADD OFFSET
BCC @CONT
INC SINDEX+1
@CONT
LDA #0
BEQ SEARCH
FOUNDITA
LDA #0
BEQ FOUNDIT
RESEQE
ONGOSUBD
ONGOTOD
ENTRYD
NOTFOUND
LDA #4E ;LOAD 'N'
JSR PRINT
LDA #4F ;LOAD 'F'
JSR PRINT
LDA #SPACE ;LOAD A SPACE
JSR PRINT
PRINTLINE0
LDA #1
STA FLAG ;SET FLAG
LDA CURLINE
STA FUTLINE ;SET FUTURE LINE
LDA CURLINE+1
STA FUTLINE+1
JSR CONVERTBACK
JSR FPA ;CONVERT TO A STRING
LDY #0
LPX
STY TEMP1
LDA (INBUFF),Y ;PRINT THE STRING
BPL LPX1 ;NOT LAST CHARACTER
AND #7F ;TURN OFF HIGH BIT
JSR PRINT
LDA #SPACE ;LOAD A SPACE
BNE ENDNF
LPX1
JSR PRINT
LDY TEMP1
INY
BNE LPX
ENDNF
JSR PRINT
LDA SAVEY ;RESTORE Y
TAY
INY
INY
INY
INY
INY
INY
RTS
RESEQF
ONGOSUBE
ONGOTOE
ENTRYC
FOUNDIT
LDA SAVEY
TAY
INY
INY
INY
INY
INY
INY
RTS
ONGOSUB
INY ;IS THIS ON GOSUB?
LDA (INDEX),Y
CMP #23
BEQ TAKEOFF ;IF YES, THEN PROCESS IT
CMP #24
BEQ TAKEOFF
CMP #14 ;DOES A NUMBER FOLLOW?
BNE LOOPAGAIN
TYA
CLC
ADC #4 ;BUMP Y UP BY 4
TAY
LOOPAGAIN
LDA #0
BEQ ONGOSUB
TAKEOFF
INY
JSR ENTRY
LDA (INDEX),Y ;GET TOKEN
CMP #20 ;END OF STATEMENT
BEQ GETOUT
CMP #22 ;END OF LINE
BEQ GETOUT
BNE TAKEOFF
BEQ RESEQH
RTS
ONGOTO
INY ;IS IT ONGOTO
LDA (INDEX),Y
CMP #27
BEQ CHECKIT
CMP #14 ;DOES NUMBER FOLLOW?
BNE AHEAD
TYA
CLC
ADC #6 ;BUMP Y BY 6
TAY
AHEAD
LDA #0
BEQ ONGOTO ;IT'S AN ONGOTO COMMAND
CHECKIT
INY
TYA
CMP STATEOFFSET ;END OF STATEMENT?
BCS OUT
BCC ENTRYC ;FOUND ON GOSUB
OUT
RTS
    
```

```

CONVERTIT
LDA #0 ;COVERTS BCD LINE TO HEX
STA LINENO5 ;CLEAR 5 AND 6
STA LINENO6
JSR FPI ;FP TO INTEGER
LDA FRO ;GET THE INTEGER
STA REFLINE0 ;STORE IT
LDA FRO+1
STA REFLINEHI
RTS
RESEQH
BEQ RESEQ
CONVERTBACK
LDA FUTLINE
STA FRO
LDA FUTLINE+1
STA FRO+1
JSR IFP ;CONVERT HEX LINE TO BCD
LDA FLAG ;CHECK FLAG
CMP #1 ;IS IT TURNED ON?
BEQ RETURN
LDA SAVEY ;RESTORE Y
TAY
LDA LINENO1 ;STUFF LINE NUMBER
STA (INDEX),Y ;INTO BASIC CODE
INY
LDA LINENO2
STA (INDEX),Y
INY
LDA LINENO3
STA (INDEX),Y
INY
LDA LINENO4
STA (INDEX),Y
INY
INY
RTS
RETURN
LDA #0
STA FLAG
RTS
RESEQ
LDA POINTER ;ALL LINE REFERENCES
STA INDEX ;TAKEN CARE OF
LDA POINTER+1 ;NOW RESEQUENCE THE PROGRAM
STA INDEX+1
LDA BASE ;GET BASE NUMBER
STA CURLINE
LDA BASE+1
STA CURLINE+1
SPINNER
LDA INDEX ;SPIN THROUGH UNTIL THE END
SEC
SBC EOP ;END OF PROGRAM?
LDA INDEX+1
SBC EOP+1
BEQ ENDITALL ;YES (WHEW)
LDY #2
LDA (INDEX),Y ;GET LINE OFFSET
STA TEMP1 ;SAVE IT
LDA CURLINE ;GET CURRENT LINE NO
CLC
LDY #0
STA (INDEX),Y ;STORE IT
LDA CURLINE+1
INY
STA (INDEX),Y ;STORE HI BYTE
LDA CURLINE
ADC INCR ;INCREMENT IT
STA CURLINE
BCC @NEXT
INC CURLINE+1
@NEXT
CLC
LDA INDEX ;GO TO NEXT LINE
ADC TEMP1
STA INDEX
BCC @NOCARRY
INC INDEX+1
@NOCARRY
LDA #0
BEQ SPINNER
ENDITALL
RTS ;AT LONG LAST, THE END
    
```

```

;INSTALL Renumber Program
;by A. Giambra
;
;THIS PROCEDURE WILL MOVE THE
;RENUMBER CODE FROM HIGH MEMORY
;TO LOW MEMORY AND FIRE UP THE
;VERTICAL BLANK SERVICE ROUTINE
;
; * = 15000
;
; OS EQUATES
;
WARMST = 8
BOOT = 9
WARMSTART = $E474
SETVB = $E45C
CONSDL = $D01F
DOSVEC = $0A
HEMLD = 743
CH = 764
EXITVB = $E462
;
; WORK AREAS
;
LOMEM = $00
SWITCH = $02
IX2 = 6
IX3 = 3
INDEX = $04
IX = $CF
IX1 = $CD
SVE = $CB
PRINT = $00 ;BASIC WILL FILL THIS IN
;
; OFFSETS
;
DIFF = FINISH-VBROUTINE+1
OFFSET = MSG-VBROUTINE
OFFSET3 = READY-VBROUTINE
OFFSET1 = CR-VBROUTINE-1
OFFSETINDEX = INDEX-VBROUTINE
OFFSET2 = VBROUTINE-BEGIN
BEGIN
LDA #0 ;CLEAR WARMSTART FLAG
STA WARMST
STA SWITCH
LDA BOOT
BDA NODISK ;IF HE HAS A DISK
LDA # <WARMSTART ;CAUSE RESET
STA DOSVEC ;IF HE KEYS IN DOS
LDA # >WARMSTART
    
```

```

NODISK  STA DOSVEC+1
        PLA
        PLA
        STA IX+1      ;GET START ADDRESS
        PLA          ;OF RENUMBER
        STA IX
        PLA
        STA IX1+1    ;GET END ADDRESS
        PLA
        STA IX1
        SEC
        LDA MEMLO
        STA SVE      ;SAVE LOMEM ADDRESS
        SBC #1       ;IN ADDRESS 0
        STA LOMEM
        LDA MEMLO+1
        STA SVE+1
        SBC #0
        STA LOMEM+1
        LDY #0
        LDA (IX),Y   ;MOVE THE RENUMBER
        STA (SVE),Y ;UTILITY TO LOMEM
        CLC
        LDA SVE
        ADC #1       ;INCREMENT OUR INDEXES
        STA SVE
        BCC INCRINDEX
        INC SVE+1
INCRINDEX
        CLC
        LDA IX
        ADC #1
        STA IX
        BCC CHECK
        INC IX+1
CHECK   LDA IX+1
        CMP IX1+1   ;ARE WE DONE?
        BNE L       ;NOT YET
        LDA IX
        CMP IX1
        BNE L       ;NOT YET
        CLC
        LDA IX
        ADC #OFFSET2 ;POINT TO THE
        STA IX      ;VB INTERRUPT ROUTINE
        LDA IX+1
        ADC #0
        STA IX+1
        LDY #0
        LDA SVE      ;POINT INDEX TO MEMLO
        STA INDEX
        LDA SVE+1
        STA INDEX+1
MOVEVB  LDA (IX),Y   ;MOVE THE VB TO LOMEM
        STA (SVE),Y
        INY
        CPY #DIFF
        BNE MOVEVB
        CLC
        LDA SVE
        ADC #DIFF    ;BUMP THE LOMEM POINTER
        STA MEMLO   ;UP PAST OUR ROUTINES
        LDA SVE+1
        ADC #0
        STA MEMLO+1
        LDA #7
        LDY SVE
        LDY SVE+1
        JSR SETVB
        JMP #A000    ;JUMP TO BASIC
VBRoutine
        LDA CONSOL
        CMP #7
        BNE COMP
        LDA #0
        STA SWITCH
        BEQ RETURN
COMP   CMP #6
        BNE RETURN  ;DID THEY PRESS START
        LDA SWITCH  ;ARE THEY HOLDING IT
        BNE RETURN  ;DOWN? IF SO, JUST RETURN
        EOR #01
        STA SWITCH  ;SET THE SWITCH
        LDY #0
        CLC
        LDA INDEX   ;POINT TO THE BANNER MESSAGE
        ADC #OFFSET
        STA SVE
        LDA INDEX+1
        ADC #0
        STA SVE+1
MESS   STY IX3
        LDA (SVE),Y ;PRINT THE BANNER
        JSR PRINT   ;ADDRESS FIXED BY BASIC
        LDY IX3
        INY
        CPY #18
        BNE MESS
        CLC
        LDA INDEX   ;SET UP OUR RETURN ADDRESS
        ADC #OFFSET1&#xFF
        STA IX2
        LDA INDEX+1
        ADC #OFFSET1/256
        PHA
        LDA IX2
        PHA
        LDA #10     ;SET UP PARAMETERS
        PHA         ;FOR RENUMBER ON THE STACK
        LDA #0
        PHA
        LDA #10
        PHA
        LDA #0
        PHA
        LDA #2
        PHA
        LDA LOMEM+1 ;THIS IS WHERE RENUMBER LIVES
        PHA
        LDA LOMEM
        PHA
        RTS        ;THIS RTS CAUSES AN INDIRECT
                   ;JSR TO THE RENUMBER UTILITY
                   ;THIS IS WHERE RENUMBER RETURNS
CR     LDA #9B
        JSR PRINT
        LDY #0
        CLC
        LDA INDEX
        ADC #OFFSET3 ;POINT TO READY MESSAGE
        STA SVE
        LDA INDEX+1
        ADC #0
        STA SVE+1
LOOPER STY IX3
        LDA (SVE),Y ;PRINT READY
        JSR PRINT
        LDY IX3
        INY
        CPY #6
        BNE LOOPER
        LDA #143
        STA CH      ;SET BREAK FLAG
RETURN JMP EXITVB  ;EXIT VB
MSG    .BYTE 125
        .BYTE +$B0,"INSTANT"
        .BYTE " "
        .BYTE +$B0,"RENUMBER"
        .BYTE $9B
        .BYTE "READY", $9B
READY .FINISH

```

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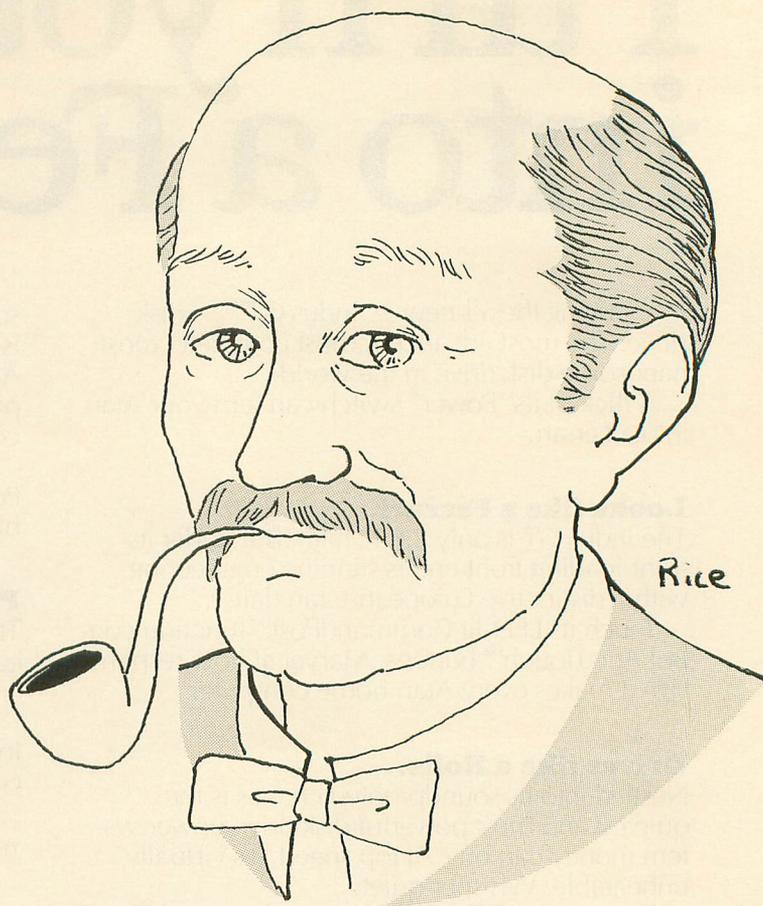
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Ask Mr. Forth



by Donald Forbes

The best way to demonstrate FORTH at the beginning of a new year is to present a program to draw calendars. This will be useful. You can add your own heading, print it on your printer and then distribute the calendar to promote your demonstration.

More importantly, the program serves as an enlightening example of how to structure a FORTH program to cope with a commonplace but tricky calculation. The program is in the public domain, thanks to Jesse Jay Wright of Pasadena, California, who contributed it to the November 1983 issue of *Forth Dimensions*.

Structuring the calendar.

The calendar problem is simply this: to match one of the seven days of the week to the day of the month and year. Since there are only seven days in the week, there are only seven yearly calendars of 365 days—because New Year's Day falls on one of them. However, leap year adds a second set of seven 366-day years, for a total of fourteen different yearly calendar setups. You can make a so-called perpetual calendar with a simple table of years to point you to one of the fourteen yearly calendars. This, of course, is a cop-out; we will try another way.

The first question to be answered is whether we've got a leap year or what is known as a "common" year.

The leap year dates to the time of Julius Caesar, when all years had 365 days. By then, the civil equinox differed from the astronomical by three months, so that the winter months were carried back into autumn, and the autumnal months into summer. Caesar tied the year to the rotation of the earth around the sun, once every 365¼ days, with a leap year every fourth year.

Actually, the solar year is only 365 days, 5 hours, 48 minutes and 46 seconds, so that by 1582 the calendar was again ten days out of synch. Pope Gregory then abolished the ten days from October 5th to 14th, and eliminated the leap years in three of every four century-years.

The British government waited until the calendar was eleven days out of line, then imposed the Gregorian calendar in England and America in 1752. Now we have the anomaly that Washington was not born on Washington's birthday. On his birthday (1731), the calendar read February 11, not February 22.

Pope Gregory's calendar is good until the year 4000, and skipping the leap year will make it good for another 3,000 years.

Here is the FORTH code to test for a leap year:

```

: IS_LEAP_YEAR? (year--flag)
  DUP DUP 400 MOD 0=
  SWAP 100 MOD 0= NOT OR
  SWAP 4 MOD 0= AND ;

```

First we put the year on the stack, then duplicate it twice to test for the century leap years. (Incidentally, you can enter the code on the screen line by line, pressing RETURN after the end of each line; your Atari will continue to compile the FORTH code until the final semicolon.) The swap makes the flag second on the stack, and the last line tests for divisibility by four. We can check the code as follows:

```

1983 IS_LEAP_YEAR? . 0 ok
1984 IS_LEAP_YEAR? . 1 ok
1985 IS_LEAP_YEAR? . 0 ok

```

The second question is: how many days are there in the month? My teacher told me to count the long and short months on the knuckles of the left hand, beginning with January on the index finger, March on the middle finger, and back to the index finger with August. Others prefer: "Thirty days hath September, April, June and November. . ."

On a computer, the solution is to set up a table like the one below:

```

: CTABLE <BUILDS 0 DO C, LOOP
DOES> + C@ ;
31 30 31 30 31 31
30 31 30 31 29 31 0
31 30 31 30 31 31
30 31 30 31 28 31 0
26 CTABLE DAYS_IN_MONTH
( month -- days in month )

```

We can test it easily enough by giving the number of any month:

```

1 DAYS_IN_MONTH . 31 ok
11 DAYS_IN_MONTH . 30 ok
2 DAYS_IN_MONTH . 28 ok

```

This innocent-looking table is actually an example of the most sophisticated feature of FORTH—and a monument to the genius of its inventor, Dr. Charles H. Moore. FORTH, unlike any other language, lets you create your own structures, so that you aren't bound by the restrictions imposed by the architects of BASIC and Pascal and FORTRAN and the rest, but can build the language to suit your own needs. In this respect, FORTH stands alone.

In the words of Chuck Moore: "If you are taking a course in computers which is taught in Pascal, you mostly don't learn about computers; you learn about Pascal. You learn about how a certain class of people think programs should be written and algorithms defined. But you don't learn much about the computer underneath the software. Take the same course in FORTH. FORTH is more transparent, and you would focus more closely on the problem, on the ways of solving it, than on the theory of computation. . . FORTH lets you get directly to that part of the problem instead of getting bound up in compilers and subroutines and things which aren't of fundamental interest."

The <BUILDS DOES> construct lets you build

your own structures. How? You don't lead a blind man to the cliff and then walk away. Here is a brief, one-paragraph explanation which you can offer your audience as a downpayment on the full-page explanation to which they are entitled.

The words <BUILDS and DOES> allow you to create new structures which have both a compile-time and a run-time behavior. If, for instance, you define the word

```

: VECTOR <BUILDS , , DOES> 2@ ;

```

then, during compilation, a phrase such as

```

41 270 VECTOR WIND

```

will place an entry named WIND in the dictionary and store (using , , or comma comma) two values after the name. (By the way, 2@ in fig-FORTH is DUP 2+ @ SWAP @.) When the program is run, then WIND will place the two numbers 41 and 270 on the stack. In our case, <BUILDS uses a DO. . . LOOP to create the 26-byte table, and DOES> lets DAYS_IN_MONTH retrieve the proper byte. That is the story in a tiny nutshell.

The third question we must answer is: what is the day of the year, given the day, month and year? Here is where we use both the leap year routine and the table of days in each month. You can, if you need to, replace 2DUP with OVER OVER and 2DROP with DROP DROP, which are actually the fig-FORTH versions of two words belonging to the FORTH-79 double number extension word set.

```

: DAY_OF_YEAR
( day, month, year -- day of year)
IS_LEAP_YEAR?
IF 13 + 14 ELSE 1 ENDIF
2DUP = IF 2DROP
ELSE DO I DAYS_IN_MONTH
+ LOOP ENDIF ;

```

What the code does is test for a leap year to convert the offsets in the table, or else start at month one. The second IF looks for January and returns the day, or else loops to cumulate the days in each of the preceding months. We can test the program this way:

```

1 1 1983 DAY_OF_YEAR . 1 ok
31 12 1984 DAY_OF_YEAR . 366 ok
31 12 1985 DAY_OF_YEAR . 365 ok

```

Now we are in a position to answer the question we posed in the first place: what is the day of the week, given the day, month and year? All we need do is cumulate the number of days from, say, New Year's Day in 1900 (which was a Monday) and then divide by seven to get the day of the week (counting up from Sunday as zero).

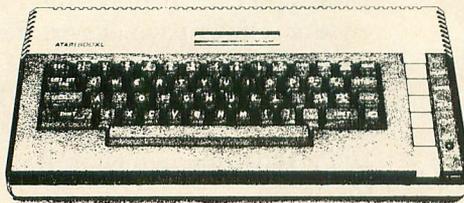
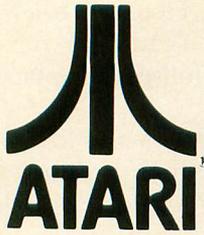
```

: DAY_OF_WEEK
( day, month, year -- day of week )
( where sunday is 0)
DUP >R DAY_OF_YEAR 0
R> 1900 DO
I IS_LEAP_YEAR?
IF 366 + ELSE 365 + ENDIF
LOOP +
7 MOD ;

```

Here we save the year on the return stack, get the

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CIRCLE #113 ON READER SERVICE CARD

current day of the year, add 365 or 366 days for each year since 1900, and then take the remainder after dividing by seven. Since we are dealing with signed numbers, we can cumulate a maximum of 32,767 days or a little more than 89 years from whichever year we choose as the starting point in which New Year's Day falls on a Monday (such as 1951, 1962 or 1973).

The code makes clever use of the stack. A stack diagram comes in handy now, just to make everything clear.

FORTH code has often been criticized as difficult to read. "FORTH programs tend to be dense and hard to read," according to Charles F. Taylor in his *Master Handbook of High-Level Microcomputer Languages*. He says, "understanding a FORTH program written by someone else often requires a great deal of tedious effort to track stack effects, and so on. Some would call FORTH a 'write only' language."

The solution is a technique to keep track of the stack, such as the one in *The Complete Forth* by Alan Winfield. "I promised to describe a technique for illustrating the stack during program execution, and it is just such a technique which we would use to clarify the operation. . . The technique is to list vertically each word in the body of the colon definition. Then look up each word, in turn, in the FORTH Handy Reference, noting that word's stack effect. The author has found this stack notation invaluable in developing FORTH programs with complex stack manipulations and, far from being cumbersome, the technique soon becomes rapid as familiarity is gained. In particular, the experienced FORTH programmer will not have to refer often to the Handy Reference, and will place words. . . in groups of more than one, where the stack effect is very clear (or none at all), so that the whole diagram is much simplified."

```

WORD      STACK      ACTION
: DAY_OF_WEEK  31 12 1984
  (day, month, year--day of week)
  DUP          31 12 1984 1984
  (add a copy of year to stack)
  >R           31 12 1984
  (store year on return stack)
  DAY_OF_YEAR  366
  (change date to day of year)
  0            366 0
  (zero a counter to sum the days)
  R>           366 0 1984
  (recover year from return stack)
  1900         366 0 1984 1900
  (beginning year for count)
  DO           366 0
  (limit & index on return stack)
  I            366 0 1900
  (push index to stack)
  IS_LEAP_YEAR? 366 0 flag
  (set true flag for leap year)
  IF 366 +     366 total-days
  (add 366 to total-days if true)
  ELSE 365 +   366 total-days
  (add 365 to total-days if false)
  ENDIF LOOP + total-days
  (count days since Jan 1, 1900)
  7 MOD ;
  ( 31046 / 7 = 1 for a Monday)
    
```

Since we can now pinpoint the days of the week,

we can print out a calendar for any month in any appropriate year.

```

: CALENDAR ( month, year-- )
  ( print calendar for month )
  2DUP SWAP
  10 SPACES . " - " . CR
  ." Sun Mon Tue Wed"
  ." Thu Fri Sat " CR
  2DUP 1 ROT ROT DAY_OF_WEEK
  DUP 2* 2* SPACES
  ROT ROT
  IS_LEAP_YEAR? IF 13 + ENDIF
  DAYS_IN_MONTH
  1+ 1 DO
  I 4 .R
  1+ DUP 7 = IF CR ENDIF 7 MOD
  LOOP 0= NOT IF CR ENDIF CR ;
    
```

To test it, we can try:

12 1984 CALENDAR

which produces a calendar that looks like this:

12 - 1984						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

We now have all the inputs to print a calendar for a whole year with just a twelve-month loop:

(continued on next page)

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CHECK OR MONEY ORDER

```

: CALENDAR_YEAR ( year -- )
  13 1 DO DUP I SWAP
  CALENDAR_LOOP DROP ;

```

And there you have it! You can dress it up any way you please. You might want to set up a table of constants to let you input the name of the month, instead of the number (JANUARY CONSTANT 1...). Or a table to print the name, rather than the number of the month. You might also like to add a message at the end or at the beginning.

Make it colorful.

No demonstration, however, can be complete without an illustration of Atari's lasting claim to fame—superb color graphics.

Two years ago, Herb Kohl and Ted Kahn brought out a book called *Atari Games and Recreations*, an engaging 338-page tutorial on Atari and BASIC, complete with comic book cartoons. One feature recreates a fable of the George (Animal Farm) Orwell of 2500 years ago, the Greek slave Aesop, who told of "the classic race between the Tortoise and the Hare. The old, plodding, deliberate Tortoise is challenged to a race by the speedy Hare. The Tortoise is steady, regular and sometimes painfully slow. The Hare is fast but erratic. It jumps all around, is impatient and, in the original Greek fable, is foolish. The Hare runs too fast for itself. . ."

Here is a FORTH version which will execute in any fig-FORTH with 1 LOAD 2 LOAD 3 LOAD TORTOISE, and needs no commentary. As the lawyers say, *res ipse loquitur*—"the thing speaks for itself." □

```

SCR #1
( tortoise and hare df841016)
: RND# ( random number )
  53770 CE SWAP /MOD DROP ;
: J ( index of outer loop )
  R> R> R> R R#
  >R >R >R R# e ;
: CLEAR_SCREEN 125 EMIT ;
: DELAY 0 DO LOOP ;
: INITIAL 7 GR. 1 COLOR
  CLEAR_SCREEN ." A race!! "
  ." Tortoise versus the Hare!!"
  CR 3000 DELAY
  ." On your marks, get set,"
  ." GO ! ! !!"
  CR 3000 DELAY ; ;5

```

```

SCR #2
( tortoise and hare df841016)
: COMMENTS ( checks column # )
  DUP 10 = IF CR
  ." Place your bets, folks !!"
  CR ENDIF
  DUP 40 = IF CR
  ." Want to change your bets???"
  CR ENDIF
  DUP 65 = IF CR
  ." It's down to the wire...!!!"
  CR ENDIF
  DUP 75 = IF CR
  ." And the winner is...???"
  CR ENDIF 77 = IF CR
  ." Guess who...!!!"
  CR ENDIF ; ;5

```

```

SCR #3
( tortoise and hare df841016)
: FINALE CLEAR_SCREEN

```

```

." Once again, "
." ORDER triumphs over CHAOS!"
QUIT ;
: TORTOISE_INITIAL
  79 0 DO 75 0 DO
  ( tortoise )
  J I PLOT
  J I 4 + DRAWTO
  J ( col # on stack ) COMMENTS
  ( hare )
  79 RND# 80 + 79 RND# PLOT
  79 RND# 80 + 79 RND# DRAWTO
  5 +LOOP LOOP FINALE ; ;5

```

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The Atari SIG has logged over 100,000 calls—with over 60,000 messages posted! They have a staff of highly competent SYSOPs, headed up by Ron Luks, who are more than happy to help you. Their program database contains well over a megabyte (that's one million bytes, folks!) of Atari programs that can be downloaded into your computer.

So, if you need to get in touch with ANALOG Computing, you can now do it through CompuServe. Our user numbers are:

Tom Hudson 70775,424
 Charles Bachand 73765,646
 Art Leyenberger 71266,46

Extending Your DOS Directory

24K Disk

by Roland S. Chan

The limitations of the length of the Atari DOS directory name and its naming convention pose difficulties for my little son. Not being able to find a suitable alternative, I decided to develop this **Extended Directory** program.

What it does.

The main functions are: (1) expanding the DOS directory name and extension from eleven to thirty characters; (2) allowing the combination of alphabetic, numeric, blank and special characters; (3) displaying up to twenty-five program or file names and one option in menu format; (4) loading and running BASIC programs and DOS, using one keystroke; and (5) automated handling of any DOS directory entry changes. The bonus: it does all this in a user-friendly way.

Getting started.

Key and transfer the **Extended Directory** to a disk containing BASIC software. Initial program execution, then display program menu in the old DOS directory format, with an option to create **Extended Directory** names.

Creating.

The **Extended Directory** prompts you to enter the desired name for each file in the DOS directory. After the entire renaming process is completed, an **Extended Directory** file (EXTDIRNM.DAT) is created.

Finally. . .

A maximum of thirteen program or file names is displayed per page. The last menu entry allows modification to the **Extended Directory** names. A message is displayed to indicate page overflow (if any) and how to page forward or backward.

Subsequent running of the **Extended Directory** will initiate comparison of program or file names in the **Extended Directory** file with the DOS directory. Programs or files on the DOS directory, but not on the **Extended Directory** file, initiate prompting for the creation of the missing **Extended Directory** name. Programs or files on the **Extended Directory**, but not on the DOS directory, are purged from the **Extended Directory** file. □

```

10 REM *****
20 REM * EXTENDED DIRECTORY *
30 REM * BY ROLAND S. CHAN MARCH 84*
40 REM * MISSISSAUGA , ONTARIO *
50 REM *****
60 REM
70 REM BRANCH TO MAINLINE
80 GOTO 2970
82 REM *****
84 REM * SUBROUTINES STARTS HERE *
86 REM *****
90 REM -SCRNDSP-
100 REM SCREEN DISPLAY ROUTINE
110 REM (HDG) = 0 ,DISPLAY HEADING
120 IF HDG THEN HDG= NOT SET:GOTO 150
130 REM PRINTS HEADING

```

```

140 ? "K":? "EXTENDED DIRECTORY BY R
Oland S Chan":? :POKE 752,N1
150 REM (DTL) SETS THE DETAIL LINES
160 ON DTL GOTO 170,240,260,280,300,35
0,370,390,410,510
170 REM (DTL)=1,DISPLAY MODIFY MESSAGE
5
180 POSITION N5,N5:?"MODIFY EXTENDED
DIRECTORY NAME"
190 POSITION N3,N7:?"Dos Directory"
200 POSITION N2,N8:?"EXTNAME$(BEGIN,BE
GIN+ORECSIZE-N1)
210 POSITION N3,N11:?"Extended Direct
ory"
220 POSITION N4,N12:?"EXTNAME$(BEGIN+O
RECSIZE,BEGIN+RECLENGTH-N1)
230 POSITION N2,N16:?"ENTER YES TO CH
ANGE DIRECTORY NAME,":GOTO 660
240 REM (DTL)=2,DISPLAY CREATE EXTENDE
D DIRECTORY.
250 POSITION N5,N4:?"Enter Extended D
irectory Name":GOTO 660
260 REM (DTL)=3,DISPLAY CREATING DATA
BASE
270 POSITION N5,N5:?"CREATING EXTENDE
D DATA BASE":POSITION N10,N8:?"PLEASE
WAIT...":GOTO 660
280 REM (DTL)=4,DISPLAY CHOICE
290 ? :?"Please Enter Choice,":GOTO
660
300 REM (DTL)=5,DISPLAY BAD LOAD FILE
310 POSITION N12,N14:?"LOADING ERROR
":GOTO 660
350 REM (DTL)=6,DISPLAY MESSAGE LOAD
360 POSITION N4,N10:?" :?" Loading ";F
ILENAME$:" PLEASE WAIT,":GOTO 660
370 REM (DTL)=7,DISPLAY ERROR MESSAGE
380 ? :?"INVALID ...PLEASE TRY AGAIN
":GOTO 660
390 REM (DTL)=8,DISPLAY CREATE EXTENDE
D DIRECTORY.
400 POSITION N5,N4:?"Enter Extended D
irectory Name":GOTO 660
410 REM (DTL)=9,DISPLAY TITLE PAGE
420 ? "K":GRAPHICS M1+16
430 POSITION N1,N4:?"#N6;"EXTENDED DIR
ECTORY"
440 WAIT=100:GOSUB DELAY
450 GRAPHICS N2+16
460 POSITION N1,N2:?"#N6;"EXTENDED DIR
ECTORY"
470 WAIT=150:GOSUB DELAY
480 POSITION N2,N4:?"#N6;"analog compu
ting"
490 POSITION N4,N10:DL=PEEK(560)+PEEK(
561)*256+6+9:POKE DL,6
500 ? #N6:"Please Wait":GOTO 660
510 REM (DTL)=10,DISPLAY MENU
520 REM DBFND=0 DOS DIRECTORY
530 REM =1 EXTENDED DIRECTORY
540 POSITION N12,N3:?"FSECT$:"
550 FOR LOOP=MENUSTART TO MENUEND
560 PTR=(LOOP*RECLENGTH)-RECLENGTH+N1
570 IF DBFND THEN BEGIN=PTR+ORECSIZE:F
IN=BEGIN+ORECSIZE-N1
580 IF NOT DBFND THEN BEGIN=PTR+N2:FI
N=BEGIN+N11
590 CHAR=LOOP+N64:CHAR$=CHR$(CHAR)
600 ? CHAR$,".":EXTNAME$(PTR,PTR+N1);E
XTNAME$(BEGIN,FIN);EXTNAME$(PTR+N14,PT
R+N16)
610 NEXT LOOP
620 IF MENUEND<NOFILES THEN POSITION N
8,N20:?"HIT RETURN FOR NEXT PAGE"
630 IF MENUEND<NOFILES THEN 660
640 CHAR=LOOP+64:CHAR$=CHR$(CHAR):? CH
AR$;
642 IF DBFND THEN ? ". MODIFY DIRECTO
RY NAME"
644 IF NOT DBFND THEN ? ". CREATE EX
TENDED DIRECTORY"
650 IF NOFILES>N14 THEN POSITION N6,N2
0:?"HIT RETURN FOR LAST PAGE"
660 RETURN
670 REM - DELAY -
680 REM DELAY ROUTINE
690 FOR TIMER=NO TO WAIT

```

```

700 NEXT TIMER
710 RETURN
720 REM -EXECNAME-
730 REM BUILD EXECUTABLE NAME
740 EXCPTR=N3:FILENAME$="D:
"
750 BEGIN=(KSTROKE*RECLENGTH)-RECLENGT
H+N3
760 FOR LOOP=BEGIN TO BEGIN+N10
770 IF EXTNAME$(LOOP,LOOP)=BLANK$ THEN
810
780 IF LOOP<>BEGIN+N8 THEN 800
790 FILENAME$(EXCPTR,EXCPTR)="":EXCPTR
R=EXCPTR+N1
800 FILENAME$(EXCPTR,EXCPTR)=EXTNAME$(
LOOP,LOOP):EXCPTR=EXCPTR+N1
810 NEXT LOOP
820 RETURN
1030 REM - LDDBASE -
1040 REM READS EXTENDED DIRECTORY DATA
BASE. MATCH DOS DIRECTORY AND STORE.
1080 CLOSE #DSKCHNL:OPEN #DSKCHNL,RDONLY,
NO,EXTFILE$
1090 TRAP 1180:DBFND=N1
1100 FOR RDLOOP=N1 TO MAXFILE
1110 INPUT #DSKCHNL:EXTDATA$
1120 FOR MTHLOOP=N1 TO NOFILES
1122 IF MTHFLG(MTHLOOP) THEN 1160
1125 BEGIN=(MTHLOOP*RECLENGTH)-RECLEN
GTH+N3
1130 IF EXTDATA$(N3,ORECSIZE)<>EXTNAME
$(BEGIN,BEGIN+ORECSIZE-N3) THEN 1160
1140 EXTNAME$(BEGIN+ORECSIZE-N2,BEGIN+
RECLENGTH-N3)=EXTDATA$(ORECSIZE+N1,REC
LENGTH)
1150 MATCH=MATCH+N1:MTHFLG(MTHLOOP)=5
ET:MTHLOOP=NOFILES+N1
1160 NEXT MTHLOOP
1170 NEXT RDLOOP
1180 RETURN
1190 REM - RDDIR -
1200 REM READS DISK DIRECTORY
1210 TRAP 1330:CLOSE #DSKCHNL:OPEN #DS
KCHNL,DIRONLY,NO,"D:*.*"
1220 NOFILES=N0
1230 FOR RDLOOP=N1 TO 65
1240 INPUT #DSKCHNL,ORECNAME$
1250 IF ORECNAME$(N5,N16)="FREE SECTOR
5" THEN FSECT$=ORECNAME$:GOTO 1320
1260 IF NOFILES=MAXFILE THEN 1320
1270 NOFILES=NOFILES+N1
1280 MTHFLG(NOFILES)=NOT SET
1290 BEGIN=(RDLOOP*RECLENGTH)-RECLENGT
H+N1
1300 EXTNAME$(BEGIN,BEGIN+ORECSIZE-N1)
=ORECNAME$
1310 IF ORECNAME$(N3,N13)<>"EXTDIRNMDA
T" THEN 1320
1315 EXTNAME$(BEGIN+ORECSIZE,BEGIN+REC
LENGTH-N1)="EXTENDED DIRECTORY FILE":M
THFLG(NOFILES)=SET:MATCH=N1
1320 NEXT RDLOOP
1330 RETURN
1340 REM - KEYINIT -
1350 REM INITIALIZE KEYBOARD / SCREEN
1360 CLOSE #KBCHNL:CLOSE #SCRNCHNL
1370 OPEN #KBCHNL,RDONLY,NO,"K:"
1380 OPEN #SCRNCHNL,WRONLY,NO,"S:"
1390 RETURN
1400 REM - KEYECHO -
1410 REM INPUT FROM KEYBOARD AND ECHO
1420 REM TO THE SCREEN
1430 FOR KEYLOOP=N1 TO NOSTROKE
1440 GET #KBCHNL,KSTROKE
1445 IF KSTROKE=CRTN OR NOT ECHO THEN
1480
1450 PUT #SCRNCHNL,KSTROKE
1460 KSTROKE=KSTROKE-N64
1470 NEXT KEYLOOP
1480 RETURN
1910 REM -CREXTDIR-
1915 REM CREATE EXTENDED DIRECTORY
1920 NOSTROKE=N1:ECHO=NOT SET:DTL=N2:
GOSUB KEYINIT:GOSUB SCRNDSP
1930 FOR LOOP=N1 TO NOFILES
1940 IF MTHFLG(LOOP)=SET THEN 2060

```

```

1950 MTHFLG(LOOP)=SET:BEGIN=(LOOP*RECL
ENGT)-RECLENGTH+N1
1960 POSITION N2,N8:? EXTNAME$(BEGIN,B
EGIN+ORECSIZE-N1)
1970 NWNAMES=BLANK$:PTR=N1
1980 POSITION N8,N12:? "
"
1990 REM POKE 702,64:POKE 694,N0
2000 TRAP 1970:POSITION N3,N12:? "NAME
":GOSUB KEYECHO:POSITION N3,N12:? KSTR
OKE:POSITION N3,N12:? "NAME"
2005 IF KSTROKE=CRTM THEN 2050
2010 IF KSTROKE=126 THEN NWNAMES(PTR-N
1)="":PTR=PTR-N1:POSITION N8,N12:? NW
NAMES;"":GOTO 2000
2020 IF KSTROKE<32 OR KSTROKE>122 THEN
1970
2030 NWNAMES(PTR,PTR)=CHR$(KSTROKE)
2040 IF LEN(NWNAMES)>ERECSIZE THEN 197
0
2045 POSITION N8,N12:? NWNAMES:PTR=PTR
+N1:GOTO 2000
2050 IF LEN(NWNAMES)=N1 AND NWNAMES(N1
,N1)=BLANK$ THEN 1970
2055 EXTNAME$(BEGIN+ORECSIZE,BEGIN+REC
LENGTH-N1)=NWNAMES:MTHFLG(LOOP)=SET
2060 NEXT LOOP
2070 RETURN
2080 REM -CRDBASE-
2090 REM WRITE THE EXTENDED DIRECTORY
2110 DTL=N3:GOSUB SCRNDSP
2120 CLOSE #DSKCHNL:OPEN #DSKCHNL,WRT0
NLY,N0,EXTFILES$
2130 BEGIN=N1:TRAP 40000
2140 FOR LOOP=N1 TO NOFILES
2150 ? #DSKCHNL;EXTNAME$(BEGIN,BEGIN+R
ECLNGTH-N1)
2160 BEGIN=BEGIN+RECLENGTH
2170 NEXT LOOP
2175 CLOSE #DSKCHNL
2180 RETURN
2560 REM -MODIFY-
2570 REM RENAME DIRECTORY
2580 GOSUB KEYINIT:NOSTROKE=N1:ECHO=SE
T:NOCHG=SET
2590 FOR LOOP=N1 TO NOFILES
2600 MTHFLG(LOOP)=SET:BEGIN=(LOOP*RECL
ENGT)-RECLENGTH+N1
2640 DTL=N1:GOSUB SCRNDSP:GOSUB KEYECH
0
2650 IF KSTROKE<>Y THEN 2700
2660 FOR PTR=BEGIN+ORECSIZE TO BEGIN+R
ECLNGTH-N1
2670 EXTNAME$(PTR,PTR)=BLANK$
2680 NEXT PTR
2690 MTHFLG(LOOP)= NOT SET:NOCHG= NOT
SET
2700 NEXT LOOP
2710 RETURN
2970 REM *****
2980 REM MAINLINE STARTS HERE *****
2990 REM *****
3000 N0=0:N1=1:N2=2:N3=3:N4=4:N5=5:N6=
6:N7=7:N8=8:N9=9:N10=10:N11=11:N12=12:
N13=13:N14=14:N16=16:N20=20
3010 DSKCHNL=N1:KBCHNL=N2:SCRNCHNL=N3:
RONLY=N4:DIRONLY=N6:WRTONLY=N8:CRTN=1
55:Y=25:N64=64:N100=100
3020 ORECSIZE=17:MAXFILE=25:SET=N1:MAX
PAGE=N13:DBFND=N0
3030 DIM ORECNAMES(ORECSIZE),FSECTS(OR
ECSIZE)
3040 REM SUBROUTINE BRANCH ADDRESSES
3050 RDDIR=1190:LDDBASE=1030:KEYINIT=1
340:KEYECHO=1400:DELAY=670:MODIFY=2560
3060 SCRNDSP=90:CREXTDIR=1910:CRDBASE=
2080:EXECNAME=720
3070 REM PRINT TITLE PAGE
3080 HDR=SET:DTL=N9:GOSUB SCRNDSP
3120 REM INITIALIZE PROGRAM BUFFERS
3130 ERECSIZE=30:RECLENGTH=ORECSIZE+ER
ECSIZE:BUFSIZE=RECLENGTH*MAXFILE
3140 DIM EXTNAME$(BUFSIZE),BLANK$(N1),
MTHFLG(MAXFILE),CHAR$(N1),FILENAME$(N1
4),EXTFILES$(N14)
3150 BLANK$=" ":EXTFILES$="D:EXTDIRNM.D
AT":MATCH=N0

```

```

3160 EXTNAME$=BLANK$:EXTNAME$(BUFSIZE)
=BLANK$:EXTNAME$(N2)=EXTNAME$
3170 REM LOAD FILENAMES FROM DIRECTORY
3180 GOSUB RDDIR
3200 REM LOAD EXTENDED DIRECTORY DATA
BASE
3210 DIM OLDNAME$(ORECSIZE),NWNAMES(ER
ECSIZE),EXTDATA$(RECLENGTH)
3220 TRAP 3370:NOCHG= NOT SET:GOSUB LD
DBASE
3230 IF MATCH=NOFILES THEN 3370
3235 CLOSE #DSKCHNL:XIO 36,#DSKCHNL,N0
,N0,EXTFILES$
3330 REM CALL CREATE DIRECTORY ROUTINE
3335 IF NOCHG THEN 3370
3340 GOSUB CREXTDIR:DBFND=N1
3350 REM WRITE EXTENDED DIRECTORY FILE
3360 GOSUB CRDBASE
3370 REM DISPLAY DIRECTORY MENU
3390 MENUSTART=N1:MENUEND=MAXPAGE
3400 IF NOFILES<MENUEND THEN MENUEND=N
OFILES
3410 GOSUB KEYINIT:DTL=N10:GOSUB SCRND
SP:HDG=SET:DTL=N4:GOSUB SCRNDSP:NOSTRO
KE=N1:ECHO=SET:GOSUB KEYECHO
3415 IF KSTROKE<>CRTM THEN 3430
3420 IF MENUEND<>NOFILES THEN MENUSTAR
T=MENUSTART+MENUEND:MENUEND=MENUEND+MA
XPAGE:GOTO 3400
3425 IF MENUEND=NOFILES THEN 3370
3430 WAIT=30:GOSUB DELAY
3435 IF DBFND AND KSTROKE=NOFILES+N1 T
HEN GOSUB MODIFY:GOTO 3330
3437 IF NOT DBFND AND KSTROKE=NOFILES
+N1 THEN 3340
3440 IF KSTROKE<MENUSTART OR KSTROKE>M
ENUEND THEN HDG=SET:DTL=N7:GOSUB SCRND
SP:WAIT=N100:GOSUB DELAY:GOTO 3410
3460 REM BUILD EXECUTABLE NAME
3470 GOSUB EXECNAME
3480 TRAP 3520:DTL=N6:GOSUB SCRNDSP
3490 IF FILENAME$(N1,N9)="D:DO5.5Y5" T
HEN WAIT=N100:GOSUB DELAY:POKE 1791,N1
:POKE 1791,N0:DO5
3500 RUN FILENAME$
3510 END
3520 REM FILE LOAD ERROR
3530 HDG=SET:DTL=N5:GOSUB SCRNDSP:WAIT
=N100:GOSUB DELAY
3540 GOTO 3370
3550 TRAP 3590:DTL=N6:GOSUB SCRNDSP
3560 IF FILENAME$(N1,N9)="D:DO5.5Y5" T
HEN WAIT=N100:GOSUB DELAY:POKE 1791,N1
:POKE 1791,N0:DO5
3570 RUN FILENAME$
3580 END
3590 REM FILE LOAD ERROR
3600 HDG=SET:DTL=N5:GOSUB SCRNDSP:WAIT
=N100:GOSUB DELAY
3610 GOTO 3380

```

CHECKSUM DATA.

(see page 8)

10 DATA	532,495,813,591,540,261,920,69
2,451,22,463,802,862,120,39,7603	
130 DATA	0,688,626,192,332,954,715,550
,817,802,581,640,142,856,268,8163	
280 DATA	701,336,487,399,994,559,721,5
39,663,131,449,291,250,425,487,7432	
460 DATA	257,449,56,455,250,261,103,11
6,237,724,413,306,783,663,941,6014	
610 DATA	223,368,383,574,572,697,735,6
09,728,264,255,132,596,34,393,6563	
740 DATA	711,973,407,791,120,5,161,227
,601,694,309,218,871,43,105,6236	
1120 DATA	685,751,119,534,167,542,645,
527,790,183,46,841,165,305,863,7163	
1250 DATA	67,396,214,957,900,479,99,31
4,528,791,799,448,798,27,516,7333	
1390 DATA	797,746,479,438,518,401,921,
739,532,461,799,561,435,116,710,8653	

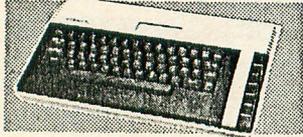
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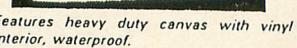
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 37,184,787,752,186,782,217,212,8449
 2060 DATA 978,788,779,629,759,227,58,6
 89,579,576,982,817,792,457,873,9983
 2580 DATA 308,706,937,559,904,18,907,9
 1,578,993,803,471,509,473,382,8639
 3010 DATA 467,668,282,64,976,484,882,6
 78,680,308,787,370,304,872,412,8234
 3200 DATA 258,875,946,281,556,851,754,
 47,949,551,313,845,151,654,374,8405
 3420 DATA 27,463,322,877,712,55,611,84
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 3550 DATA 791,88,605,280,145,792,744,3
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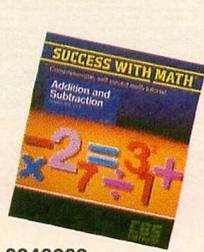
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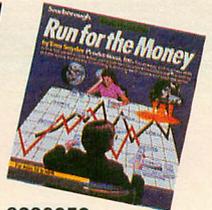
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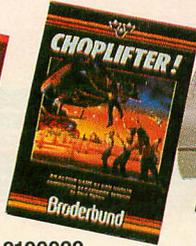
8172052
Master Type
C-64, Atari H.C.: disk and cart; Apple: disk.



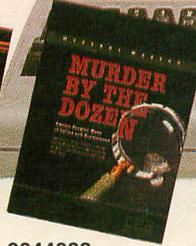
8230052
Run For The Money
C-64, Atari H.C. and Apple: disk.



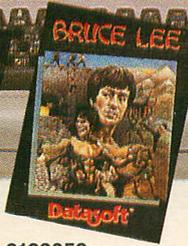
8122062
Pitfall II
Adam, Atari H.C.: cart; C-64: disk and cart.



8100022
Choplifter
C-64, Atari H.C.: disk and cart; Apple: disk.



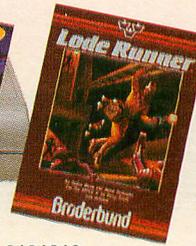
0044082
Murder By The Dozen
C-64, Apple: disk.



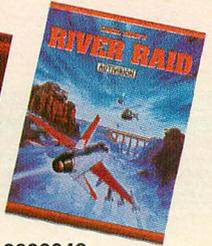
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Bruce Lee
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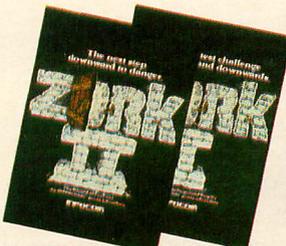
8216032
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C-64, Atari H.C. and Apple: disk.



8101012
Lode Runner
C-64, Atari H.C.: disk and cart; Apple: disk.



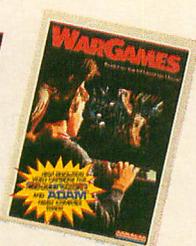
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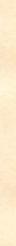
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Screenmaker

16K Disk

by Vern L. Mastel

This is a screen formatting program that will run on any Atari computer with at least 16K and a disk drive. Screen formatting can be one of the most time-consuming and memory-intensive parts of developing a program. Print and position statements are the generally accepted method of handling screen displays.

Screenmaker is an alternative to this conventional approach. You create the display, using the character set of the Atari, and then save it to a disk file. This file is essentially a "snapshot" of the screen and can be recalled at any time. The process of storage or retrieval takes less than two seconds, and the BASIC code which handles I/O takes very little space.

How.

In direct mode, the Atari will print on the screen any and all characters entered from the keyboard. You can create all sorts of pictures using graphics characters. If the RETURN key is pressed, however, the computer tries to interpret what has been entered and delivers a SYNTAX ERROR to the user.

Screenmaker avoids this problem by intercepting all of the characters from the keyboard, examining them and then printing to the screen.

The RETURN and ESCAPE keys are used as command keys. RETURN functions as the SAVE screen command; and ESC, the LOAD screen command. All other characters are passed on, to be printed to the screen. You retain full cursor control and don't have to give up any printable characters.

Screenmaker makes use of the built-in capability of the Atari to move a block of data to or from a disk file without the help of BASIC. The CIO (central in/out) does the work; all it needs to know are the specifics of the move—how many bytes to move, the source and destination. Table 1 contains all of the locations used by the OS for doing direct I/O via the CIO.

Table 1.

IOCB#	ICCOM	ICBLL	ICBLH	ICBAL	ICBAH
1	850	856	857	852	853
2	866	872	873	868	869
3	882	888	889	884	885
4	898	904	905	900	901
5	914	920	921	922	923
6	Priority given to device S:				
7	Priority given to LPRINT and LOAD				

The locations are as follows:

IOCB# — The I/O control block number.

ICCOM — This location contains the command for what is to be done. A 7 specifies read bytes (for example, POKE 850,7), while an 11 specifies write bytes.

ICBLL — Low byte of the total number of bytes to be moved.

ICBLH — High byte of the number of bytes to be moved.

ICBAL — Low byte of the memory location where the data is to be moved from (as in the case of a disk save), or where the data is to be put (disk load).

ICBAH — High byte of the target address.

Once these locations have been POKEd with the correct values, the entire process is set into motion with a **USR** call to the OS. Note that only the top twenty lines of the text screen are saved by **Screenmaker**. This was intentional; it leaves the bottom four lines for command and user input within a program.

Creations of **Screenmaker** can be loaded from **BASIC** very easily. The complete listing of necessary code is in Listing 2. Just be sure that you match the control block chosen with the value contained in the **USR** call.

Using Screenmaker.

To use the program, all you need to do is **RUN** it. The screen will go blank except for the cursor, which you control. You can move it anywhere on the screen—all of the cursor controls still work. So do the **INSERT** and **DELETE** line keys, the **INSERT** and the **BACKSPACE** keys and the **CLEAR SCREEN** command.

You can use the graphics characters to create pic-

tures, insert text where desired and, at any time, save the screen to disk.

Only two commands are needed. **RETURN** is used to save a screen to disk. You must specify the filename in the form **D(1 or 2):FILENAME**. To **LOAD** any screen, press the **ESC** key and enter the filename in the same form. Each screen takes up only seven sectors of disk space, so the chance of filling up a disk with screens is rather remote.

Program description.

Lines 10-50 do all of the initialization.

Lines 60-90 handle the characters coming from the keyboard. **RETURN** and **ESC** are used for command.

Lines 100-110 prompt for filename to save or load.

Lines 300-370 set up the parameters for the direct call to the **CIO**. Here **IOCB#1** is used.

Lines 380-390 clear off the bottom of the screen.

Lines 400-440 handle errors and keep the program on track.

I'll leave you with a thought: imagine what could be done with **Screenmaker** and a custom character set. Think of the effort that could be saved in setting up displays. □

Listing 1.

```

10 DIM F$(16),ML$(7)
20 FOR X=1 TO 7:READ A:ML$(X)=CHR$(A):
NEXT X
30 DATA 104,104,104,170,76,86,228
40 PRINT CHR$(125)
50 TRAP 400:OPEN #2,4,0,"K:"
60 GET #2,KC:IF KC=155 THEN DIR=11:IO=
8:GOTO 110
70 IF KC=27 THEN DIR=7:IO=4:GOTO 100
90 PRINT CHR$(KC)::GOTO 60
100 POSITION 2,21:? "INPUT FILE NAME T
O LOAD=>":INPUT F$:GOTO 300
110 POSITION 2,21:? "INPUT FILE NAME T
O SAVE":INPUT F$
300 OPEN #1,IO,0,F$
310 SCREEN=PEEK(88)+256*PEEK(89)
320 STARTHB=INT(SCREEN/256)
330 STARTLB=SCREEN-256*STARTHB
340 POKE 852,STARTLB:POKE 853,STARTHB
350 POKE 856,31:POKE 857,3
360 POKE 850,DIR:A=USR(ADR(ML$),16)
370 CLOSE #1
380 POSITION 2,21:? ""
390 GOTO 60
400 POSITION 2,21:? ""
420 IF PEEK(195)=138 THEN POSITION 2,2
1:? "DRIVE NOT THERE":FOR X=1 TO 400:N
EXT X:GOTO 370
430 IF PEEK(195)=170 THEN POSITION 2,2
1:? "FILE NOT FOUND":FOR X=1 TO 400:NE
XT X
440 GOTO 370

```

CHECKSUM DATA.

(see page 8)

```

10 DATA 276,541,674,482,565,41,804,476
,828,419,602,985,826,258,321,8098
350 DATA 242,469,660,75,521,53,312,193
,726,3251

```

BASIC Loader.

```

1000 OPEN #1,4,0,F$
1010 SCREEN=PEEK(88)+256*PEEK(89)
1020 STARTHB=INT(SCREEN/256)
1030 STARTLB=SCREEN-STARTHB*256
1040 POKE 852,STARTLB:POKE 853,STARTHB
1050 POKE 856,31:POKE 857,3
1060 POKE 850,7:A=USR(ADR("hhhLV"),1
6)
1065 REM 3 small H's, inverse *, LV, i
nverse small D
1070 CLOSE #1

```

CHECKSUM DATA.

(see page 8)

```

1000 DATA 347,231,980,482,49,287,835,7
05,860,4776

```

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by Patrick J. Kelley

Before I begin this review in earnest, I feel that I must clarify something. I have a somewhat different outlook when it comes to relaxation, especially in computer games. For a game to be relaxing to me, it must attain a certain level of, well, excitement . . . and satisfaction . . . of the vicarious kind. So, by my definition only, **F-15 Strike Eagle** is a very relaxing game. Indeed, it's just the thing to unwind with, after a hard day of stress and strife. But now, back to the world of normal, even-tempered people. **F-15 Strike Eagle** writes the book when it comes to putting the player in a stress-inducing situation, as you'll soon see.

HUDs, SAMs and ECMs.

For those of you not familiar with the F-15, or the NASA-like environs of its cockpit, the main display screen is sufficiently mind-boggling. Put simply, you are in the pilot's seat, not some computer generated humanoid. If you get into a jam, you have only yourself to kick later.

Arranged before you are the controls that will blast you into action. First—and most important—is your HUD (acronym for Heads Up Display). This is the brain of your fighter and your electronic nursemaid. HUD tells you relative speed, the amount of ammo remaining in your 20mm gatling cannon, your pitch lines, your altitude (*really* handy), and your navigational heading (handier still). The HUD also alerts you to the presence of incoming hostile aircraft, the status of your rack of short- or long-range air-to-air missiles, the number of bombs remaining to you, and the operational status of your ECM (Electronic Counter Measures) pod.

The ECM is used to confuse enemy radar, foul ground- and air-launched missile guidance systems, and generally save your bacon when the going gets rough. Your joystick acts as both control stick and weapons activator, with throttle and ECM controls relegated to the keyboard.

All these displays are concise and do their jobs well. Once you know where the controls are, and what they do, you're ready for the real fun to begin.

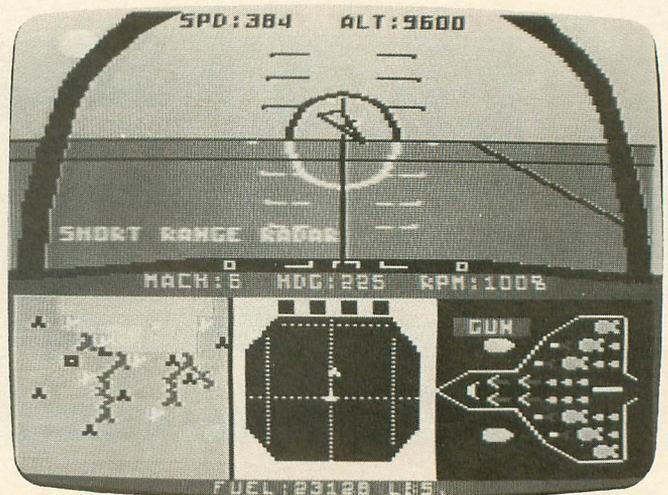
Scramble Flight Baker!

The ultimate objective of **F-15 Strike Eagle** is to fly into enemy territory, conduct airstrikes against primary and secondary targets, and engage hostile aircraft in action.

Besides the aforementioned airborne adversaries, you must also avoid the fusillade of ground-launched

SAMs (Surface-to-Air Missiles) that streak upward from batteries to punch your ticket. As the combat level increases, so does the shooting accuracy of the SAM gunners. ("Rolling Thunder" was never like this!) Utilizing the downward-looking radar displayed beneath your HUD, you must locate targets, penetrate hostile airspace, complete your bombing run, and return to your carrier or airstrip alive and (hopefully) intact. Sounds simple, doesn't it?

Appearances are deceiving. Skill and piloting ability are a real must here, and the adrenal glands get quite a workout as you approach your target. With one eye on the map and the other on the radar, you go forward to victory—or down to defeat. I could go on and on about this game, so I'll try to keep this short and sweet.



F-15 Strike Eagle.

F-15 Strike Eagle is a real winner, easily surpassing another great MicroProse offering, **MiG Alley Ace**. The feeling of flight is so real in this game that you'll probably find yourself pitching to and fro in your seat at home, as you put the aircraft through its paces. Although some may find this game overly complex, I feel that it has just the right blend of detail and action to keep me coming back for more.

Yankee air pirates.

Whatever your tastes in adventure, **F-15 Strike Eagle** delivers. The choice of combat mission simulations is yours. Whether you're streaking above the parched sands of Syria or rocketing in at Mach 2 over Haiphong, you're in for your money's worth.

Just remember this—Speed: Mach 2.3; Altitude: 64,000 feet; drop down to 3500 to pop your stick and roll on back to the Nimitz for a few cool ones. Keep your throttle up, your guns hot and your Sidewinders ready; you'll be stenciling a MiG 23 on your plane, come morning. Need I say more?

Don't wait. *Run* down to your local software merchant and buy a copy of **F-15 Strike Eagle** today. Tomorrow may be *too late!* □

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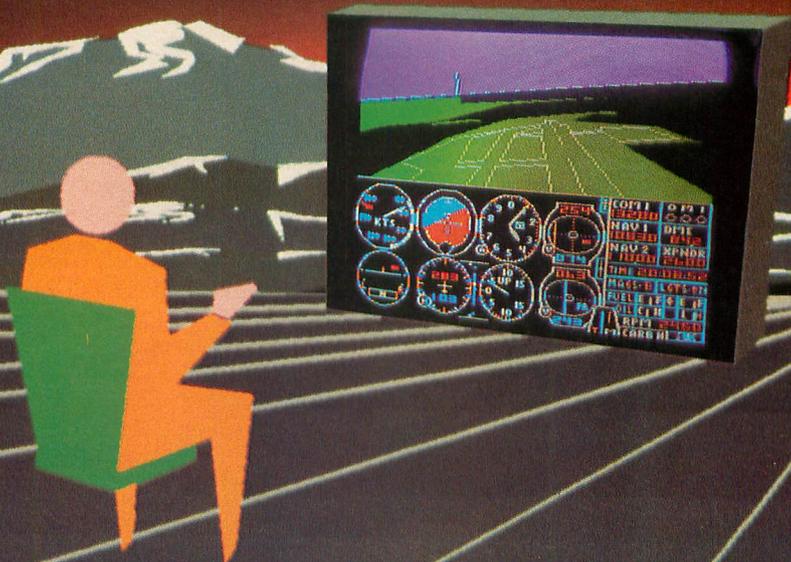
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More Fun with Bounce!

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by Joel Gluck

Way back in the golden days, when issues of **ANALOG Computing** were still numbering in the teens, I wrote a program called **Bounce**. It appeared in the **Our Game** column in issue 15. At that time, I was fiddling with a fun new language for the Atari—**Action!** by Optimized Systems Software. I was thinking that a version of **Bounce** in **Action!** would be a worthwhile project.

Not long after I had that thought I discovered, to my amusement, that someone had beaten me to it. The friendly folks at **ANALOG Computing** told me one day that a certain David Plotkin had submitted a little ditty called **Bounce in Action!**, which later appeared in issue 20.

However, David's idea of a better **Bounce** program was different from mine. His improvements consisted of adding GTIA color and, of course, speed (with **Action!**) to the original design. I *enjoyed* playing with David's program, and I was *pleased* that someone else was as enthusiastic about **Bounce** as I was. . . I simply had another idea that had to be tried.

To me, the next natural step for **Bounce** is to add more discs—having multiple moving objects at your command makes **Bounce** about a million times more fun than the original. Of course, **Action!** is the only high-level language for the Atari that is fast enough to run a multiple-object **Bounce** effectively.

So there was **Bounce**, then **Bounce in Action!**, and now I give you **More Fun with Bounce (MFB)** (see page 44).

Other improvements.

I had other upgrading in mind, too. Tops on the list was user-friendliness. **MFB** lets you move the cursor around freely without upsetting the walls or the discs already laid down. Drawing or erasing occurs only when your joystick trigger is held down. To switch between the two functions (drawing and erasing), simply hit the **SPACE BAR**.

Another user-friendly feature is the amount of control over cursor speed available. For a slow cursor (to maintain fine drawing control), hit a lower digit key like 3 or 4. For high-speed drawing, hit 7 or 8. Cursor speed 9 is for maniacs only.

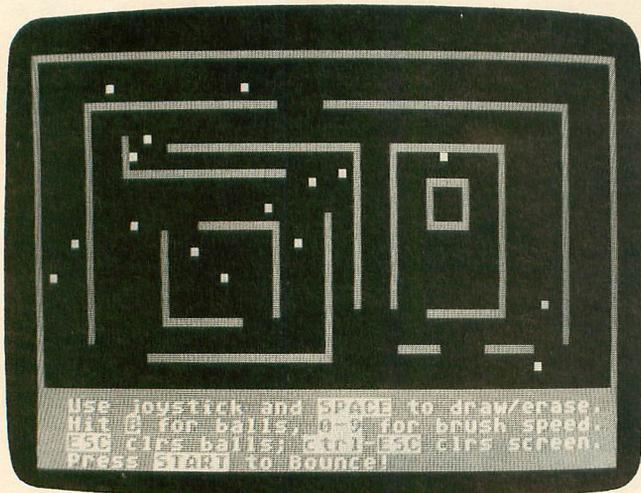
Laying down the spheres is simplicity itself. Just hit the **B** key. A disc appears at the cursor's position, while the cursor itself moves to the right (so you can keep laying down more). Note that—when drawing, erasing, moving or placing balls—the cursor performs automatic wraparound should it go off the edge of the screen.

Even **Bounce's** screen-clearing feature has been improved upon. In **MFB**, when you hit **ESC**, instead of the whole screen clearing, only the discs disappear. This lets you keep your old wall patterns. If you'd like to clear everything, just hit **CTRL-ESC**. To remove individual discs, draw or erase over them with the cursor.

Let 'er rip!

To start things bouncing, hit **START**. (If you forgot to lay discs down, the program automatically returns

you to the drawing mode.) Immediately, the playing field fills with red goop (to be eaten away by the bouncing balls), and the number of objects bouncing appears in the text window.



Again, as in drawing mode, you have a number of options. For starters, you have complete control over disc speed. Simply hit digit keys 0 through 9, 9 being the fastest. Keep in mind, however, that the fewer objects you have on screen, the faster they will go (this is a natural by-product of the limited processing speed of your Atari computer). One or two discs on the screen at speed 9 move so fast that they are more of a blur than an object.

You may notice as the balls are bouncing that only one of them is actually making bouncing sounds; the others are silent. To change the "sound focus," hit the S key. This allows you to make different balls audible, one at a time. If you keep hitting S, you'll finally return sound focus to the original disc. This effect is easier to see if you have only a few objects on the screen.

An improvement I've always wanted to add to **Bounce** is to give the user some direct control over the bouncing sphere. In **MFB**, this feature exists and is called "nudging." When you hit the N key, the ball that the sound focus is on gets nudged. The effect of this is distinct, yet simple—it causes the ball to react as if a vertical wall were momentarily placed directly ahead of it. Essentially, the ball bounces off of a ghost wall.

Nudging is fun (as is holding down the N key for repeated nudgings) and, also, useful if there is a red area on the screen where no ball has been. You can direct one over to that area by nudging it. Note: it is best to practice nudging with only a few objects and at a slow speed. Also note: you can nudge different spheres by changing the sound focus.

When you want to change your wall configuration or the number of bouncing objects, hit SELECT to get back to the drawing mode. To start with a fresh screen, just hit CTRL-ESC. □

Action! listing.

```

;More Fun With BOUNCE
;by Joel Gluck
;for ANALOG COMPUTING

BYTE ARRAY xx(256),yy(256),
            xd(256),yd(256)
BYTE xc,yc,hidden,cmode,TIME=20,
RANDOM=53770,CONSOL=53279,
CUR5C=708,CH=764,NEWCOL=710,
dist=[0],audball=[0]
CARD num=[0],curspeed=[1500],
ballspeed=[900]
CARD ARRAY linept(48)

PROC gr5init()
CARD scrn=88
BYTE line,BALLCOL=709,WALLCOL=710

Graphics(5)
FOR line=0 TO 47 DO
    linept(line)=scrn+20*line
OD
BALLCOL=$0C
WALLCOL=$94
RETURN

PROC plot5(BYTE x,y,col)
BYTE POINTER pixel
BYTE ARRAY colfil=[0 85 170 255],
mask=[63 207 243 252],
mask2=[192 48 12 3]

pixel = linept(y)+(x RSH 2)
pixel^ = pixel^ & mask(x & 3)
        % (colfil(col)
        & mask2(x & 3))

RETURN

BYTE FUNC locate5(BYTE x,y)
BYTE POINTER pixel
BYTE ARRAY mask=[192 48 12 3]

pixel = linept(y)+(x RSH 2)
RETURN((pixel^ & mask(x & 3)) RSH
        ((x & 3) XOR 3) LSH 1))

PROC hline(BYTE y,c)
BYTE i

FOR i = 0 TO 79 DO
    plot5(i,y,c)
OD
RETURN

PROC vline(BYTE x,c)
BYTE i

FOR i = 0 TO 47 DO
    plot5(x,i,c)
OD
RETURN

PROC pauz(CARD p)
CARD i

FOR i=1 TO p DO
OD
RETURN

PROC f16(BYTE x,y)
BYTE g,a,b

g=Locate(x,y)
IF g=32 THEN
    RETURN
FI
g==+128

```

```

MEMCOL=15
b=y
DO
  color=0
  Plot(x,b)
  b=-1
  color=g
  Plot(x,b)
  IF b=2 THEN
    EXIT
  FI
  Sound(0,b,8,8)
  pauz(700+x*50)

```

```

OD
a=x
DO
  color=0
  Plot(a,b)
  a=+1
  color=g
  Plot(a,b)
  IF a=19 THEN
    EXIT
  FI
  Sound(0,a,8,8)
  pauz(700+x*50)

```

```

OD
color=0
Plot(a,b)
SndRst()
RETURN

```

```

PROC colburst(BYTE x,y)
BYTE g,c,a

```

```

g=Locate(x,y)
IF g=32 THEN
  RETURN
FI
g=g+128
MEMCOL=(Rand(16) LSH 4) % 10
color=g
a=x-1
IF a>13 THEN
  a=0
FI
Plot(x,a)
DrawTo(x,y)
FOR c=0 TO 15 DO
  Sound(0,0,4,15-c)
  pauz(400)
OD
color=0
Plot(x,0)
DrawTo(x,y)
SndRst()
RETURN

```

```

PROC dropkick(BYTE x,y)
BYTE g,h,a,b

```

```

g=Locate(x,y)
IF g=32 THEN
  RETURN
FI
g=+128
MEMCOL=152
b=y
DO
  color=0
  Plot(x,b)
  b=+1
  color=g
  Plot(x,b)
  IF b=23 THEN
    EXIT
  FI
  Sound(0,b+10+(x LSH 1),10,8)
  Sound(1,b+20+(x LSH 1),10,8)
  pauz(400)

```

```

OD
SndRst()
h=0
MEMCOL=159
a=x

```

```

DO
  color=h
  Plot(a,b)
  h=Locate(a+1,b-1)
  a=+1
  b=-1
  color=g
  Plot(a,b)
  IF a=18 OR b=1 THEN
    EXIT
  FI
  Sound(0,a-x,8,(b RSH 1))
  pauz(800)

```

```

OD
color=0
Plot(a,b)
SndRst()
RETURN

```

```

PROC foo()
BYTE v

```

```

FOR v=0 TO 15 DO
  Sound(0,255,10,15-v)
  Sound(1,0,8,8-(v RSH 1))
  pauz(500)

```

```

OD
SndRst()
RETURN

```

```

PROC intro()
BYTE x

```

```

Graphics(17)
CURSC=$08
Position(0,10)
PrintD(6,"MORE FUN WITH")
Position(0,12)
PrintD(6,"B O U N C E !")
Position(0,14)
PrintD(6,"BY JOEL GLUCK")
pauz(65000)
pauz(65000)
pauz(65000)
FOR x=0 TO 12 DO
  f16(12-x,10)
OD
FOR x=0 TO 12 DO
  colburst(x,12)
OD
FOR x=0 TO 12 DO
  dropkick(12-x,14)
OD
CURSC=$48
Position(14,1)
PrintD(6,"ANALOG")
foo()
Position(11,3)
PrintD(6,"COMPUTING")
foo()
Position(12,5)
PrintD(6,"FEBRUARY")
foo()
Position(16,7)
PrintD(6,"1985")
foo()
pauz(65000)
pauz(65000)
pauz(65000)
RETURN

```

```

PROC drawdoc()
BYTE CURS=752

```

```

CURS=1
PUTE()
Print("Use joystick and ")
PrintE("SPACE to draw/erase.")
Print("Hit B for balls, ")
PrintE("0-9 for brush speed.")
Print("ESC clr balls; ")
PrintE("ctrl-ESC clr screen.")
Print("Press START to Bounce!")
RETURN

```

```

PROC clearscrn()
BYTE a,b,g
FOR b=1 TO 19 DO
  FOR a=1 TO 78 DO
    g=locate5(a,b)
    IF (g=2 OR CH>28) AND g>1 THEN
      plot5(a,b,0)
      Sound(0,b,6,4)
      IF CH=28 THEN
        paуз(300)
      FI
    FI
    g=locate5(a,39-b)
    IF (g=2 OR CH>28) AND g>1 THEN
      plot5(a,39-b,0)
      Sound(0,b,6,4)
      IF CH=28 THEN
        paуз(300)
      FI
    FI
  OD
  Sound(0,0,0,0)
OD
IF CH>28 OR hidden=2 THEN
  hidden=0
FI
RETURN

```

```

PROC movecursor(BYTE bflag)
BYTE g,STIK=632,TRIG=644,vol
BYTE ARRAY v={2 2 2 0 2 1 1 1 0 2 0
              0 0 1 1 1 1 2 1 0 1 1}
INT cxd,cyd

```

```

IF STIK<15 OR bflag=1 THEN
  cxd=v((STIK-5) LSH 1)-1
  cyd=v(((STIK-5) LSH 1) % 1)-1
  IF bflag=1 THEN
    cxd=2
  FI
  g=hidden
  IF TRIG THEN
    vol=4
  ELSE
    vol=10
    g=cmode*3
  FI
  Sound(0,(xc+yc)*cmode,
        8+(cmode LSH 1),
        vol-(cmode LSH 1))
  plot5(xc,yc,g)
  xc==+cxd
  yc==+cyd
  IF xc<1 THEN
    xc=78
  FI
  IF xc>78 THEN
    xc=1
  FI
  IF yc<1 THEN
    yc=38
  FI
  IF yc>38 THEN
    yc=1
  FI
  hidden=locate5(xc,yc)
  plot5(xc,yc,1)
FI
RETURN

```

```

PROC audlayball()
BYTE i,j,k
FOR j=0 TO 2 DO
  FOR i=j*50 TO j*50+20 DO
    Sound(0,i,10,15-j*6)
    paуз(100)
  OD
OD
Sound(0,0,0,0)
RETURN

```

```

BYTE FUNC number()

```

```

BYTE n,v
v=CH
Open(2,"K:",4,1)
n=GetD(2)
Close(2)
CH=v
IF n>47 AND n<58 THEN
  RETURN(57-n)
ELSE
  RETURN(99)
FI

PROC audcmode()
BYTE n
FOR n=1 TO 5 DO
  IF cmode THEN
    Sound(0,100-n*10,10,4)
  ELSE
    Sound(1,150-n*10,10,4)
    Sound(0,5-n,8,6)
  FI
  paуз(2000)
  SndRst()
  paуз(1000)
OD
RETURN

```

```

PROC cursor()
BYTE n
IF CH<>255 THEN
  IF CH=33 THEN
    cmode==XOR 1
    audcmode()
  ELSEIF CH=28 OR CH=156 THEN
    clearscrn()
  ELSEIF CH=21 THEN
    hidden=2
    plot5(xc,yc,2)
    movecursor(1)
    audlayball()
  ELSE
    n=number()
    IF n<99 THEN
      curspeed=n*500
    FI
  FI
  CH=255
FI
movecursor(0)
RETURN

```

```

PROC bouncedoc()
CARD n
PutE()
n=num
IF n=1 THEN
  PrintE("1 ball is bouncing.")
ELSE
  PrintC(n)
  PrintE(" balls are bouncing.")
FI
PrintE("Hit digits 0-9 for speed.")
PrintE("S changes sound focus, ")
PrintE("N nudges ball.")
PrintE("Press SELECT to Draw again.")
RETURN

```

```

PROC process(BYTE a,b)
BYTE g
g=locate5(a,b)
IF g=2 THEN
  IF num<200 THEN
    xx(num)=a
    yy(num)=b
    num==+1
  ELSE
    plot5(a,b,0)
  FI

```

```
ELSEIF g=0 THEN
  plot5(a,b,1)
FI
RETURN
```

```
PROC ballinit()
  BYTE a,b

  CURSC=$44
  num=0
  FOR b=1 TO 19 DO
    FOR a=1 TO 78 DO
      process(a,b)
      process(a,39-b)
    OD
  OD
  FOR a=0 TO num DO
    xd(a)=Rand(2) LSH 1
    yd(a)=Rand(2) LSH 1
  OD
  RETURN
```

```
PROC moveball(BYTE n)
  BYTE g,pa,pb

  g=locate5(xx(n)+xd(n)-1,yy(n)+yd(n)-1)
  IF g<2 THEN
    plot5(xx(n),yy(n),0)
    xx(n)=xx(n)+xd(n)-1
    yy(n)=yy(n)+yd(n)-1
    plot5(xx(n),yy(n),2)
    IF n=audball THEN
      dist==+1
    FI
    RETURN
  ELSE
    pb=locate5(xx(n),yy(n)+yd(n)-1)
    pa=locate5(xx(n)+xd(n)-1,yy(n))
    IF n=audball THEN
      IF dist THEN
        Sound(0,170-((38-dist) LSH 2),
          10,8)
        Sound(1,((38-dist) LSH 2),
          10,8)
      FI
      dist=0
      TIME=0
    FI
    IF pa>1 THEN
      xd(n)=2-xd(n)
    IF pb>1 THEN
      yd(n)=2-yd(n)
      RETURN
    ELSE
      plot5(xx(n),yy(n),0)
      yy(n)=yy(n)+yd(n)-1
      plot5(xx(n),yy(n),2)
      RETURN
    FI
    ELSEIF pb>1 THEN
      yd(n)=2-yd(n)
      plot5(xx(n),yy(n),0)
      xx(n)=xx(n)+xd(n)-1
      plot5(xx(n),yy(n),2)
      RETURN
    ELSEIF Rand(2) THEN
      xd(n)=2-xd(n)
    ELSE
      yd(n)=2-yd(n)
      RETURN
    FI
  FI
  RETURN
```

```
PROC cleanup()
  BYTE a,b

  FOR b=1 TO 19 DO
    FOR a=1 TO 78 DO
      IF locate5(a,b)=1 THEN
        plot5(a,b,0)
      FI
      IF locate5(a,39-b)=1 THEN
        plot5(a,39-b,0)
      FI
    OD
  OD
```

```
FI
OD
RETURN
```

```
PROC bounce()
  CARD i
  BYTE n

  ballinit()
  bouncedoc()
  audball=0
  dist=0
  IF num THEN
    DO
      FOR i=0 TO num-1 DO
        moveball(i)
        IF CH<>255 THEN
          IF CH=62 THEN
            audball==+1
            IF audball=num THEN
              audball=0
            FI
            dist=0
          ELSEIF CH=35 THEN
            xd(audball)=2-xd(audball)
          ELSE
            n=number()
            IF n<99 THEN
              ballspeed=n*n*100
            FI
          FI
          CH=255
        FI
        IF CONSOL=5 THEN
          EXIT
        FI
      OD
      pauz(ballspeed)
      IF TIME THEN
        SndRst()
      FI
      UNTIL CONSOL=5
    OD
    SndRst()
  FI
  cleanup()
  RETURN
```

```
PROC MFWB()

  intro()
  gr5init()
  hline(0,3)
  hline(39,3)
  vline(0,3)
  vline(79,3)
  DO
    drawdoc()
    xc=39
    yc=19
    hidden=locate5(xc,yc)
    cmode=1
    plot5(xc,yc,1)
  OD
  cursor()
  CURSC=TIME
  pauz(curspeed)
  Sound(0,0,0,0)
  pauz(curspeed)
  UNTIL CONSOL=6
  OD
  plot5(xc,yc,hidden)
  CH=255
  bounce()
OD
RETURN
```



English Error Messages in BASIC

16K Disk

by Stephen Prokopchuk

One of the few frustrating things about programming in Atari BASIC is that errors are given as numbers. This means that every time an unfamiliar error number appears, you'll need to check the Reference Manual to determine the meaning.

The following program resolves this dilemma by printing the English equivalent on the screen every time an error occurs. The error messages are even changeable. You could, for example, change *OUT OF DATA* to *YOU GOOFED!* To use it, however, requires a disk drive.

How it works.

Listing 1, written in BASIC, will create an *AUTO-RUN.SYS* file on the disk currently inserted in the drive. It is important that the disk to which this file is written contains DOS 2.0. When you boot up with that disk, the error message program will automatically load into the bottom of memory.

The program changes the editor device to point to itself, so that whenever something has to be printed on the screen, it goes to this routine first. If memory location 175 (\$B9 hex) doesn't equal zero, then the printer knows that BASIC has found an error. It prints the English equivalent on the screen.

Using the program.

Listing 1 is written in BASIC and is the one most users will type in. Listing 2 is written in assembly language and is presented for more advanced users.

When using the error message program, it is important not to enter the disk utilities package by typing *DOS*. Doing so will cause a fatal lockup. Also, take note that the list of errors is at the end of both programs. Any of the error messages may be freely changed to anything you want. □

Listing 1. BASIC listing.

```

10 REM *** ENGLISH ERROR MESSAGES ***
20 DATA 0,1,2,3,4,5,6,7,8,9,0,0,0,0,0,
0,0,10,11,12,13,14,15
30 DIM DAT$(91),HEX(22):FOR X=0 TO 22:
READ N:HEX(X)=N:NEXT X:LINE=990:RESTOR
E 1000:TRAP 110:?"CHECKING DATA"
40 LINE=LINE+10:?"LINE:";LINE:READ DA
T$:IF LEN(DAT$)<>90 THEN 150
50 DATLIN=PEEK(183)+PEEK(184)*256:IF D
ATLIN<>LINE THEN ? "LINE ";LINE;" MISS
ING!":END
60 FOR X=1 TO 89 STEP 2:D1=ASC(DAT$(X)
)-48:D2=ASC(DAT$(X+1))-48:BYTE=HEX(D1)
*16+HEX(D2)
70 IF PASS=2 THEN PUT #1,BYTE:NEXT X:R
EAD CHKSUM:GOTO 40

```



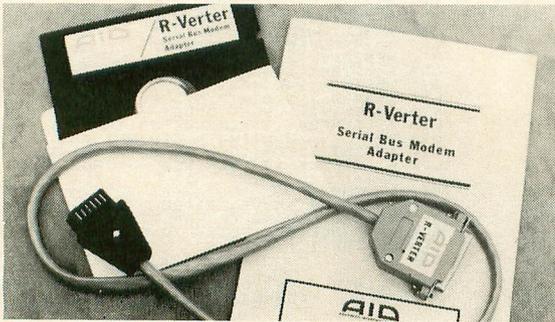
```

EXIT      LDA #2          ;ALLOW FOLLOWING
          STA FLAG       ;CHARS TO BE
          PLA           ;PRINTED ALWAYS
          TAY           ;
          PLA           ;RESTORE REG'S
          TAX           ;
          PLA           ;
          JMP $FFFF     ;CHANGED TO PUT ROUTINE
;
ERROR     LDA ERRNUM    ;MULTIPLY ERRNUM
          ASL A         ;#2
          TAY           ;#2
          BCS IOERR     ;ERROR<128
          LDA BASIC, Y  ;FIND MESSAGE
          STA VLOW      ;ADDRESS AND
          LDA BASIC+1, Y ;SAVE IT
          STA VLOW+1
          JMP PRINT     ;PRINT MESSAGE
;
IOERR     LDA ID, Y     ;FIND MESSAGE
          STA VLOW      ;ADDRESS AND
          LDA ID+1, Y   ;SAVE IT
          STA VLOW+1
;
PRINT     LDY #255     ;ROUTINE TO
          INY           ;PRINT ERROR MESSAGE
          TYA           ;SAVE Y REG
          PHA           ;
          LDA (VLOW), Y ;GET CHARACTER
          AND #7F       ;MASK INVERSE
          JSR JUMP      ;GO PRINT IT
          PLA           ;RESTORE Y REG
          TAY (VLOW), Y ;
          BPL PRLOOP   ;ARE WE AT END?
          LDA #32       ;SEND SPACE AT
          JSR JUMP      ;END
          LDA #1        ;SET FLAG TO MASK BASIC'S
          STA FLAG     ;ERROR MESSAGE
          JMP GETPAR    ;AND EXIT
;
FLAG      .BYTE 0
CHR        .BYTE 0
;
;ERROR MESSAGE ADDRESS TABLES
;
BASIC     .WORD 0,0,B2,B3,B4,B5,B6,B7,B8
          .WORD B9,B10,B11,B12,B13,B14,B15
IO        .WORD B16,B17,B18,B19,B20,B21
          .WORD 1128,1129,1130,1131,1132
          .WORD 1133,1134,1135,1136,1137
          .WORD 1138,1139,1140,1141,1142
          .WORD 1143,1144,1145,1146,1147
          .WORD 0,0,0,0,0,0,0,0,0,0
          .WORD 1160,1161,1162,1163,1164
          .WORD 1165,1166,1167,1168,1169
          .WORD 1170,1171
    
```

```

;
; THE ERROR MESSAGES
;
B2        .CBYTE "MEMORY INSUFFICIENT"
B3        .CBYTE "VALUE ERROR"
B4        .CBYTE "TOO MANY VARIABLES"
B5        .CBYTE "BAD STRING LENGTH"
B6        .CBYTE "OUT OF DATA"
B7        .CBYTE "ILLEGAL VALUE"
B8        .CBYTE "INPUT ERROR"
B9        .CBYTE "DIM ERROR"
B10       .CBYTE "STACK OVERFLOW"
B11       .CBYTE "NUMBER TOO COMPLEX"
B12       .CBYTE "LINE NOT FOUND"
B13       .CBYTE "NEXT WITHOUT FOR"
B14       .CBYTE "LINE TOO LONG"
B15       .CBYTE "GOSUB OR FOR DELETED"
B16       .CBYTE "RETURN WITHOUT GOSUB"
B17       .CBYTE "GARBAGE ERROR"
B18       .CBYTE "BAD STRING CHARACTER"
B19       .CBYTE "PRDGRAM TOO LONG"
B20       .CBYTE "BAD DEVICE NUMBER"
B21       .CBYTE "LOAD FILE ERROR"
1128      .CBYTE "BREAK ABORT"
1129      .CBYTE "IOCB OPEN"
1130      .CBYTE "NO SUCH DEVICE"
1131      .CBYTE "IOCB WRITE ONLY"
1132      .CBYTE "INVALID COMMAND"
1133      .CBYTE "FILE NOT OPEN"
1134      .CBYTE "BAD IOCB NUMBER"
1135      .CBYTE "IOCB READ ONLY"
1136      .CBYTE "END OF FILE"
1137      .CBYTE "TRUNCATED RECORD"
1138      .CBYTE "DEVICE TIMEOUT"
1139      .CBYTE "DEVICE NAK"
1140      .CBYTE "SERIAL BUS FRAMING"
1141      .CBYTE "CURSOR OUT OF RANGE"
1142      .CBYTE "SERIAL BUS OVERRUN"
1143      .CBYTE "SERIAL BUS CHECKSUM"
1144      .CBYTE "DEVICE DONE"
1145      .CBYTE "VERIFY ERROR"
1146      .CBYTE "FUNCTION UNIMPLEMENTED"
1147      .CBYTE "INSUFFICIENT RAM"
1160      .CBYTE "DRIVE NUMBER ERROR"
1161      .CBYTE "TOO MANY OPEN FILES"
1162      .CBYTE "DISK FULL"
1163      .CBYTE "DATA I/O ERROR"
1164      .CBYTE "FILE NUMBER MISMATCH"
1165      .CBYTE "BAD FILE NAME"
1166      .CBYTE "BAD POINT DATA LENGTH"
1167      .CBYTE "FILE LOCKED"
1168      .CBYTE "COMMAND INVALID"
1169      .CBYTE "DIRECTORY FULL"
1170      .CBYTE "FILE NOT FOUND"
1171      .CBYTE "POINT INVALID"
;
;
; PROGBND == $02E0
; WORD START
; END
    
```

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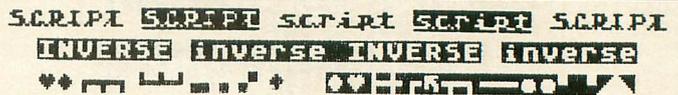
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Data work.

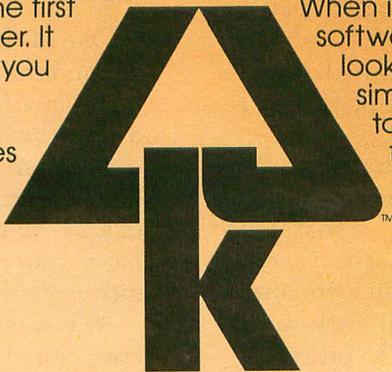


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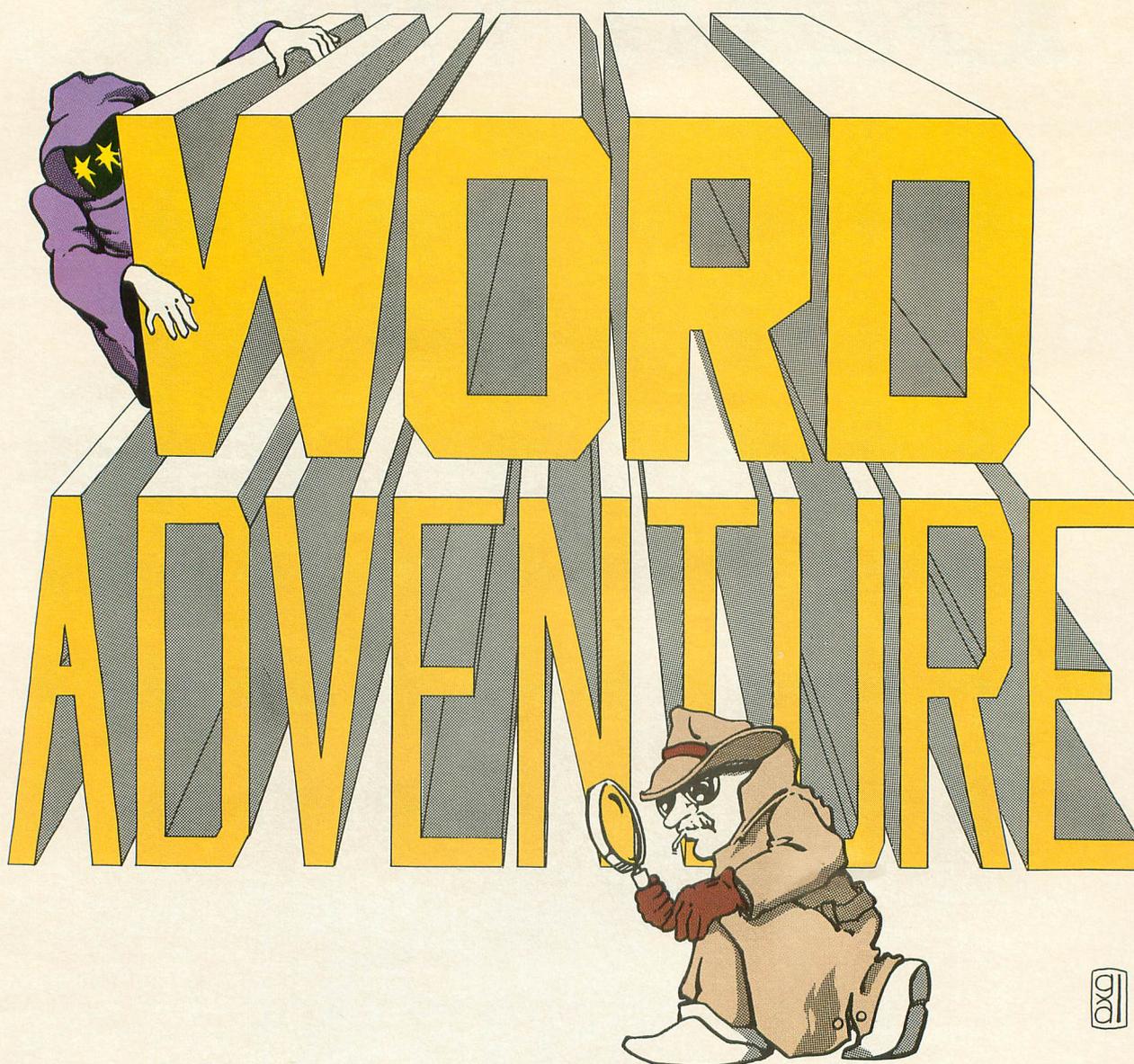
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by Stephen D. Groll

Here is a game that will make learning to spell a real adventure! After you type *RUN*, the title screen will show while characters are being defined. Then you will be given the option of a difficult game or an easy one.

After you have chosen the game difficulty, you'll be asked if you would like to enter new words. If you type *Y*, four lines of code will be listed, so that you may enter the words you would like to learn to spell. Simply move the cursor past the *DATA* statement after each line number and type in your word. Each word may be up to fifteen letters long. Be sure to press *RETURN* after completing each word.

After you've entered four words, be sure the cursor is on a free line and type *CON.* to continue.

The game plan.

One of the four words you entered will be selected at random and shown for a brief time. It will then be replaced by a line of dashes. Each dash represents a letter in the word.

A colored square which appears below the line of dashes represents your marker. You're in the first room of a 22-room complex. Using a joystick in port 1, you move your marker from one room to another—as you move off the screen, another room will appear.

As you move through the complex, you'll see different colored letters and keys scattered about. The letters are from the word shown in the first room.

Your task is to move all of the letters to the first
(continued on page 54)



600XL CALL
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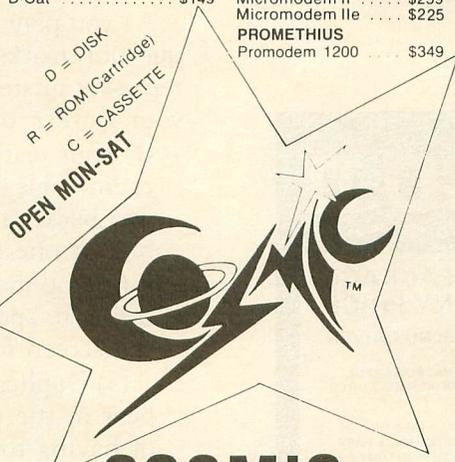
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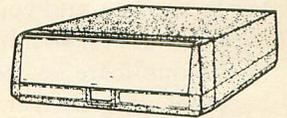
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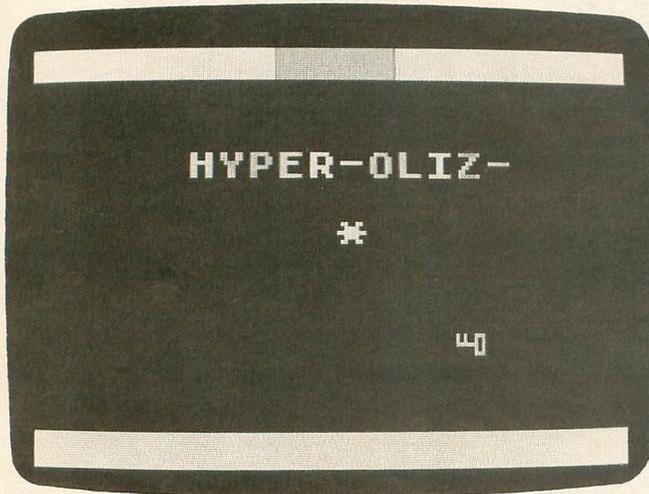
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room and place them, in proper order, along the line of dashes. This isn't an easy job. To move a letter, you must first find one of the keys that corresponds to the color of the letter you wish to move. Touch your marker to the key, and your marker will become a duplicate of that key. Touching any letter of the same color as the duplicate key releases that letter, which then becomes your marker.



Word Adventure.

Take the letter to the first room and place it on the dash which represents its proper location within the word. Press the joystick button, and the letter will be released. Your marker will reappear on the star below. Continue this process until all letters are properly placed.

When you've finished placing all the letters, position your marker on the star and press the joystick button. The word will appear, properly spelled, below the marker. If you have the word correct, a flash of color and a chirping sound will result. If you spelled the word incorrectly, a buzzing sound will be heard. When you're ready to continue, press the joystick button, and a new word will appear for you to spell.

After you've completed all four words correctly, the gate at the top of the screen in the first room will open. Move your marker through this gate to receive a victor's crown and hear the cheering applause of the multitudes.

If you would like to continue to play, simply press the joystick button again. The options and opportunity to enter new words will be offered to you once more.

The catches and assists.

As you play **Word Adventure**, you'll notice some question marks appearing from time to time. These represent mysteries. If you touch a question mark with your marker, one of three things will happen:

(1) Your marker may be transported to the first room. This can be a timesaver if you're on your way back, or it can be a delay if you were hoping for one of the results below.

(2) You may get a glimpse of the word you're trying to spell. It will appear at the bottom of the screen for a moment, then disappear.

(3) Duplicates of all four colored keys may appear in the room. This will save you the time of having to hunt for the original.

Another thing you will notice as you move through the complex is a nasty-looking square face. This is the Phantom. He's a mean character placed in the maze to make things difficult for you. In the Phantom's lair, which is at the end of the corridor moving right from the first room, he'll come after you—to throw you out. If the Phantom touches your marker, it will be transported back to the first room.

From time to time, you'll run into the Phantom in other parts of the complex. He will appear in rooms which contain letters, and he won't come after you unless you're carrying a key. If you *are* carrying a key, he'll try to touch your marker and take the key away. If he succeeds, your marker will simply return to its original square shape.

If you're able to touch the letter with your key before the Phantom steals the key, he'll stop the chase. This is also true in his lair.

DISK WIZARD II

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Some things to be aware of... an easy game and a hard game play exactly the same. The only difference is that the Phantom moves more slowly in the simpler version. And beware: as you get closer to completing the word, the Phantom appears more often.

Always be careful while carrying a letter. If you happen to touch a key or a Phantom while carrying a letter, you'll lose the letter. And there's no way to get it back. If this happens, or if you find you've made a mistake in placing a letter (so that it's clear you cannot spell the word correctly), place your marker on the star in the first room and press the joystick button. The word will be read as an incorrect spelling. Press the button again, and you'll be given the same word or a new one to work on. □

Listing 1.

```

1 REM WORD ADVENTURE
2 REM BY STEVE GROLL
3 REM
4 K1=1:K2=2:K32=32:DIM WD$(15),LITT(19)
5 ,LITL(15),KEY(4),RCON(19),LX(15),LIP(
6 15),WRD(4),DIF$(K1),NM$(K1)
7 C=K1:KEY(K1)=35:KEY(K2)=3:KEY(K3)=163
8 :KEY(4)=131:PLX=7:PLY=4:MX=9:MY=5:G=K0
9 :GOTO 16
10 PLX=INT(10*RND(K0))+6:PLY=INT(6*RND
11 (K0))+3:LOCATE PLX,PLY,LSE:IF LSE<>K32
12 THEN 10
13 RETURN
14 MP=K0:FOR LP=K1 TO WD
15 IF RCON(LP)=R THEN COLOR LITT(LP):P
16 LOT PLX,PLY:GOSUB 10:IF LP<=LEN(WD$) T
17 HEN MP=1
18 NEXT LP:RETURN
19 POKE 106,PEEK(106)-5:GRAPHICS K0:5L
20 =(PEEK(106)+K1)*256:POSITION K1,5:GOSU
21 B 32200:FOR MM=K0 TO 512
22 POKE 5L+MM,PEEK(57344+MM):NEXT MM:P
23 OKE 756,5L/256:FOR LP=K1 TO 4:FOR MM=K
24 0 TO 7:READ V:POKE C*8+5L+MM,V
25 NEXT MM:C=C+K1:NEXT LP:GOSUB 32300:
26 GOTO 50
27 IF FND=3 OR FND=35 OR FND=131 OR FN
28 D=163 THEN SOUND K2,12,10,15:PLR=FND:M
29 APP=K1:RETURN
30 K=K1:FOR LP=K1 TO WD-4:IF K=5 THEN
31 K=K1
32 IF FND=LITT(LP) AND R=RCON(LP) AND
33 PLR=KEY(K) THEN PLR=FND:FND=K32:RCON(L
34 P)=K0:MAPP=K0:SOUND 1,12,0,15:GOSUB 40
35 K=K+K1:NEXT LP:IF NM<3 THEN NM=K2
36 RETURN
37 NM=NM-K1:G=K1:MR=K0:SOUND K1,K0,K0,
38 K0:RETURN
39 FOR LP=K1 TO 4:WRD(LP)=K0:NEXT LP:W
40 RDC=K0
41 TRAP 68:VM=K1:LL=K1:FND=42:K=K1:L=K
42 1:COL=K0:LOK=K1:MSEE=K0:C1=K0:C2=K0:C4
43 =K0:C5=K0
44 G=K0:SELW=INT(4*RND(K0))+K1:ON SELW
45 GOTO 1010,1020,1030,1040
46 READ WD$:NM=LEN(WD$)
47 WD=LEN(WD$)+4:FOR LP=K1 TO WD:RCON(L
48 P)=INT(20*RND(K0))+K1:NEXT LP
49 LITT(L)=ASC(WD$(L))+COL:IF COL=K32
50 THEN COL=COL+64
51 COL=COL+K32:IF COL>160 THEN COL=K0
52 LITL(L)=LITT(L)+KEY(K)+RCON(L):K=K+
53 K1:IF K=5 THEN K=K1
54 L=L+K1:GOTO 60
55 TRAP 3000:LITT(L)=3:L=L+K1:LITT(L)=
56 35:L=L+K1:LITT(L)=131:L=L+K1:LITT(L)=1
57 63:GOTO 78
58 FOR LP=K0 TO WD-5:COLOR 45:PLOT (20
59 -LEN(WD$))/K2+LP,3:NEXT LP
60 FOR LP=K1 TO WD-4:IF LX(LP) THEN CO
61 LOR LIP(LP):PLOT LX(LP),3
62 NEXT LP:RETURN
63 X=10:Y=5:GRAPHICS 18:POKE 756,5L/25
64 6
65 IF INT(K2*RND(K0)) THEN BDR=161:GAT
66 =33:PLRC=129:MC=130:GOTO 81
67 BDR=33:GAT=161:PLRC=K1:MC=K2
68 FOR LP=K0 TO 3:C=INT(4*RND(K0))+K1:
69 ON C GOSUB 82,84,86,87:SETCOLOR LP,C,5
70 :NEXT LP:PLR=PLRC:GOTO 10000
71 IF NOT C1 THEN C1=K1:C=K2:5=8:RETU
72 RN
73 IF NOT C2 THEN C2=K1:C=4:5=4:RETUR
74 N
75 IF NOT C4 THEN C4=K1:C=9:5=4:RETUR
76 N
77 IF NOT C5 THEN C5=K1:C=12:5=8:RETU
78 RN
79 GOTO 82
80 ? #6;"K":COLOR BDR:RETURN
81 GOSUB 90:PLOT K0,K0:PLOT 19,K0:PLOT
82 19,11:PLOT K0,11:RETURN
83 GOSUB 90:PLOT K0,K0:DRAWTO 19,K0:P
84 LOT K0,11:DRAWTO 19,11:RETURN
85 GOSUB 90:PLOT K0,K0:DRAWTO K0,11:P
86 LOT 19,K0:DRAWTO 19,11:RETURN
87 GOSUB 90:PLOT K0,K0:DRAWTO 19,K0:D
88 RAWTO 19,11:DRAWTO K0,11:DRAWTO K0,K0:
89 RETURN
90 GOSUB 90:PLOT K0,K0:DRAWTO K0,11:D
91 RAWTO 19,11:DRAWTO 19,K0:RETURN
92 GOSUB 90:PLOT 19,K0:DRAWTO K0,K0:D
93 RAWTO K0,11:DRAWTO 19,11:RETURN
94 GOSUB 90:PLOT K0,K0:DRAWTO 19,K0:D
95 RAWTO 19,11:DRAWTO K0,11:RETURN
96 GOSUB 90:PLOT K0,11:DRAWTO K0,K0:D
97 RAWTO 19,K0:PLOT 19,11:RETURN
98 GOSUB 90:PLOT K0,11:DRAWTO 19,11:D
99 RAWTO 19,K0:PLOT K0,K0:RETURN
100 GOSUB 90:PLOT K0,K0:DRAWTO 19,K0:D
101 RAWTO 19,11:PLOT K0,11:RETURN
102 GOSUB 90:PLOT K0,K0:DRAWTO K0,11:
103 DRAWTO 19,11:PLOT 19,K0:RETURN
104 IF NOT WRD(K1) THEN N=K1:RESTORE
105 30010:GOTO 56
106 IF NOT WRD(K2) THEN N=K2:RESTORE
107 30020:GOTO 56
108 IF NOT WRD(3) THEN N=3:RESTORE 3
109 0030:GOTO 56
110 IF NOT WRD(4) THEN N=4:RESTORE 3
111 0040:GOTO 56
112 GOTO 1010
113 M5E=K32:CM05=INT(NM*RND(K0))+K1:IF
114 CM05<4 OR MR=K1 THEN GOSUB 10:MY=PLY
115 :MX=PLX:COLOR MC:PLOT MX,MY
116 RETURN
117 SOUND K1,130,8,6:COLOR M5E:PLOT M
118 X,MY
119 IF MX<X THEN MX=MX+K1:GOTO 1230
120 IF MX>X THEN MX=MX-K1
121 IF MY<Y THEN MY=MY+K1:GOTO 1250
122 IF MY>Y THEN MY=MY-K1
123 LOCATE MX,MY,M5E:COLOR MC:PLOT MX
124 ,MY
125 IF MX=X AND MY=Y THEN SOUND K1,K0
126 ,K0,K0:PLR=PLRC:COLOR PLR:PLOT X,Y:MAP
127 P=K0:FND=MC:M5E=32:IF MR=K1 THEN MR=K2
128 IF STICK(K0)=15 THEN FOR D=K1 TO
129 G5H:NEXT D
130 RETURN
131 POKE 77,K0:FND=K32:SOUND K1,K0,K0
132 ,K0:Q=INT(30*RND(K0))+K1:IF Q<6 THEN G
133 OSUB 10:COLOR 63:PLOT PLX,PLY
134 IF G=K1 THEN MR=K0
135 IF MP=K1 OR MR=K1 THEN GOSUB 1150
136 GOTO 2050
137 FOR LP=K1 TO 4:GOSUB 10:COLOR KEY
138 (LP):PLOT PLX,PLY:NEXT LP:FND=K32:GOTO
139 2600
140 FND=K32:X=10:Y=5:FND=42:GOTO 1000
141 0
142 POSITION (20-LEN(WD$))/K2,9: ? #6;
143 WD$:FOR LP=K1 TO 400:NEXT LP:COLOR 32:
144 PLOT K2,9:DRAWTO 17,9:FND=32:GOTO 2600
145 2050 S=STICK(K0):SOUND K0,10,8,8:SOUND
146 K0,K0,K0
147 DX=(5=5 OR 5=6 OR 5=7)-(5=9 OR 5=
148 10 OR 5=11):DY=(5=5 OR 5=9 OR 5=13)-(5
149 =6 OR 5=10 OR 5=14)

```

```

2200 X=X+DX:Y=Y+DY:X1=X:Y1=Y
2400 COLOR FND:PLOT X-DX,Y-DY
2450 LOCATE X,Y,FND
2550 IF FND<>K32 THEN 2900
2600 COLOR PLR:PLOT X,Y
2700 TT=TT+K1:IF (MP=K1 AND MAPP=K1 AN
D TT>G5 AND CM05<4) OR (MR=K1 AND TT>G
5) THEN TT=K0:GOSUB 1200
2705 IF MR=K2 THEN RETURN
2710 IF NOT STRIG(K0) THEN 30300
2750 IF STICK(K0)=15 THEN 2700
2800 GOTO 2050
2900 IF FND=161 OR FND=33 THEN X=X-DX:
Y=Y-DY:FND=K32:GOTO 2600
2910 IF FND=63 THEN ON Q GOTO 2010,201
0,2020,2020,2030:GOTO 2600
2920 IF FND=MC THEN GOSUB 1255:GOTO 26
00
2930 IF FND<>K32 THEN GOSUB 30:SOUND K
2,K0,K0,K0:GOTO 2600
3000 IF X<K0 THEN X=19
3010 IF X>19 THEN X=K0
3020 IF Y<K0 THEN Y=11
3030 IF Y>11 THEN Y=K0
3040 IF X=19 AND X1=19 THEN X=18
3050 IF NOT (X OR X1) THEN X=K1
3060 IF NOT (Y OR Y1) THEN Y=K1
3070 IF Y=11 AND Y1=11 THEN Y=10
3080 TRAP 3000:RETURN
3100 IF X>6 AND X<12 THEN X=9
3110 IF Y=4 OR Y=6 THEN Y=5
3120 RETURN
4000 GOSUB 250:RESTORE 30010:Y=9
4045 FOR LP=K2 TO 8 STEP K2:READ WD$:P
OSITION K1,LP:Y #6;WD$:NEXT LP:COLOR 4
:PLOT X,Y:SOUND K1,20,8,8
4530 IF NOT STRIG(K0) THEN GOSUB 3230
0:GOTO 50
4540 SETCOLOR INT(5*MRND(K0)),INT(16*MRN
D(K0)),INT(7*MRND(K0))*K2:GOTO 4530
8100 GOSUB 250:COLOR K32:PLOT 9,11:R=K
1:GOSUB 12:GOSUB 3100:GOSUB 2000:IF MX
=X AND MY=Y THEN 2020
8150 IF NOT Y THEN 9700
8200 GOSUB 250:COLOR K32:PLOT 9,K0:GOS
UB 3100:R=K2:GOSUB 12:GOSUB 3100:GOSUB
2000:IF MX=X AND MY=Y THEN 2020
8250 IF Y=11 THEN 9700
8300 GOSUB 250:COLOR K32:PLOT K0,5:R=3
:GOSUB 12:GOSUB 3100:GOSUB 2000:IF MX=
X AND MY=Y THEN 2020
8350 IF X=19 THEN 9700
9700 MR=K1:GOSUB 250:COLOR K32:PLOT K0
,5:PLOT 9,K0:PLOT 19,5:PLOT 9,11:R=20:
GOSUB 12:GOSUB 3100:GOSUB 2000
9705 IF MX=X AND MY=Y THEN 2020
9710 IF NOT Y THEN 8200
9720 IF NOT X THEN 8300
9740 IF Y=11 THEN 8100
9800 GOSUB 600:COLOR K32:PLOT 19,5:R=4
:MR=K0:GOSUB 12:GOSUB 3100:GOSUB 2000:
IF NOT X THEN 9700
10000 MR=K0:GOSUB 100:COLOR GAT:PLOT 8
,K0:DRAWTO 11,K0:POSITION 7,3:IF VW=K1
THEN GOSUB 30200:GOSUB 30500:VW=K0
10005 IF WRDC=5 THEN GOSUB 32100
10010 POSITION 10,5:Y #6;"*":GOSUB 70:
MP=K0:SOUND K1,K0,K0,K0:GOSUB 2050:IF
Y=11 THEN 4000
10020 IF NOT X THEN 9800
10200 GOSUB 100:COLOR K32:PLOT 8,11:DR
AWTO 10,11:R=5:GOSUB 12:GOSUB 3100:GOS
UB 2000:IF NOT X THEN 10000
10250 IF NOT Y THEN 12000
10300 GOSUB 700:R=6:GOSUB 12:GOSUB 200
0:IF NOT X THEN 10200
10400 GOSUB 200:R=7:GOSUB 12:GOSUB 200
0:IF Y=11 THEN 10300
10500 GOSUB 800:R=8:GOSUB 12:GOSUB 200
0:IF Y=11 THEN 10400
10600 GOSUB 100:COLOR K32:PLOT 8,K0:DR
AWTO 10,K0:R=9:GOSUB 12:GOSUB 3100:GOS
UB 2000:IF NOT X THEN 10500
10640 IF Y=11 THEN 20000
10900 GOSUB 95:R=10:GOSUB 12:GOSUB 200
0:IF NOT X THEN 10600
10940 IF NOT Y THEN 11100
10950 IF X=19 THEN 11300
11000 GOSUB 900:R=11:GOSUB 12:GOSUB 20
00:IF NOT Y THEN 10900
11030 IF X=19 THEN 11200
11100 GOSUB 400:R=12:GOSUB 12:GOSUB 20
00:IF Y=11 THEN 10900
11200 GOSUB 700:R=13:GOSUB 12:GOSUB 20
00:IF NOT X THEN 11000
11300 GOSUB 1000:R=14:GOSUB 12:GOSUB 2
000:IF NOT X THEN 10900
11340 IF Y=11 THEN 11200
12000 GOSUB 500:COLOR K32:PLOT 8,K0:DR
AWTO 10,K0:R=15:GOSUB 12:GOSUB 3100:GO
SUB 2000:IF Y=11 THEN 10200
12100 GOSUB 600:R=16:GOSUB 12:GOSUB 20
00:IF X=19 THEN 12000
20000 GOSUB 400:COLOR K32:PLOT 8,11:DR
AWTO 10,11:R=17:GOSUB 12:GOSUB 3100:GO
SUB 2000:IF NOT Y THEN 10600
20100 GOSUB 900:R=18:GOSUB 12:GOSUB 20
00:IF NOT Y THEN 20000
20200 GOSUB 500:R=19:GOSUB 12:GOSUB 20
00:IF NOT X THEN 20100
30000 DATA 255,255,255,255,255,255,255
,255,126,195,231,153,153,255,165,255,0
,0,167,165,253,5,7,0
30005 DATA 0,0,24,60,153,219,255,255
30010 DATA RECOMPENSE
30020 DATA SCHEDULE
30030 DATA GRATUITOUS
30040 DATA PORRIDGE
30200 POSITION (20-LEN(WD$))/K2,3:Y #6
;WD$:FOR LP=K1 TO 500:NEXT LP:COLOR K3
2:PLOT K1,3:DRAWTO 18,3:RETURN
30300 IF FND=42 THEN 31500
30305 IF FND<>45 THEN 2750
30310 COLOR PLR:PLOT X,Y:LX(LL)=X:LIP(L
L)=PLR:LL=LL+K1:PLR=PLRC:FND=42:X=10:
Y=5:COLOR PLR:PLOT X,Y:G=K0
30350 IF NOT STRIG(K0) THEN 30350
30360 GOTO 2750
30500 FOR LP=K1 TO WD-4:LX(LP)=K0:LIP(L
P)=K0:NEXT LP:RETURN
31500 FOR LP=K1 TO WD-4:WC=A5C(WD$(LP)
):MCH=(20-LEN(WD$))/K2+LP-K1
31505 LOCATE MCH,3,MC1
31510 IF WC=MC1 OR WC+K32=MC1 OR WC+12
8=MC1 OR WC+160=MC1 THEN LOK=LOK+K1
31515 POSITION MCH,7:Y #6;CHR$(WC)
31520 NEXT LP:MAPP=K0
31530 IF LOK=LP THEN WRD(N)=K1
31540 IF LOK=LP THEN CLP=CLP+K1:SETCOL
OR 4,CLP,CLP:SOUND K2,10,CLP,8:IF CLP<
14 THEN 31540
31550 IF LOK=LP THEN CLP=K0:SOUND K2,K
0,K0,K0:SETCOLOR 4,K0,K0:WRDC=WRDC+K1:
GOTO 32010
32000 WRD(N)=K0:FOR LP=K1 TO 30:SOUND
K2,50,K2,8:NEXT LP:SOUND K2,K0,K0,K0
32010 IF STRIG(K0) THEN 32010
32015 IF WRDC=4 THEN GOSUB 32100:GOTO
2050
32020 GOTO 52
32100 COLOR K32:PLOT 8,K0:DRAWTO 11,K0
:RETURN
32200 GRAPHICS 18:POSITION 3,K2:Y #6;"
Word adventure":POSITION 9,5:Y #6;"B"
:POSITION 4,8
32220 ? #6;"STEVE GROLL":RETURN
32300 SOUND K1,K0,K0,K0:GRAPHICS K0:PO
SITION K2,K1:Y #6;"TYPE E FOR AN EASY GAM
E.":POSITION K2,3
32320 ? "TYPE H FOR A HARD GAME.":Y #6:
INPUT DIF$:Y #6;"IF DIF$="H" THEN G5=K1:G5
H=30:GOTO 32330
32325 G5=4:G5H=70
32330 ? "WOULD YOU LIKE TO ENTER NEW W
ORDS IN THE GAME?":INPUT NW$:IF NW$="
N" THEN RETURN
32335 LIST 30010,30050
32340 ? #6;"TYPE ONE WORD AFTER DATA A
ND PRESS RETURN ON EACH LINE."
32350 ? #6;"TYPE COM. WHEN READY TO CO
NTINUE.":END
32400 RETURN

```

CHECKSUM DATA.
(see page 8)

1 DATA 467,338,991,297,633,731,755,412
,216,711,712,999,863,659,573,9357
34 DATA 227,21,780,315,910,34,684,1,93
5,861,985,326,325,947,431,7782
74 DATA 560,726,194,290,307,270,291,36
9,391,266,650,920,186,923,941,7284
250 DATA 910,400,413,388,812,814,841,8
41,739,745,199,206,702,839,788,9637
1200 DATA 447,783,512,800,523,940,190,
995,792,592,964,539,721,870,951,10619
2030 DATA 253,157,194,196,935,782,78,1
59,37,323,88,637,735,875,536,5985
2920 DATA 273,584,55,999,44,996,733,87
3,881,693,58,545,565,788,959,9046
4045 DATA 290,873,8,418,59,793,903,325
,913,603,105,64,64,899,880,7197
10000 DATA 304,173,811,366,822,175,408
,356,374,965,941,412,178,964,862,8111
11030 DATA 952,247,838,607,943,109,270
,41,857,853,911,964,956,783,6,9337
30040 DATA 805,128,216,161,172,385,975
,65,427,226,523,730,935,203,536,6487
31550 DATA 369,257,685,467,911,342,233
,412,45,282,247,169,787,850,834,6890
32400 DATA 54,54

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by Jim Haney

The sun had just chinned itself on the mountains east of my San Clemente home and was climbing strongly, burning away the last vestiges of fog still clinging in patches along the ocean's edge. It promised a beautiful day—a perfect day for flying, I thought.

Oceanside, a city midway between San Diego and San Clemente, has a private airport, uncrowded and without major airlines to contend with, like those at John Wayne, Orange County's municipal airport.

A walk around the plane, a Piper PA-28-181 Archer II, revealed that nothing of import had transpired since my last flight. A check of the engine compartment showed that the Lycoming 4, a strong engine, was okay for oil, no leaks evident. Although small, the Archer is a four-seater and quite comfortable. I unlocked the cabin door, and eased myself into the pilot's seat.

A scan of the instrument panel relayed important information. Altimeter reading, 28 feet; give it a tap or two, to confirm. The magnetic compass indicated 283 degrees with the plane on the parking apron.

Reaching over, I adjusted the mixture control and snapped the magneto switches to both. A press of the starter button was rewarded by the Lycoming's healthy roar. It quickly settled into idle at an indicated 650 RPMs. I watched the oil pressure build and hold midway on the gauge. While warming up, it was time to set both the communications and navigation receivers. On my previously-filed flight plan, my intended destination for the day was Riverside Municipal.

Reaching over, I adjusted the NAV1 to the VOR frequency of 112.4, Riverside. That done, I dialed COMM1 to the ATIS frequency of 126.0. This would provide me with communication to the local ground controllers and ensure that I wouldn't become an unwanted obstacle for some 747.

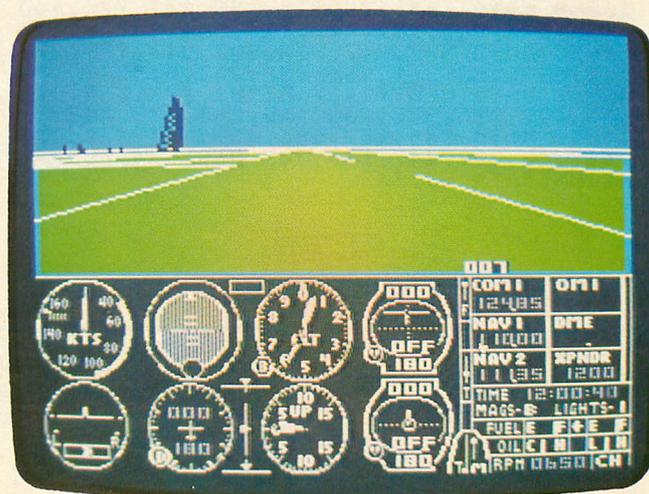
I centered all flight controls, then eased the throttle up and noted the corresponding rise of RPMs. With the plane rolling down the apron, I eased out onto the taxiway, heading for the west end of the duty (only) runway.

After centering the aircraft on the black asphalt runway, I set the brakes and prepared for last minute adjustments. The magnetic compass indicated a heading of 60 degrees, steady. I twisted the control for the trim knob of the heading indicator, which employs a gyro, until both agreed. Now my attention was diverted to the omni-bearing knob, where a course of 345 was

dialed in. I was immediately greeted with the readout of the distance measuring equipment (DME)—64.2 nautical miles to my destination.

A quick scan of the instrument panel again showed all to be in order. Both wing tanks were full, and the indicator showed fuel flowing from the right tank.

Easing the throttle forward to full, I watched as the RPMs came up to an indicated 2450. Minor corrections of the rudder pedals kept the plane tracking down centerline as the airspeed indicator rose to 40, 45, 50. At an indicated airspeed of 55 knots, I eased back on the yoke. The nose pitched-up, and the runway began to fall away.



Flight Simulator II.

Once again, I had slipped those surly bonds. The plane was climbing out smoothly, requiring almost no correction input from me. Still on a heading of 60 degrees magnetic and climbing out through 1500 feet, I retracted the flaps.

Lowering the RPMs to 1950, I climbed at a rate of about 500 feet per minute. The omni-bearing deviation indicator needle showed that it was time to begin a sweeping left turn.

I mentally plotted an intercept course of 330, which would bring me to a heading of 345 degrees. I rotated the yoke to the left. A slight press of the left rudder pedal in conjunction with a gentle tug of the yoke, and the aircraft was in a 30 degree left bank, neither gaining nor losing altitude. As the world wheeled below me, I glanced out to see the Pacific gleaming in the distance, under a blue and cloudless sky. As I maneuvered the aircraft onto the intercept course, the San Bernardino mountains loomed ahead.

This flight, friends, occurred in my living room. The magic utilized was my Atari computer and subLOGIC's fantastic new program **Flight Simulator II**.

Yes, the entire flight was one of fantasy. Since that first advertisement of subLOGIC's impending release of FS2, I couldn't wait to get my hands on it—and I wasn't disappointed! The documentation of this pro-

gram is the best this author has seen. The colorful package only hints at the adventure awaiting within.

Two disks comprise the media of FS2. One contains the core programs for both 48 and 64K equipped Ataris, scenery data for Chicago, and the WWI game, Ace. If there was any disappointment, it was finding that, with only 48K, I couldn't load or run the reality mode. You must have 64K to do this. Does this leave you with only a partially-executable program? Hardly.

With 48K, you fly in the "easy mode." Having never had one flying lesson, I made many holes around the central portion of Illinois prior to awarding myself a set of wings. I can now comfortably take off from the Champaign airport, hop over to Bloomington, and then fly on up to Kankakee for fuel—all without plowing some farmer's field!

Four area flight charts are furnished on two separate sheets. One depicts the New York, Boston area with Chicago to Champaign portrayed on the reverse. The other shows the Los Angeles area from north of Fillmore VOR, west to Riverside and south to San Diego. The reverse of this chart reveals the Seattle area, with some twenty airports from which to take off and land.

FS2 is also replete with two comprehensive manuals. One, the Pilot's Operating Handbook and Airplane Flight Manual, consists of 90 pages, including 11 pages of appendices devoted to descriptions of the aircraft, flying characteristics and program specifications. This booklet and the FS2 flight reference card are essential reading prior to any flight. Also included is a 92-page booklet on flight physics and aircraft control. This provides an introduction to advanced aerobatics, so very necessary to stay alive in the WWI air ace game.

The simulator and game may be flown utilizing two joysticks or the keyboard of your Atari. I prefer one joystick for primary flight controls, elevator, ailerons/rudder, and keyboard input for other necessary functions, such as engine RPMs, etc.

Upon booting, you'll find yourself at Meigs Field, Chicago. The John Hancock building stands to your left front. To practice takeoffs and landings, enhanced visual aids can be employed by entering the editor and punching up mode 8. This greatly aids first-time flyers and transfers you to the airport located at Champaign, Illinois.

Your radios, both COMM1 and NAV1, will be automatically set to the required frequencies. Takeoffs are performed fairly easily if the basic guidelines of the manuals are followed. Landings, however—until you get the hang of utilizing flaps in conjunction with throttle and elevator, and performing maneuvers while on the reverse side of the power curve—tend to be rather abrupt!

The second disk contains scenery information for the Seattle/Los Angeles area. The promise of sub-

LOGIC indicates that additional scenery disks will be made available to encompass other areas of the U.S. How about Denver for starters? Also, let's hope that consideration is made for those of us with multi-drive systems.

A visit to the local flying club, at the Marine Corps Air Station in El Toro, California, provided my first view of the actual aircraft in which I'd already spent many engrossing hours. With the field attendant's permission, I was allowed to examine the aircraft.

I was amazed at the accuracy with which subLOGIC had portrayed the instruments. All primary flight instruments were almost exact; I really had the feeling that, with very little instruction, I could fly this airplane. Minor changes had been made to accede to the computer's requirements.

The clock portrayed by FS2 is digital, as is its RPM indicator. The magnetic compass resides in the dash, not as portrayed, on top, in FS2. These differences were all technicalities. The beauty of this program is that I felt as if, with a qualified instructor, I could start and fly this aircraft!

I hope I've pricked your imagination with this review. If so, run, don't walk, to your nearest dealer. Plunk your hard-earned dollars down for your copy of subLOGIC's **Flight Simulator II**. I'll be waiting at 6000 feet, on my way to Riverside. □

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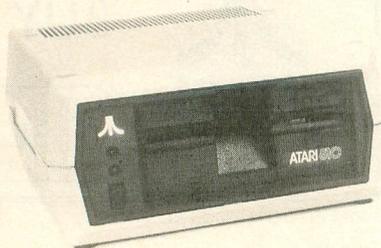
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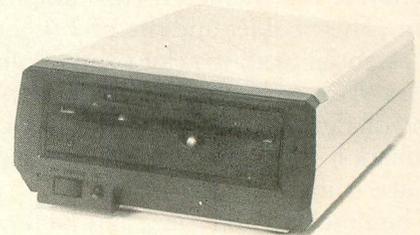
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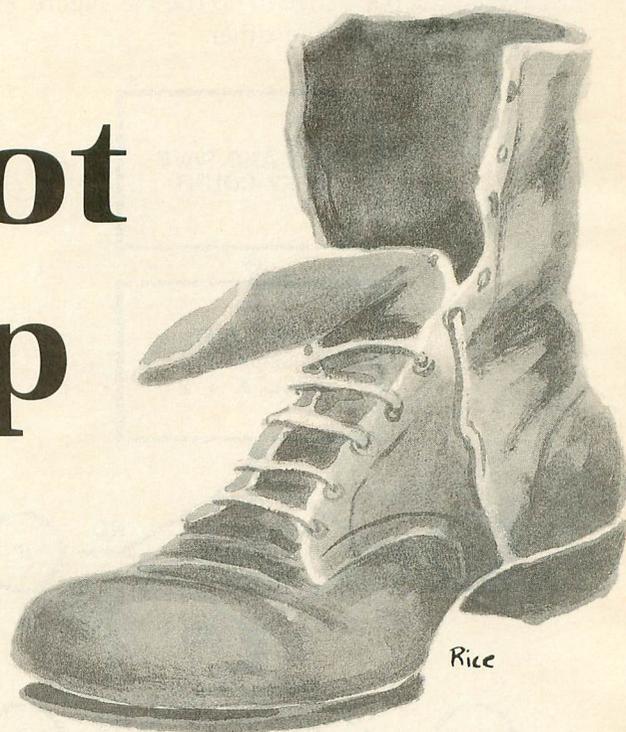
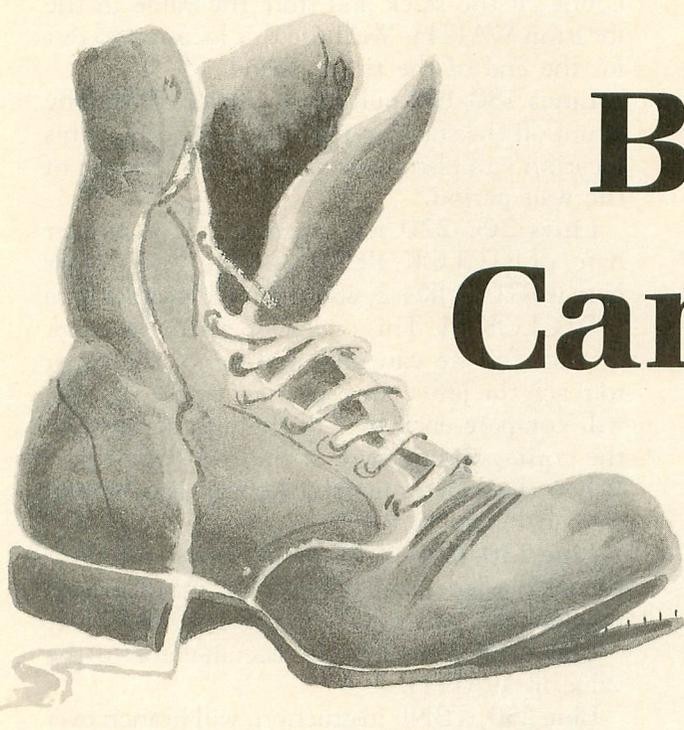
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CIRCLE #126 ON READER SERVICE CARD

Boot Camp



by Tom Hudson

In this installment of **Boot Camp**, we continue our work with BASIC USR calls, in order to become more familiar and comfortable with the 6502 instruction set.

It's about time.

The first USR call we'll look at this time is a simple timer. Timer programs are easy to write on Atari computers, because, inside each one, is a real-time clock. It doesn't have any hands, but you can write a program to read it.

The Atari's real-time clock is found in three memory locations: 18, 19 and 20 (\$12, \$13 and \$14). The clock itself is updated by the system's vertical blank interrupt (VBI) code, which is executed sixty times per second. Each 1/60th of a second is known as a jiffy. Each time the VBI code is executed, the byte at location \$14 is incremented. When this value gets to 255, it is set to zero, and location \$13 is incremented. When location \$13 reaches 255, it is set to zero and location \$12 is incremented.

In order for you to see exactly how this timer operates, type in the BASIC program shown in Figure 1 and RUN it.

As you can easily see, this program simply prints the contents of memory locations 18, 19 and 20 to the screen. You can actually watch each location being modified by the VBI routines. Note that location 20 takes roughly 4.25 seconds to go from 0-255 (256 * 1/60th of a second). Locations 19 and 20, which together make up a 2-byte counter ranging from 0-

65535, take roughly 1092 seconds, or 18.2 minutes, to go from 0-65535. All three locations, making up a 3-byte counter ranging from 0-16777215, take about 77.6 hours to go from 0-16777215. I don't recommend leaving your computer on long enough to test this principle; just take my word for it.

```
10 POKE 752,1:POSITION 2,0:PRINT PEEK(
18);" ";PEEK(19);" ";PEEK(20);" ":GOT
0 10
```

Figure 1.

Now that we know how the internal real-time clock works, let's write a USR call that will take advantage of it. This program will allow us to pass a value in jiffies from BASIC, ranging from 0-65535, that will make the computer wait that exact period of time.

This is actually a very simple routine. All we need to do is set the two low-order bytes of RTCLOCK (real-time clock) to zero and wait for them to reach the jiffy count that BASIC asked for. The flowchart for this program is shown in Figure 2.

One thing important to note about the real-time clock bytes is that they are not ordered in memory from low- to high-order. Instead of RTCLOCK containing the low-order value, RTCLOCK+2 has it. In the same manner, RTCLOCK contains the highest-order byte, not RTCLOCK+2. This is one of the few cases where the low-order, high-order custom is broken, so keep this in mind when working with RTCLOCK.

All right, now that we know what must be done,

let's write the 6502 code to do the job. Figure 3 shows one way to handle the timer.

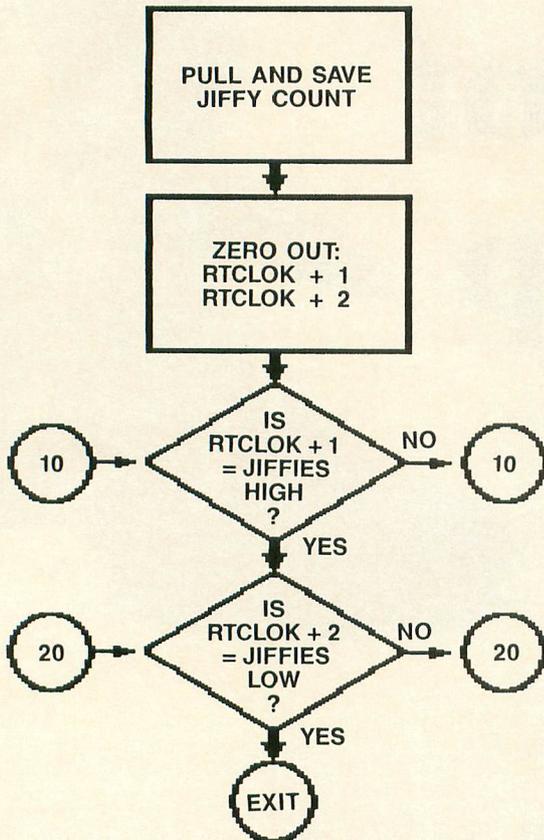


Figure 2.

```

0100 WAITL  =  $CB
0110 WAITH  =  $CC
0120 RTCLOCK = $12
0130      *= $0600
0140      CLD          ;CLEAR DECIMAL
0150      PLA          ;DISCARD BARG5
0160      PLA          ;PULL WAIT HI
0170      STA WAITH    ;AND SAVE IT
0180      PLA          ;PULL WAIT LO
0190      STA WAITL    ;AND SAVE IT
0200      LDA #0       ;ZERO OUT...
0210      STA RTCLOCK+1 ;CLOCK BYTE 2
0220      STA RTCLOCK+2 ;CLOCK BYTE 3
0230 WAITLP LDA RTCLOCK+1 ;GET CLOCK HI
0240      CMP WAITH    ;= WAIT HI?
0250      BNE WAITLP  ;NO, LOOP BACK!
0260 WAITL2 LDA RTCLOCK+2 ;GET CLOCK LO
0270      CMP WAITL    ;= WAIT LO?
0280      BNE WAITL2  ;NO, LOOP BACK!
0290      RTS          ;WAIT'S OVER!

```

Figure 3.

Let's walk through the timer code and see what's going on.

Line 140 clears the decimal mode. This isn't necessary in this program, since we're not doing any addition or subtraction, but let's get into the habit of using this instruction.

Line 150 pulls the number of arguments from the 6502 stack. This number is assumed to be 1, and we're going to simply discard it.

Lines 160-170 pull the high byte of the jiffy count off the stack and store the value in the location WAITH. We'll use this location to test for the end of the timer period.

Lines 180-190 pull the low byte of the jiffy count off the stack and store it in WAITL. This location will also be used to test for the end of the wait period.

Lines 200-220 zero out the two low-order bytes of RTCLOCK. Remember, the lowest-order byte is RTCLOCK+2, and the middle-order byte is RTCLOCK+1. This operation starts the timer at zero, and we can now waiting for the timer to reach the jiffy count specified by BASIC. We will compare each byte of the jiffy count with the corresponding byte of the real-time clock. When these bytes match, the wait is over, and we can return to BASIC.

Line 230, labeled WAITLP (wait loop), loads the middle-order byte of RTCLOCK into the accumulator. We can now compare it to WAITH.

Line 240 compares the accumulator to the value in WAITH.

Line 250, a BNE instruction, will branch over to WAITLP if the accumulator is *not equal* to WAITH. If these bytes are equal, we need to compare the low-order bytes, and the program continues at the next instruction.

Line 260, labeled "WAITL2" (wait loop 2) loads the low-order byte of RTCLOCK into the accumulator, and we're ready to compare the low-order bytes.

Line 270 compares the accumulator to the value in WAITL.

Line 280, another BNE instruction, branches back to WAITL2 if the accumulator is *not equal* to WAITL. If the branch is taken, the program will continue at WAITL2, waiting for the low-order bytes to match. If the bytes are equal, then the wait is over, since the high-order and low-order bytes are the same.

Line 290 is executed when all the timer values match. This RTS statement simply returns control to BASIC.

You can try the timer routine for yourself. Figure 4 shows the BASIC code necessary to set up and call the USR subroutine.

```

10 FOR X=1536 TO 1562:READ N:POKE X,N:
NEXT X:TIMER=1536
20 TRAP 20:? "ENTER JIFFIES TO WAIT";:
INPUT WAIT:TRAP 40000
30 ? "WAITING..."
40 A=USR(TIMER,WAIT)
50 ? "TIME'S UP!":?
60 GOTO 20
100 DATA 216,104,104,133,204,104,133,2
03,169,0,133,19,133,20,165,19,197,204,
208,250,165,20,197,203,208
110 DATA 250,96

```

Figure 4.

Line 10 READs the assembly-language data in Lines 100-110 and POKEs them into memory, starting at location 1536 (\$0600). Since the timer code is relocatable, you may place it in a BASIC string and call it that way, if you like.

Line 20 accepts the number of jiffies to wait from the keyboard, placing the value in the variable WAIT. You should limit this value to the range 1-65535, for a wait of from 1/60th of a second to 18.2 minutes. To wait exactly one minute, you should type 3600 (60 seconds times 60 jiffies per second).

Line 30 prints a message to let you know when the time period starts.

Line 40 calls the USR routine with the statement:

A=USR (TIMER, WAIT)

Note that, instead of using 1536 as the USR code address in the USR call, we have used the variable TIMER, which was set to 1536 in Line 10. This is a good practice, since it helps document what the USR call is doing. This can be very helpful later, when you need to change the program for some reason.

Lines 50-60 cause the console speaker to beep, print a "time's up" message, and return to Line 20 to accept another time period.

Lines 100-110 contain the numeric data values which, when POKEd into memory, make up the timer USR subroutine.

After you have typed in the program, RUN it. The program will ask:

ENTER JIFFIES TO WAIT?

Type 60 and press RETURN. The computer should wait one second, beep, and print:

TIME'S UP!

See? When you typed 60, BASIC told the USR subroutine to zero out the real-time clock and wait until it counted 60 jiffies. If you type 65535, the computer will wait 18.2 minutes before it beeps.

This routine can be very handy in almost any program which requires several time delays. You probably won't use any time periods over a couple of minutes, but the program can handle it if the need arises.

PEEKing Tom?

How many times have you wanted to know the value stored in a 2-byte data item? For example, if you want to know where the display list begins, you must type:

DLIST=PEEK (560) +PEEK (561)*256

If you have to do this a dozen times in a single program, each time with a different address, it can be a real pain—as well as use up memory.

Well, why not write a USR call that will do this tedious work for you? It's simple and only takes 20 bytes of memory space.

We'll call the USR function "DPEEK," for double-byte PEEK. It will be set up so that, when the user furnishes the address of the first byte of the 2-byte value, the USR call will return the value contained in the 2 bytes.

This will be the first time we've used post-indexed indirect addressing, but don't get nervous. It's actually not as bad as it sounds, and is a very handy function of the 6502.

As you will recall, post-indexed indirect addressing uses 2 bytes on page 0 (the first 256 bytes of memory) to form an address. It then uses the Y register to get an offset from this address. Let's look at an example.

Let's say the computer wants to execute the instruction: LDA (ADDR),Y. The location ADDR must be on page 0 (this is a restriction of the 6502). Assume that location ADDR contains \$4F, and ADDR+1 contains \$60. The computer will form the address \$604F from these 2 bytes, then add the Y register to this address. Assuming the Y register contains \$06, the final address will be \$6055, the total of \$604F + \$06. Therefore, the accumulator will be loaded from location \$6055. Get it?

What we'll do in this USR call is pass an address to the subroutine. The subroutine will store the ad-

(continued on next page)

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dress on page 0 and indirectly load the byte at the address (the low byte of a 2-byte value) and the byte at the address + 1 (the high byte of a 2-byte value). The decimal equivalent of this number will be returned to BASIC. The flowchart of this procedure is shown in Figure 5.

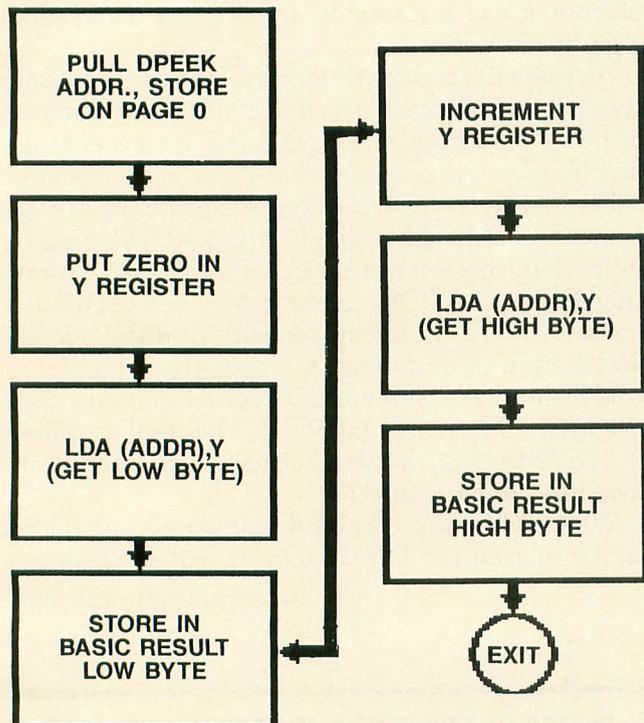


Figure 5.

Now let's look at the 6502 assembly code corresponding to the flowchart. It's relatively short and easy to follow. This code is shown in Figure 6.

```

0100 PEEKL = $CB
0110 PEEKH = $CC
0120 RESLO = $D4
0130 RESHI = $D5
0140      *= $0600
0150 CLD      ;CLEAR DECIMAL
0160 PLA      ;DISCARD HARG5
0170 PLA      ;PULL PEEK HI
0180 STA PEEKH ;AND SAVE IT
0190 PLA      ;PULL PEEK LO
0200 STA PEEKL ;AND SAVE IT
0210 LDY #0    ;Y REG = 0
0220 LDA (PEEKL),Y ;GET LO BYTE
0230 STA RESLO ;AND SAVE IT
0240 INY      ;Y REG NOW = 1
0250 LDA (PEEKL),Y ;GET HI BYTE
0260 STA RESHI ;AND SAVE IT
0270 RTS      ;ALL DONE!
  
```

Figure 6.

Lines 100-110 set up equates for 2 bytes on page 0. Remember that BASIC only allows us to use 0 page locations \$CB-D1; using other addresses could prevent the subroutine from working properly—or even lock up the system. Note that these bytes are stored in low-byte, high-byte order. This is a must for indirect addressing.

Lines 120-130 set equates for RESLO and RESHI, the storage locations which will return the subroutine's result to BASIC. For further information on these bytes, see issue 25's **Boot Camp**.

Line 140 sets the program counter to \$0600, placing this program on page 6. This subroutine will be relocatable, though, so the address really doesn't matter.

Line 150 clears the decimal mode, placing us in binary mode. This program doesn't do any math, but let's get into the CLD habit, okay?

Line 160 starts the subroutine's operation by pulling the number of arguments off of the stack. Assume the programmer has only sent one argument, the address the subroutine is to DPEEK at. After being pulled off the stack, this value is discarded.

Lines 170-180 pull the high byte of the address to be DPEEKed off the stack and store it in its page 0 location, PEEKH.

Lines 190-200 pull the low byte of the address to be DPEEKed off the stack and store it in its page 0 location, PEEKL. At this point, the program has set up its indirect memory pointer and is ready to perform the DPEEK operation.

Line 210 places a zero in the Y register. All post-indexed indirect instructions use the Y register to calculate an offset from the address used, and, since we want to load the first byte from the address in PEEKL and PEEKH with no offset, the Y register must be zero (no offset).

Line 220 loads the accumulator indirectly from the address in PEEKL and PEEKH. Since we are loading the first byte of the 2-byte value, this is the *low order* byte of the DPEEK value.

Line 230 stores the value just loaded into RESLO, the low-order byte of the result to be returned to BASIC.

Line 240 increments the Y register, changing it from 0 to 1. In this way, we're now ready to retrieve the second byte of the DPEEK value, because a 1 in the Y register will cause the indirect load to get the byte from the address in PEEKL and PEEKH + 1.

Line 250 loads the accumulator indirectly from the address in PEEKL and PEEKH + 1. This is the *high order* byte of the DPEEK value.

Line 260 stores the high order byte of the DPEEK value in RESHI, so that it can be returned to BASIC.

Line 270 executes an RTS instruction to return control to BASIC. At this point, RESLO and RESHI contain the value that was DPEEKed out of the address passed to the subroutine by BASIC.

The BASIC code for your DPEEK subroutine is shown in Figure 7.

```

10 FOR X=1536 TO 1555:READ N:POKE X,N:
NEXT X:DPEEK=1536
20 TRAP 20:? "ENTER DPEEK ADDRESS";:IN
PUT ADDRESS:TRAP 40000
30 A=USR(DPEEK,ADDRESS)
40 PRINT A
50 GOTO 20
100 DATA 216,104,104,133,204,104,133,2
03,160,0,177,203,133,212,200,177,203,1
33,213,96
    
```

Figure 7.

Type in this short BASIC program and RUN it. When asked for a DPEEK address, type 88 and press RETURN. The program will print a number and ask for another DPEEK address.

The number printed by the subroutine is the value PEEK(88) + PEEK(89) * 256. To confirm this, stop the program by pressing BREAK and type:

```
PRINT PEEK(88)+PEEK(89)*256
```

The number printed by this statement when you press RETURN should match the one printed by the DPEEK function. If not, you probably mistyped one or more DATA values in Line 100.

What did we DPEEK? The addresses 88 and 89 are known as "SAVMSC." These bytes point to the first byte of screen memory. To prove this, POKE a 1 into the address printed by the DPEEK subroutine. For example, if the DPEEK routine printed 40000, you would enter:

```
POKE 40000,1
```

You should see an exclamation point (!) at the upper left corner of your screen. The exclamation point is represented in screen memory by the number 1, so that's what shows up. See how handy the DPEEK function is?

You can easily find out where the display list is by DPEEKing SDLSTL (560). To find where the DOS vector is pointing, DPEEK DOSVEC (10). You can use the DPEEK function to find the contents of any 2-byte pointer that is in standard low-byte, high-byte format.

To summarize, the DPEEK subroutine uses a value passed to it by BASIC to point to a location in memory. The contents of this location and the location + 1 are used to build a 2-byte value which is passed back to BASIC. Figure 8 shows a pictorial representation of this function.

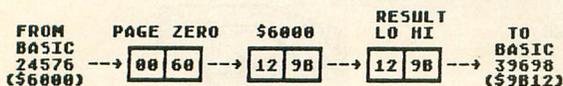


Figure 8.

I'm sure most of you programmers out there will appreciate the DPEEK function. It makes the operation of checking pointers a lot easier.

Homework time.

Now that I've shown you an example of indirect addressing, it's time for you to try one of your own.

The assignment: write a companion subroutine for DPEEK that will perform a DPOKE function. That is, the subroutine accepts two arguments—the address to DPOKE and the value to be DPOKEd into the address. The function is very similar to the DPEEK operation, except that the program stores the second argument's bytes into the address and address+1, instead of reading them and returning them to BASIC.

After you code the program, verify that it is operating correctly by using the DPEEK function. For example, if you DPOKE address 1776 with a value of 65245, the DPEEK of address 1776 should return 65245.

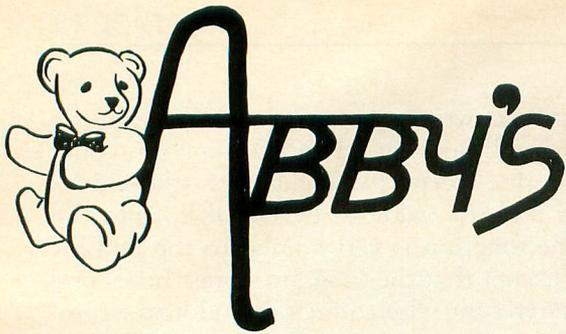
Until next time, try coding this problem. Use the DPEEK routine as a guide, since its operation is very similar. If you have any problems, remember that you can contact me via the Atari SIG on CompuServe. My user ID is 70775,424. If you don't have a modem, you can write the address below. □

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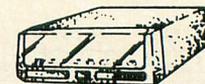
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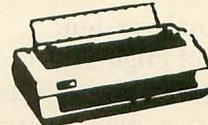
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CIRCLE #129 ON READER SERVICE CARD

BASIC Training



by Tom Hudson

Well, here it is, folks! The final, BASIC version of **High Seas**, the program we've been developing since issue 23. You're now welcome to type it in and give it a try.

The final version?

Actually, this version of **High Seas** isn't *exactly* perfect—its graphics won't win any awards, and there's no sound. It does, however, play a respectable game of Battleship, and it does this in a 16K cassette system. If your computer has more than 16K left, you may want to spruce up the graphics and add sound, to make the game more aesthetically pleasing.

The actual artificial intelligence (AI) routines aren't sacred, either. If you can find a way to make the computer play a better game, by all means, do it! Use the game logic flowcharts from the last four issues as a guide.

Playing High Seas.

When RUN, **High Seas** will take a few seconds to set up and initialize its storage areas. After this process is complete, the computer will set up its ships and ask you to enter the positions of your ships. At this point, your screen should look like Figure 1.

In Figure 1, you will see two ship grids, labeled *COMPUTER* and *PLAYER*. The *COMPUTER* grid, on the left side of the screen, is the one you will use to shoot at the computer's ships. The right grid, *PLAYER*, is the one on which you will place your ships. You will note that each grid is initially filled with + symbols. These indicate that the location is not oc-

cupied by a ship, and no shots have been fired at the location.

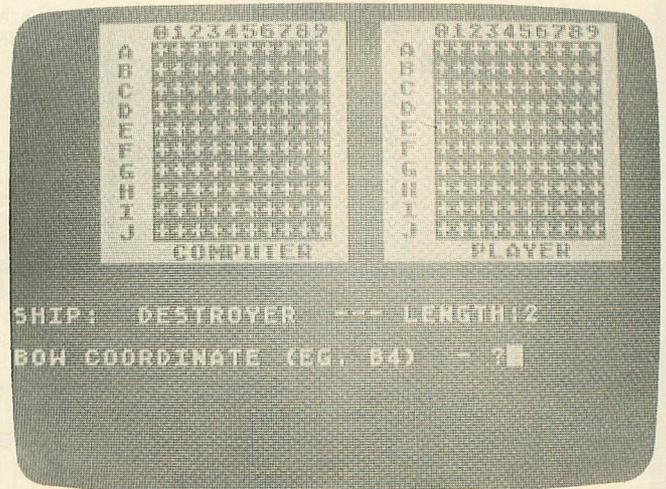


Figure 1.

To place your ships, you must enter a bow and stern coordinate for each ship. The computer will indicate which ship is to be placed, and you simply enter the endpoints. Figure 2 shows one possible fleet configuration.

In Figure 2, all five ships (destroyer, submarine, cruiser, battleship and aircraft carrier) have been placed on the *PLAYER* grid. The coordinates necessary to place them in this formation are shown in Figure 3.

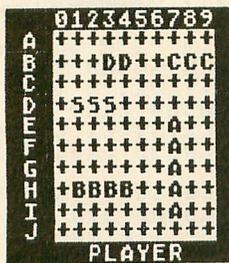


Figure 2.

SHIP	COORDS
DESTROYER	B3 TO B4
SUBMARINE	D1 TO D3
CRUISER	B7 TO B9
BATTLESHIP	H1 TO H4
A. CARRIER	E7 TO I7

Figure 3.

Note that all the coordinates are entered in letter-number format, the letter taken from the left side of the placement grid, and the number from the top.

When entering the ship coordinates, the computer will ask (as above) for "bow" and "stern" coordinates. Actually, these terms are interchangeable, and the computer doesn't care which coordinate you enter first. For example, the destroyer's coordinates could have been entered as BOW: B3, STERN:B4 or as BOW:B4, STERN:B3.

Ships must be placed either horizontally or vertically (no diagonals), and they cannot overlap. If you try to enter an illegal coordinate, the computer will inform you and ask you to input the values again.

After entering the coordinates of all five ships, the computer will pick a random number and decide who goes first.

The player and computer take turns firing at each other's ships. As in ship placement, firing is accomplished by entering the letter-number coordinate of the position you want to shoot at on the COMPUTER grid. Hits on enemy ships are indicated by an * character, while misses are shown as blanks. You can fire at any position that has not been fired at yet. Any errors in shooting will cause the computer to ask you to re-enter your shot.

As the computer shoots at your fleet, its shots will appear on the PLAYER grid, in the same way your shots appear on the COMPUTER grid.

The first being (either computer or human) to sink all the other's ships wins the game. If the computer wins, it will reveal the positions of its ships, so that you can see where you should have fired.

I think you'll find that the artificial intelligence routines in **High Seas** make the computer a worthy opponent. The combination of luck and strategy make this game fun for everyone (even computers).

The program.

Because of memory limitations (**High Seas** barely fits in 16K cassette systems), REMarks in the program were limited to main routines. However, if you look at the flowcharts from past issues, you should have little trouble finding the function of any particular group of code. The following information should also help clear up any confusion.

Lines 70-150 define and initialize the major constants, strings and arrays used by the program. The variables C0 through C10, defined in Line 70, are used to save memory in frequently-used numeric values. Lines 120-130 zero out the numeric arrays, an important operation, since Atari BASIC does not do this for you.

Lines 160-200 set up the **High Seas** game screen. As mentioned earlier, this display is probably the bare minimum to get the information across. Once again, this was primarily due to memory constraints, and you should feel free to improve it.

Line 210 calls the subroutine at 2270, which sets up the computer's fleet.

Lines 220-240 set variables for each of the five ships and call the subroutine at 520 for each ship, enabling the player to place his or her ships.

Lines 250-260 decide who goes first with a simple random number function. If the computer goes first, control is transferred to the AI routines starting at Line 730. If the human player goes first, the program continues at Line 270.

Lines 270-510 are the human's shooting routine. This code accepts a letter-number coordinate, verifies it and checks for a hit or miss. Lines 370-460 check for sunken ships. If no ships are sunk, control goes to the computer's AI routine at Line 730. If a ship is sunk, Line 480 increments XS, the computer's sink counter. If XS=5, all five ships have been sunk, and the human wins.

Lines 520-720 make up the human ship placement subroutine. This routine accepts the bow and stern coordinates, converts them into numeric values with the subroutine at 2510, and verifies that the coordinates are valid. If the coordinates are okay, the ship is placed, and the subroutine RETURNS. If not, an appropriate error message is printed by Line 620 or Lines 690-710.

Lines 730-1990, which take up about half of the program code, are the computer's AI routines for shooting. Most of the effort in writing **High Seas** was spent coding and fine-tuning this section. This code has two main sections: random firing, when there are no unresolved hits; and selective firing, used to sink a ship that already has one or more hits on it. This code is incredibly complex, so I suggest that you study the flowcharts from issue 26 before altering these lines.

Lines 730-1010 handle random firing; 1020-1310 are general subroutines; and 1320-1570 execute a shot, update the display and test for sunken ships. Lines 1580-2100 try to sink those ships with one or more hits and also detect ships which have been placed next to each other.

Lines 2110-2170 are general purpose subroutines which clear portions of the screen, position the cursor and perform time-delay functions.

Lines 2180-2260 are used when the game is over. If the computer wins, a GOSUB 2560 is executed, in order to reveal the computer's fleet layout. If desired, the player may request another game at this point.

Lines 2270-2500 make up a small AI routine that's used to set up the computer's fleet. This routine is careful about placing ships next to each other—a bad tactic if used too often.

Lines 2510-2540 decode the letter-number coordinates entered by the human player into numeric values used in array subscripts.

Lines 2550-2580 display the computer's fleet layout at the end of the game.

More BASIC Training.

Next issue, we'll start designing a new game. Remember to send in your topic suggestions. □

Send letters to:

BASIC Training

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P.O. Box 23
Worcester, MA 01603

```

10 REM *****
20 REM *
30 REM * HIGH SEAS BY TOM HUDSON *
40 REM * A.N.A.L.O.G. COMPUTING *
50 REM *
60 REM *****
70 READ C0,C1,C2,C3,C4,C5,C9,C10:DATA
0,1,2,3,4,5,9,10
80 POKE 82,C0:REM *** LEFT MARGIN ***
90 DIM CG0(C9,C9),CG1$(100),HG0(C9,C9),
HG1$(100),SL0(C5,C5),SL1(C5,C5),SD(C5,C1)
100 DIM SN$(50),SH$(C3),S1$(C3),S2$(C3),
S3$(C3),B$(C3),W$(C5),W2$(C5)
110 DIM HA(C9,C9),D(C4),P$(C1):D(C1)=C
1:D(C2)=C2:D(C3)=C3:D(C4)=C4
120 FOR X=C0 TO C9:FOR Y=C0 TO C9:CG0(X,Y)=C0:HG0(X,Y)=C0:HA(X,Y)=C0:NEXT Y:
NEXT X
130 FOR X=C0 TO C5:FOR Y=C0 TO C5:SL0(X,Y)=C0:SL1(X,Y)=C0:NEXT Y:SD(X,C0)=C0
:SD(X,C1)=C0:NEXT X
140 CG1$="" :CG1$(100)="" :CG1$(2)=CG1
$:HG1$=CG1$
150 SN$="DESTROYER SUBMARINE CRUISER
BATTLESHIP-A-CARRIER ":IF RND(C0)<0.5
THEN T=0.5
160 ? "K":? " 0123456789 " 0
123456789 "
170 LTR=193:FOR Y=C2 TO 11:POSITION C5
,Y:?"":CHR$(LTR);"++++++"
180 POSITION 21,Y:?"":CHR$(LTR);"++++
++++" :LTR=LTR+C1:NEXT Y
    
```

```

190 POSITION C5,12:?" COMPUTER " :
POSITION 21,12:?" PLAYER "
200 GOSUB 2120
210 GOSUB 2130:?"I'M SETTING UP MY FL
EET.":GOSUB 2270:GOSUB 2120
220 GOSUB 2130:?"IT'S TIME TO SET UP
YOUR SHIPS.":GOSUB 2160
230 SIX=C1:SL=C2:SV=C1:GOSUB 520:SIX=1
1:SL=C3:SV=C2:GOSUB 520:SIX=21:SL=C3:V
=C3:GOSUB 520
240 SIX=31:SL=C4:SV=C4:GOSUB 520:SIX=4
1:SL=C5:SV=C5:GOSUB 520
250 GOSUB 2120:?" IF RND(0)<0.5 THEN ?
"I WILL GO FIRST.":GOSUB 2160:GOSUB 2
120:GOTO 730
260 ? "YOU GO FIRST!":GOSUB 2160:GOSUB
2120
270 REM *** HUMAN'S TURN ***
280 GOSUB 2120:?"ENTER YOUR SHOT - ";
:INPUT SH$:IF LEN(SH$)<>C2 THEN 510
290 S1$=SH$:GOSUB 2510:IF BX<C0 OR BX>
C9 OR BY<C0 OR BY>C9 THEN 510
300 CIX=BX+BY*C10+C1:IF CG1$(CIX,CIX)<
>" THEN GOSUB 2140:?"OOPS - TRY AGA
IN!":GOSUB 2160:GOTO 270
310 CG1$(CIX,CIX)="2"
320 IF CG0(BX,BY)<C0 THEN S$="*":SD(CG
0(BX,BY),C1)=SD(CG0(BX,BY),C1)+C1:HD=5
D(CG0(BX,BY),C1):GOTO 350
330 S$="" :GOSUB 500:GOSUB 2140:?"YOU
R SHOT MISSES!":GOSUB 2160
340 CG1$(CIX,CIX)="1":GOTO 730
350 GOSUB 500:GOSUB 2140:?"IT'S A HIT
!!!":GOSUB 2160:ON CG0(BX,BY) GOTO 370
,390,410,430,450
360 STOP
370 IF HD=C2 THEN SM=C1:GOTO 470
380 GOTO 730
390 IF HD=C3 THEN SM=C2:GOTO 470
400 GOTO 730
410 IF HD=C3 THEN SM=C3:GOTO 470
420 GOTO 730
430 IF HD=C4 THEN SM=C4:GOTO 470
440 GOTO 730
450 IF HD<C5 THEN 730
460 SM=C5
470 POSITION C0,19:?"YOU SUNK MY ":SM
$(SM-C1)*C10+C1,SM*C10;"!!!!":GOSUB 2
160
480 X5=X5+C1:IF X5=C5 THEN 2190
490 GOTO 730
500 POSITION 8+BY,C2+BX:?" S$:RETURN
510 GOSUB 2140:?"INCORRECT INPUT!":GO
SUB 2160:GOTO 270
520 REM *** HUMAN SET-UP ***
530 GOSUB 2120
540 ? "SHIP: ";SN$(SIX,SIX+C9);" ---
LENGTH:";SL;" "
550 ? " ? "BOW COORDINATE (EG. B4) - "
";:INPUT B$
560 ? "STERN COORDINATE - ";;I
NPUT S$
570 IF LEN(B$)<>C2 OR LEN(S$)<>C2 THEN
690
580 S1$=B$:S2$=S$:GOSUB 2510
590 IF BY<C0 OR BY>C9 OR S1<C0 OR S1>C
9 THEN 690
600 IF BX<C0 OR BX>C9 OR S1<C0 OR S1>C
9 THEN 690
610 XI=SGN(BX-S1):YI=SGN(BY-S1):IF ABS
(XI-YI)<>C1 THEN 700
620 IF ABS(BX-S1)+ABS(BY-S1)<>(SL-C1)
THEN GOSUB 2150:?"SHIP WON'T FIT!":GO
TO 720
630 H1=5X:H2=5Y
640 H1=H1-XI:H2=H2-YI
650 FOR W2=C1 TO SL:H1=H1+XI:H2=H2+YI:
IF HG0(H2,H1)<C0 THEN 710
660 NEXT W2:H1=5X-XI:H2=5Y-YI
670 FOR W2=C1 TO SL:H1=H1+XI:H2=H2+YI:
POSITION 24+H2,2+H1:?" S1$(SIX,SIX):SL0
(SV,W2)=H2:SL1(SV,W2)=H1
680 HG0(H2,H1)=SV:NEXT W2:RETURN
690 GOSUB 2150:?"INCORRECT INPUT!":GO
TO 720
700 GOSUB 2150:?"NO DIAGONALS!":GOTO
720
    
```

```

710 GOSUB 2150:?"SHIP OVERLAPS ANOTHE
R!"
720 GOSUB 2160:GOTO 520
730 REM *** COMPUTER'S TURN ***
740 IF 50(C5,C0)<C5 THEN 05=C5:GOTO 78
0
750 IF 50(C4,C0)<C4 THEN 05=C4:GOTO 78
0
760 IF 50(C3,C0)<C3 OR 50(C2,C0)<C3 TH
EN 05=C3:GOTO 780
770 05=C2
780 IF 50(C1,C0)<C2 THEN L5=C2:GOTO 82
0
790 IF 50(C2,C0)<C3 OR 50(C3,C0)<C3 TH
EN L5=C3:GOTO 820
800 IF 50(C4,C0)<C4 THEN L5=C4:GOTO 82
0
810 L5=C5
820 IF HP>C0 THEN 1580:REM *** SRCH FO
R NEXT HIT ***
830 IF 5>75 THEN 960:REM *** SYSTEMATI
C ***
840 G5=C0:N=C0
850 N=N+C1:IF N>C10 THEN 900
860 GOSUB 1080:IF HG1$(HIX,HIX)<>" " T
HEN 850
870 GOSUB 1140:IF BH>C0 AND RND(C1)<0.
8 THEN 850
880 GOSUB 1050:IF G5=C1 THEN 1320
890 GOTO 850
900 G5=C0:N=C0
910 N=N+C1:IF N>75 THEN 960
920 GOSUB 1080:IF HG1$(HIX,HIX)<>" " T
HEN 910
930 GOSUB 1140:IF BH>C0 AND RND(C1)<0.
8 THEN 910
940 GOSUB 1020:IF G5=C1 THEN 1320
950 GOTO 910
960 FOR X=C0 TO C9:FOR Y=C0 TO C9:GOSU
B 1090:IF HG1$(HIX,HIX)<>" " THEN 980
970 G5=C0:GOSUB 1050:IF G5=C1 THEN 132
0
980 NEXT Y:NEXT X
990 FOR X=C0 TO C9:FOR Y=C0 TO C9:GOSU
B 1090:IF HG1$(HIX,HIX)<>" " THEN 1010
1000 G5=C0:GOSUB 1020:IF G5=C1 THEN 13
20
1010 NEXT Y:NEXT X:STOP
1020 GOSUB 1100:GOSUB 1120:IF XT>=05 T
HEN 1040
1030 GOSUB 1130:IF YT<05 THEN RETURN
1040 G5=C1:RETURN
1050 GOSUB 1100:GOSUB 1120:IF XT<05 TH
EN RETURN
1060 GOSUB 1130:IF YT<05 THEN RETURN
1070 G5=C1:RETURN
1080 X=INT(RND(C0)*C10):Y=INT(RND(C0)*
C10)
1090 HIX=X+Y*C10+C1:RETURN
1100 OE=(X+Y)/C2:IF OE=INT(OE)<>T THEN
POP
1110 RETURN
1120 XI=C1:YI=C0:GOSUB 1170:XT=DT:XI=-
C1:YI=C0:GOSUB 1170:XT=XT+DT+C1:RETURN
1130 XI=C0:YI=C1:GOSUB 1170:YT=DT:XI=C
0:YI=-C1:GOSUB 1170:YT=YT+DT+C1:RETURN
1140 BH=C0:FOR IX=X-C1 TO X+C1:FOR IY=
Y-C1 TO Y+C1:IF IX<C0 OR IX>C9 OR IY<
0 OR IY>C9 THEN 1160
1150 HIX=IX+IY*C10+C1:IF HG1$(HIX,HIX)
="2" THEN BH=BH+C1
1160 NEXT IY:NEXT IX:RETURN
1170 DT=C0:WX=X:WY=Y
1180 WX=WX+XI:WY=WY+YI:IF WX<C0 OR WX>
C9 OR WY<C0 OR WY>C9 THEN RETURN
1190 IF HA(WX,WY) THEN RETURN
1200 DT=DT+C1:GOTO 1180
1210 FOR P1=C1 TO HD:HA(SL0(SM,P1),SL1
(SM,P1))=C1:HP=HP-C1:NEXT P1:RETURN
1220 D1=C0:D2=C0
1230 D5=C0:XI=C1:YI=C0:GOSUB 1280:T1=D
5:D5=C0:XI=-C1:YI=C0:GOSUB 1280:T1=T1+
D5
1240 D5=C0:XI=C0:YI=C1:GOSUB 1280:T2=D
5:D5=C0:XI=C0:YI=-C1:GOSUB 1280:T2=T2+
D5
1250 IF T1>=L5 THEN D1=C1

```

```

1260 IF T2>=L5 THEN D2=C1
1270 RETURN
1280 VX=GX:VY=GY:D5=C1
1290 VX=VX+XI:VY=VY+YI:IF VX>C9 OR VY>
C9 OR VX<C0 OR VY<C0 THEN RETURN
1300 IF HA(VX,VY)=C1 THEN RETURN
1310 D5=D5+C1:GOTO 1290
1320 W5=5TR$(Y):W$(C1)=CHR$(ASC(W$(LEN
(W5)))+17):W2$=5TR$(X):W$(2)=W2$(LEN(W
2$))
1330 S$=" ":HA(X,Y)=C1:IF HG0(X,Y)=C0
THEN 1350
1340 S$="*":50(HG0(X,Y),C0)=50(HG0(X,Y
),C0)+C1
1350 GOSUB 1090:HG1$(HIX,HIX)="1":S=S+
C1
1360 GOSUB 2120:?"MY SHOT IS ";W$
1370 POSITION 24+X,C2+Y:?" S$
1380 IF S$=" " THEN GOSUB 2140:?"IT'S
A MISS!":GOSUB 2160:GOTO 270
1390 GOSUB 2140:?"IT'S A HIT!":GOSUB
2160:HW=C1
1400 GOSUB 1090:HG1$(HIX,HIX)="2"
1410 HA(X,Y)=C2:HP=HP+C1
1420 Q1=X:Q2=Y:HD=50(HG0(X,Y),C0):ON H
G0(X,Y) GOTO 1430,1450,1470,1490,1510:
STOP
1430 IF HD=C2 THEN SM=C1:GOTO 1530
1440 GOTO 270
1450 IF HD=C3 THEN SM=C2:GOTO 1530
1460 GOTO 270
1470 IF HD=C3 THEN SM=C3:GOTO 1530
1480 GOTO 270
1490 IF HD=C4 THEN SM=C4:GOTO 1530
1500 GOTO 270
1510 IF HD<C5 THEN 270
1520 SM=C5
1530 POSITION C0,19:?"YOUR ";SN$((SM-
C1)*C10+C1,5M*C10);" HAS BEEN SUNK!"
1540 GOSUB 2160:GOSUB 1210
1550 REM *** ONE MORE COMPUTER-SINK **
*
1560 Y5=Y5+C1:IF Y5=C5 THEN 2190
1570 HW=C0:GOTO 270
1580 REM *** SINK SHIP SUBROUTINE ***
1590 E1=C0:E2=C9:E3=C1:IF RND(C1)>0.5
THEN E1=C9:E2=C0:E3=-C1
1600 FOR FX=E1 TO E2 STEP E3:FOR FY=E1
TO E2 STEP E3
1610 IF HA(FX,FY)<C2 THEN 1760
1620 IF HP=C1 THEN 1980:REM *** RANDOM
DIR SHOT ***
1630 GX=FX:GY=FY:GOSUB 1220
1640 IF D1<>C1 THEN 1700
1650 LE=C9:RI=C9
1660 IF FX>C0 THEN LE=HA(FX-C1,FY)
1670 IF FX<C9 THEN RI=HA(FX+C1,FY)
1680 IF LE=C0 AND RI=C2 THEN X=FX-C1:Y
=FY:GOTO 1320
1690 IF LE=C2 AND RI=C0 THEN X=FX+C1:Y
=FY:GOTO 1320
1700 IF D2<>C1 THEN 1760
1710 UP=C9:DN=C9
1720 IF FY>C0 THEN UP=HA(FX,FY-C1)
1730 IF FY<C9 THEN DN=HA(FX,FY+C1)
1740 IF UP=C0 AND DN=C2 THEN X=FX:Y=FY
-C1:GOTO 1320
1750 IF UP=C2 AND DN=C0 THEN X=FX:Y=FY
+C1:GOTO 1320
1760 NEXT FY:NEXT FX:REM *** NOW YOU K
NOW THERE ARE PARALLEL SHIPS ***
1770 FOR FX=C0 TO C9:FOR FY=C0 TO C9
1780 IF HA(FX,FY)<C2 THEN NEXT FY:NEXT
FX:STOP
1790 GX=FX:GY=FY:GOSUB 1220
1800 IF D1<>C1 THEN 1850
1810 LE=C9:RI=C9:DR=C1
1820 IF FX>C0 THEN LE=HA(FX-C1,FY)
1830 IF FX<C9 THEN RI=HA(FX+C1,FY)
1840 IF LE=C0 OR RI=C0 THEN 1910
1850 IF D2<>C1 THEN 1900
1860 UP=C9:RI=C9:DR=C2
1870 IF FY>C0 THEN UP=HA(FX,FY-C1)
1880 IF FY<C9 THEN DN=HA(FX,FY+C1)
1890 IF UP=C0 OR DN=C0 THEN 1910
1900 NEXT FY:NEXT FX:STOP
1910 IF DR=C2 THEN 1950

```

```

1920 XD=-C1+INT(RND(C0)*C3):IF XD=C0 T
HEN 1920
1930 IF HA(FX+XD,FY) THEN XD=-XD
1940 X=FX+XD:Y=FY:GOTO 1320
1950 YD=-C1+INT(RND(C0)*C3):IF YD=C0 T
HEN 1950
1960 IF HA(FX,FY+YD) THEN YD=-YD
1970 X=FX:Y=FY+YD:GOTO 1320
1980 FOR X=C1 TO 20:U1=C1+INT(RND(C0)*
C4):U2=C1+INT(RND(C0)*C4):U3=D(U1):D(U
1)-D(U2):D(U2)=U3:NEXT X
1990 FOR DP=C1 TO C4:ON D(DP) GOTO 200
0,2020,2040,2060:STOP
2000 XI=C1:YI=C0:X=FX:Y=FY:GOSUB 1170:
XD=DT:XI=-C1:YI=C0:GOSUB 1170:XD=XD+DT
+C1:IF XD<L5 THEN 2100
2010 GOTO 2070
2020 XI=-C1:YI=C0:X=FX:Y=FY:GOSUB 1170
:XD=DT:XI=C1:YI=C0:GOSUB 1170:XD=XD+DT
+C1:IF XD<L5 THEN 2100
2030 GOTO 2070
2040 XI=C0:YI=-C1:X=FX:Y=FY:GOSUB 1170
:XD=DT:XI=C0:YI=C1:GOSUB 1170:XD=XD+DT
+C1:IF XD<L5 THEN 2100
2050 GOTO 2070
2060 XI=C0:YI=C1:X=FX:Y=FY:GOSUB 1170:
XD=DT:XI=C0:YI=-C1:GOSUB 1170:XD=XD+DT
+C1:IF XD<L5 THEN 2100
2070 KX=FX+XI:KY=FY+YI:IF KX<C0 OR KX)
9 OR KY<C0 OR KY)9 THEN NEXT DP:STOP
2080 IF HA(KX,KY) THEN NEXT DP:STOP
2090 X=KX:Y=KY:GOTO 1320
2100 NEXT DP:STOP
2110 REM *** SCREEN SUBROUTINES ***
2120 GOSUB 2130:?"*****":GOSUB 21
30:RETURN
2130 POSITION C0,15:RETURN
2140 POSITION C0,17:RETURN
2150 POSITION C0,20:RETURN
2160 REM *** TIME DELAY ROUTINE ***
2170 FOR DT=C1 TO 200:NEXT DT:RETURN
2180 REM *** END-OF-GAME CODE ***
2190 IF Y5=C5 THEN GOSUB 2560
2200 GOSUB 2160:GOSUB 2120:GOSUB 2130:
IF Y5=C5 THEN 2220
2210 ? "YOU WIN!!":GOTO 2230
2220 ? "I WIN!!"
2230 GOSUB 2140:?"ANOTHER GAME (Y/N)"
:INPUT M$
2240 IF M$="N" THEN END
2250 IF M$(">")"Y" THEN GOSUB 2140:?"":
GOTO 2230
2260 RUN
2270 REM *** SET COMPUTER'S SHIPS ***
2280 5V=C1:5L=C2:GOSUB 2300:5V=C2:5L=C
3:GOSUB 2300:5V=C3:5L=C3:GOSUB 2300:5V
=C4:5L=C4:GOSUB 2300
2290 5V=C5:5L=C5:GOSUB 2300:RETURN
2300 WX=INT(RND(C0)*C10):WY=INT(RND(C0
)*C10):D=INT(RND(C0)*C4)
2310 ON D+C1 GOTO 2320,2340,2360,2380:
STOP
2320 IF WY<5L THEN 2300
2330 B1=C1:B2=C0:XI=C0:YI=-C1:GOTO 240
0
2340 IF (C10-WX)<5L THEN 2300
2350 B1=C0:B2=C1:XI=C1:YI=C0:GOTO 2400
2360 IF (C10-WY)<5L THEN 2300
2370 B1=C1:B2=C0:XI=C0:YI=C1:GOTO 2400
2380 IF WX<5L THEN 2300
2390 B1=C0:B2=C1:XI=-C1:YI=C0
2400 HX=WX:HY=WY:IF CG0(WX,WY) THEN 23
00
2410 Z1=HX+B1:Z2=HY+B2:IF Z1<C10 AND Z
2<C10 THEN IF CG0(Z1,Z2) AND RND(1)<0.
95 THEN 2300
2420 Z1=HX-B1:Z2=HY-B2:IF Z1>-C1 AND Z
2>-C1 THEN IF CG0(Z1,Z2) AND RND(1)<0
.95 THEN 2300
2430 FOR WC=C1 TO (5L-C1):HX=HX+XI:HY=
HY+YI:IF CG0(HX,HY) THEN 2300
2440 Z1=HX+B1:Z2=HY+B2:IF Z1<C10 AND Z
2<C10 THEN IF CG0(Z1,Z2) AND RND(1)<0
.95 THEN 2300
2450 Z1=HX-B1:Z2=HY-B2:IF Z1>-C1 AND Z
2>-C1 THEN IF CG0(Z1,Z2) AND RND(1)<0
.95 THEN 2300

```

```

2460 NEXT WC
2470 HX=HX+XI:HY=HY+YI:IF HX<C0 OR HX)
C9 OR HY<C0 OR HY)C9 THEN 2490
2480 IF CG0(HX,HY) AND RND(1)<0.95 TH
EN 2300
2490 HX=WX:HY=WY:CG0(HX,HY)=5V
2500 FOR WC=C1 TO (5L-C1):HX=HX+XI:HY=
HY+YI:CG0(HX,HY)=5V:NEXT WC:RETURN
2510 REM *** DECODE GRID INPUT ***
2520 BX=ASC(51$(C1,C1))-65:BY=ASC(51$(
LEN(51$))-48
2530 5X=ASC(52$(C1,C1))-65:5Y=ASC(52$(
LEN(52$))-48
2540 RETURN
2550 REM *** SHOW COMPUTER'S LAYOUT AT
END ***
2560 FOR X=C0 TO C9:FOR Y=C0 TO C9:WV=
CG0(X,Y):POSITION 8+Y,C2+X:IF WV=C0 TH
EN ? " ":GOTO 2580
2570 ? CHR$(ASC(5N$(WV-C1)*C10+C1,(WV
-C1)*C10+C1))+128)
2580 NEXT Y:NEXT X:RETURN

```

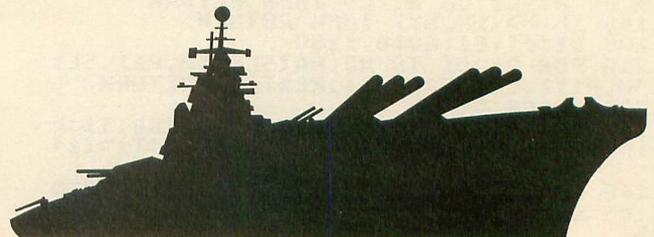
CHECKSUM DATA.

(see page 8)

```

10 DATA 532,994,696,479,0,542,861,790,
727,261,641,667,959,448,265,8862
160 DATA 383,186,710,320,797,298,989,9
00,237,968,634,726,359,217,435,8159
310 DATA 604,866,225,766,729,449,156,7
32,166,710,147,716,157,722,799,7944
460 DATA 390,602,385,737,958,234,752,8
12,309,822,517,167,666,264,235,7850
610 DATA 796,344,249,965,588,192,644,4
04,610,112,213,893,215,4,3,6232
760 DATA 774,390,978,778,965,368,797,5
37,891,612,644,977,255,753,881,10600
910 DATA 447,624,957,239,733,342,37,55
6,563,164,428,38,154,542,391,6215
1060 DATA 157,545,242,623,659,783,965,
47,418,76,252,792,980,942,842,8323
1210 DATA 533,155,995,71,348,353,792,2
79,976,279,845,628,278,662,88,7282
1360 DATA 482,739,123,931,48,150,909,4
49,888,454,890,457,892,462,887,8761
1510 DATA 807,557,669,203,67,869,660,1
0,440,60,641,203,655,900,314,7055
1660 DATA 435,466,528,523,919,340,474,
430,531,528,659,811,148,664,919,8375
1810 DATA 70,437,468,662,913,108,482,4
38,694,685,683,911,969,724,921,9165
1960 DATA 976,734,585,320,374,716,431,
718,394,720,341,786,720,311,588,8714
2110 DATA 443,729,689,694,682,450,294,
986,542,721,631,13,507,945,649,8975
2260 DATA 324,904,320,527,690,170,753,
797,380,602,383,604,757,566,556,8333
2410 DATA 559,238,889,247,241,768,258,
457,309,173,408,161,220,800,348,6076
2560 DATA 764,358,606,1728

```



Adventure at Vandenberg A.F.B.

16K Cassette or 24K Disk

by Tom Hudson

Adventure games have been with us for quite a while, but for the longest time, I was not too thrilled about playing them. Perhaps it was because the first adventure I ever played was poorly written, slow and contained numerous bugs.

I never wrote any adventure programs, either, since it's obviously no fun solving a puzzle you created in the first place.

All this was true, until Brian Moriarty wrote the text adventure, *Crash Dive*, for issue 18. I had noth-

ing to do one evening, so I sat down and played it. I enjoyed the puzzle-solving nature of *Crash Dive* so much, I went back and played Brian's *Adventure in the 5th Dimension*, from issue 11 of *ANALOG Computing*. I was hooked.

The night I finished *Crash Dive*, I was reading an article on the space shuttle complex at Vandenberg Air Force Base. The idea for an adventure program hit me like a brick. Two weeks later, *Adventure at Vandenberg A.F.B.* was complete.

The scenario.

You're a nosy reporter for the *Daily Babble*, a large metropolitan gossip tabloid, following a hot story. You've overheard several terrorists discussing a diabolical plot: the destruction of the Air Force's newest space shuttle seconds before launch! The bomb has already been placed somewhere on the base, its timer set to detonate at 09:00.

Shocked, you rush to the local police station, to warn them to stop the launch. Unfortunately, they've read your stories about Bigfoot actually being a UFO alien, and they won't believe the shuttle story, either. Now it's up to you alone to save the shuttle and its five crew members.

Using all your reporter's cunning, you manage to sneak past the gate guards. You duck into a small storage shed, knowing that the hardest part of your job is still ahead of you.

And you've only got one hour.

Typing it in.

Using Atari BASIC, type Listing 1 into your computer. It must be typed exactly as printed, or the adventure could be rendered unsolvable.

The other listings are the assembly language source code for the `USR` calls used by the program. You *don't* have to type in these listings to play the game. They are included for the benefit of assembly language programmers.

After you've typed in the BASIC code, `Unicheck` should be used to check your typing. When you are certain the program is typed correctly, `SAVE` it to tape or disk before running it.

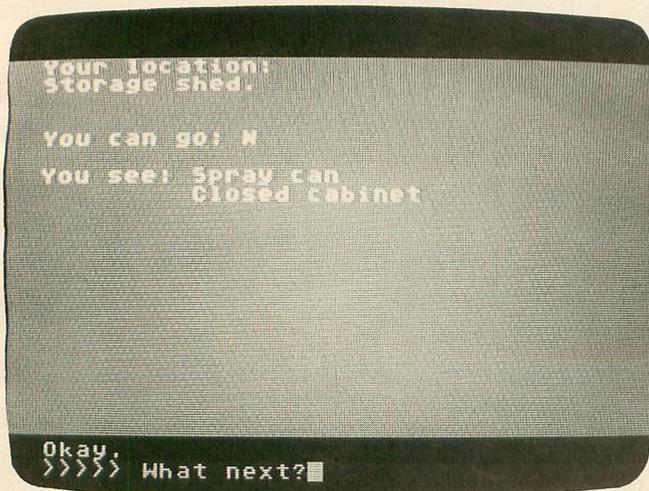
Gameplay.

When `RUN`, *Adventure at Vandenberg* will display the title screen, along with the message `INITIALIZING`. And, after a few seconds, you'll see the prompt:

Press **START** to begin new game.

Press **OPTION** to restore old game.

Now press the `START` key. The screen should look like this:



The screen is divided into five imaginary text areas or "windows." The black response window at the bottom accepts commands from the user and displays descriptions of objects and the results of your actions. A blinking cursor in the response window indicates that the program is waiting for new commands.

The location window at the top of the screen gives you a brief description of your immediate surroundings. Underneath it is the compass window, which indicates all of the possible exits from that location.

The objects window shows a list of all objects visible at the current location. The bottom of the blue screen area is the inventory window, which lists the items you are carrying.

Like most text adventures, *Adventure at Vandenberg* understands two-word sentences in the form of `VERB-(space)-NOUN`. Try typing the sentence `TAKE CAN` on the starting screen. The "spray can" will vanish from the objects window and reappear on your inventory window.

You can interact with objects on the screen just as you can in real life. Watch the response window as you type `EXAMINE CAN`. If you type `DROP CAN`, the can will return to the object window.

This adventure will understand several nouns and verbs. You'll have to experiment to find out just which ones are valid. If you type something the computer can't decipher, you'll see the message, "I don't understand—try again," in the response window.

Single-character commands.

Adventure at Vandenberg also understands a limited number of single-commands. These commands control movement and other special functions.

MOVEMENT COMMANDS

N — North S — South E — East W — West
U — Up D — Down

OTHER COMMANDS

I — Inventory Q — Quit/Save Game

The movement commands let you head in any of the directions shown in the compass window. The `I` command displays the objects you are carrying in the inventory window. This window is also updated whenever you `TAKE` or `DROP` anything.

Saving and loading games.

Adventure at Vandenberg allows you to save your current game status to tape or disk. To use this feature, make sure your storage device is properly connected and is loaded with a blank tape or formatted disk. Type the command `Q` (quit) and answer `Y` to the *Save Game?* prompt. Then indicate whether you are saving to disk or tape.

To prevent the screen from going crazy during this process, it will go black for a few seconds while the game is saved. When the save is complete, the screen will return, so the game can be continued. I/O errors

will result in a "beep," and the *Disk or Tape* prompt will reappear.

To load a previously saved game, type *Q/RETURN* and then *RETURN* again, to exit. *RUN* the program again and press the *OPTION* key when initialization is complete. When the screen appears, the game will be restored to exactly the way it was when you last saved it.

Don't try aborting the game with the *BREAK* key. This key is disabled to prevent you from crashing the machine-language routine that makes the cursor blink. Whenever you want to stop the program for any reason, press *SYSTEM RESET*.

Helpful hints.

1. Stay out of sight. As you can imagine, security at a military base like Vandenberg is extremely tight. Standing out in the open for too long will allow you to be spotted by security personnel.
2. Draw a map. The base grounds and underground tunnel system at Vandenberg are confusing, with few landmarks. It's a good idea to draw a map as you go along. Be careful, though—the base security guards are diligent!
3. Examine everything. Objects may have important features that will not be evident unless you examine them closely. You should also keep track of the

objects you discover—most of them are essential to your success.

4. Save your game frequently. Use the *Q* command to save your current status after every important discovery. . . and before you try anything that might be dangerous. Otherwise, you'll have to go back to the storage shed and start all over again.

5. Try anything. Don't be afraid to find out what you can or can't do.

6. Don't give up. The space shuttle *can* be saved! If you're stuck, ask for other people's advice. A fresh outlook might uncover a solution you didn't think of.

7. Don't call **ANALOG Computing**. We are not — absolutely, positively and definitely not—giving adventure hints over the telephone! If you run into an impasse, drop me a letter (include a pre-addressed, stamped envelope), and I'll try to help you out. Whatever you do, verify your typing with **Unicheck**. One mistyped line is all it takes to make **Adventure at Vandenberg A.F.B.** truly impossible to win.

The credits.

I'd like to thank Brian Moriarty for his **Adventure in the 5th Dimension**. Rather than re-invent the wheel, I used the basic structure of his program for this one. This allowed me to write **Adventure at Vandenberg** in under two weeks of spare time. □

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BASIC listing.

```

10 CLR :GOTO 212
11 GRAPHICS C0:ST$=M$(401,405):Z=A5C(5
15(C5,C5)):OPEN #C2,C8,C0,"5":GOSUB 1
5:POKE 703,C4
12 DL=PEEK(560)+PEEK(561)*256:FOR I=DL
+31 TO DL+24 STEP -C1:POKE I,PEEK(I-C1
):NEXT I:POKE DL+25,C16
13 Q=USR(1648,1680):POKE 54286,192:POK
E C16,112:POKE 53774,112:GOTO 75
14 POKE C710,C0:POKE C709,C14:RETURN
15 POKE C709,C14:POKE C710,148:RETURN
16 FOR I=C0 TO C12 STEP C4:X1=USR(FAD,
I):NEXT I
17 X1=USR(FAD,C15):RETURN
18 SOUND C0,25,C10,C15:FOR I=C1 TO C4:
NEXT I:SOUND C0,C0,C0,C0:RETURN
19 SC=5C-C1:? "I don't understand. Tr
y again.":GOTO 50
20 ? "That is impossible.":RETURN
21 ? "There isn't enough room here.":R
ETURN
22 ? "It isn't here.":RETURN
23 X=USR(LOOK,CL7,N,C8):RETURN
24 Y=USR(LOOK,5T,W,C4):RETURN
25 GOSUB 24:IF Y THEN RETURN
26 POP :POP :? DH$:GOTO 50
27 Q=C15*(ASC(ST$(C5,C5))-65)+C1:RETUR
N
28 POP :FLAG=C1:GOTO 80
29 ? #C2;"On base grounds.":RETURN
30 ? #C2;"Payload prep. center.":RETUR
N
31 ? #C2;"South of Headquarters.":RETU
RN
32 ? #C2;"North of Security.":RETURN
33 ? #C2;"Storage shed.":RETURN
34 ? #C2;"Security office.":RETURN
35 ? #C2;"Headquarters.":RETURN
36 ? #C2;"Maze of tunnels.":RETURN
37 ? #C2;"Materials distribution.":RET
URN
38 ? #C2;"Instrument bay.":RETURN
39 ? #C2;"Escape bunker.":RETURN
40 ? #C2;"Pipe trunk.":RETURN
41 ? #C2;"Fuel pumping station.":RETUR
N
42 CLOSE #C2:GRAPHICS C0:GOSUB 14:RETU
RN
43 POP :GOSUB 42:POSITION C12,C10:? "C
ongratulations!":? "↓ The bomb has b
een deactivated!↓↓↓↓":END
44 POP :GOSUB 42:POKE 752,C1:ON DR GOT
O 45,46,48
45 ? "↓↓↓)OUT OF TIME!"
46 ? "↓↓↓ The bomb explodes, killin
g you"
47 ? " and destroying the shuttle!"
:GOTO 49
48 ? "↓↓↓ Before you can act, a guard
appears":? " and shoots you DEAD!"
49 ? "↓) RE-INITIALIZING":GOTO 2
17
50 POP :IF 5FLG=C1 THEN 5FLG=C0:GOTO 5
5
51 SC=5C+C1:IF NOT USR(LOOK,ADR("ABDE
FGHK"),C1,C8) THEN SC=C0
52 IF CL$(1,1)<>"K" THEN 55
53 IF M$(397,397)="*" THEN 55
54 M$(392,392)="*":M$(397,397)="*":? "
A guard leaves Security and":? "walks
out of sight."
55 ? ">>> What next":GOSUB 18:TRAP
50:INPUT K$:TRAP OFF:L=LEN(K$):IF NOT
L THEN 19
56 IF L=C1 AND (K$="I" OR K$="Q") THEN
58
57 IF L=C1 AND USR(LOOK,CL7,ADR("A"),C
8) AND M$(392,392)="?" THEN M$(394,394
)="*"
58 IF 5C>4 THEN 211
59 IF L=C1 THEN V$=K$:GOTO 71
60 Q=USR(LOOK,ADR(K$),ADR(" " ),L):IF Q
<C3 THEN 19

```

```

61 V$=K$(C1,Q-C1):N$=K$(Q+C1,L):IF LEN
(N$)<C3 THEN 19
62 Z=USR(1536,ADR(VERB$)-C4,V):IF NOT
Z THEN 19
63 Q=USR(1536,ADR(NOUN$)-C4,N):IF NOT
Q AND Z<>76 THEN 19
64 GOSUB 210:N$=CHR$(Q):IF N$="\ " OR N
$="J" THEN ? "Refer to it by color.":G
OTO 50
65 GOSUB 69:IF NOT USR(LOOK,CL7,ADR("
A"),C8) OR M$(392,392)="*" THEN 68
66 IF (Z=65 OR Z=70) AND Q=65 THEN 68
67 M$(394,394)="*"
68 Z=Z-64:ON Z GOSUB 95,124,139,150,16
3,169,174,177,181,185,189,198:GOTO 50
69 55=55+C15:IF 55=C60 THEN 55=C0:MM=M
M+C1:IF MM=C60 THEN DR=C1:GOTO 44
70 RETURN
71 Q=USR(LOOK,ADR(C$),V,C8):IF NOT Q
THEN 19
72 IF Q<C6 THEN Q=Q-C6:ON Q GOTO 85,89
73 Q=Q+C1:Z=A5C(CL$(Q,Q)):IF Z=63 THEN
? "You can't go that way.":GOTO 50
74 GOSUB 69
75 GOSUB 210:GOSUB 16:GOSUB 27:M$(Q,Q+
C14)=CL$:ST$(C5,C5)=CHR$(Z):GOSUB 27:C
L$=M$(Q,Q+C14)
76 ? OK$:POSITION C2,C0:? #C2;"Your lo
cation.":POSITION C2,C1
77 Z=Z-64:ON Z GOSUB 29,29,30,31,29,29
,29,29,33,34,32,35,36,36,36,37,36,36,3
6,36,36,38,39,40,41
78 POSITION C2,C4:? #C2;"You can go: "
;:FOR I=C1 TO C6:IF CL$(I+C1,I+C1)<>"?
" THEN ? #C2;C$(I,I);" ";
79 NEXT I
80 X1=USR(FAD,C6):X1=USR(FAD,C10):POSI
TION C2,C6:? #C2;"You see: ";:X=C6
81 FOR I=C1 TO C8:Q=A5C(CL$(I+C7,I+C7)
)-64:IF Q<>-C1 THEN RESTORE 247+Q:READ
K$:POSITION 11,X:? #C2;K$:X=X+C1
82 NEXT I:IF X=C6 THEN POSITION 11,X:?
#C2;"Nothing interesting"
83 IF FLAG=C1 THEN FLAG=C0:GOTO 85
84 GOTO 50
85 ? OK$:GOSUB 17:POSITION C2,C15:? #C
2;"You have: ";
86 X=C15:FOR I=C1 TO C4:Q=A5C(ST$(I,I)
)-64:IF Q<>-C1 THEN RESTORE 247+Q:READ
K$:POSITION C12,X:? #C2;K$:X=X+C1
87 NEXT I:IF X=C15 THEN POSITION 12,X:
? #C2;"Nothing"
88 GOTO 50
89 ? "Type  to save,  RETURN to quit";
:INPUT K$:IF K$<>"Y" THEN CLOSE #C2:G
RAPHICS C0:END
90 CLOSE #C1:POKE 559,34:? "Position 5
ave:  Disk or  Tape";:INPUT N$:IF N$<>"
D" AND N$<>"T" THEN 50
91 TRAP 90:K$="D1:SAVE.DAT":IF N$="T"
THEN K$="C:"
92 POKE 559,C0:POKE 54272,C0:OPEN #C1,
C8,C0,K$:M$(401,405)=ST$:GOSUB 27:M$(Q
,Q+C14)=CL$
93 FOR I=325 TO C1 STEP -81:? #C1;M$(I
,I+80):NEXT I:? #C1;NOUN$=? #C1;CE$=?
#C1;C1$=? #1;MM=? #1;55=? #1;5C
94 CLOSE #C1:POKE 559,34:POKE 54286,19
2:GOTO 55
95 Q=Q-64:GOSUB 23:IF NOT X AND N$="A
" THEN N$="B":Q=C2:GOSUB 23:IF NOT X
THEN 22
96 IF NOT X THEN GOSUB 24:IF NOT Y T
HEN 22
97 ON Q GOTO 101,103,104,106,99,99,107
,99,99,109,110,99,99,112,114,117,117,1
15,100,99,116,117
98 ON Q-22 GOTO 122,111,118,121
99 ? "Seems ordinary.":RETURN
100 ? "Looks dangerous.":RETURN
101 IF M$(392,392)="?" THEN ? "Has a r
ed light!":RETURN
102 ? "It's deactivated.":RETURN
103 ? "Paint covers lens.":RETURN
104 IF M$(391,391)<>"0" THEN ? "Not mu
ch paint left.":RETURN

```



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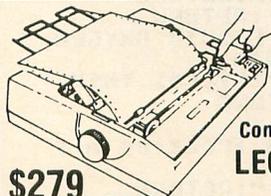
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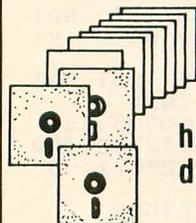
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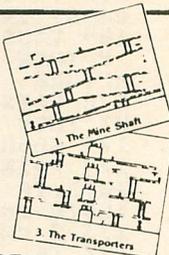
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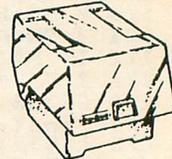


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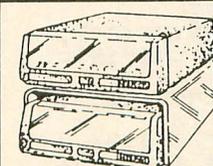
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```

105 ? "It's empty!":RETURN
106 ? "Says: Cameras off. Back after
launch.":RETURN
107 ? "Door is securely locked.":RETUR
N
108 ? "It's unlocked.":RETURN
109 ? "Says: ";CE$(C6,C10):RETURN
110 ? "Says: ";CE$(C1,C5):RETURN
111 ? "Says: WARNING - LIQUID OXYGEN
":? ">>EXTREME COLD":RETURN
112 IF USR(LOOK,CL7,ADR("I"),C8) THEN
? "It's bolted shut.":RETURN
113 GOTO 99
114 ? "It's filled with a freezing mis
t.":RETURN
115 ? "It's screwed shut.":RETURN
116 ? "It's securely nailed shut.":RET
URN
117 ? "It's ticking!":RETURN
118 ? "Time is 08:":;IF MM<C10 THEN ?
"0";
119 ? MM;";":;IF 55<C10 THEN ? "0";
120 ? 55:RETURN
121 ? "Hopelessly wrecked!":RETURN
122 IF M$(393,393)<"?" THEN 105
123 ? "There's a clock inside!":RETURN
124 GOSUB 24:IF Y THEN ? "You already
have that.":RETURN
125 Z=USR(LOOK,5T,ADR("?"),C4):IF NOT
Z THEN ? "You can't carry any more.":
RETURN
126 GOSUB 23:IF NOT X THEN 22
127 IF USR(LOOK,ADR("ABGHINORSTUVX"),
N,C14) THEN 20
128 IF N$="P" THEN DR=C2:GOTO 44
129 IF N$="Y" THEN M$(393,393)="*"
130 IF N$="U" THEN ? "You can't lift i
t.":RETURN
131 IF N$<"Q" THEN 137
132 IF NOUN$(64,64)<"T" THEN 44
133 HO=C0:FOR HT=C1 TO C4:IF 5T$(HT,HT
)="?" THEN HO=HO+C1:IF HO<C4 THEN HO(H
O)=HT
134 NEXT HT:IF HO<C3 THEN ? "You'll ha
ve to drop something.":RETURN
135 5T$(HO(C1),HO(C1))="Q":5T$(HO(C2),
HO(C2))="R":5T$(HO(C3),HO(C3))="T":GOS
UB 138:M$="R":GOSUB 23
136 GOSUB 138:M$="T":GOSUB 23:GOSUB 13
8:GOTO 28
137 GOSUB 138:5T$(Z,Z)=M$:GOTO 28
138 CL$(X+C7,X+C7)="?":RETURN
139 GOSUB 25:IF N$="Q" AND CL$(C1,C1)=
"U" AND USR(LOOK,CL7,ADR("O"),C8) THEN
43
140 IF USR(LOOK,ADR("QRT"),N,C3) THEN
145
141 X=USR(LOOK,CL7,ADR("?"),C8):IF NO
T X THEN 21
142 5T$(Y,Y)="?":IF CL$(C1,C1)="U" AND
USR(LOOK,CL7,ADR("O"),C8) THEN ? "It
falls into the hatch!":GOTO 28
143 IF N$="Y" THEN N$="Z":NOUN$(80,80)
="Z":? "It smashes into a thousand pie
ces!"
144 CL$(X+C7,X+C7)=M$:GOTO 28
145 GOSUB 148:IF HO<C3 THEN 21
146 CL$(HO(C1),HO(C1))="Q":CL$(HO(C2),
HO(C2))="R":CL$(HO(C3),HO(C3))="T":M$=
"Q":GOSUB 24:5T$(Y,Y)="?"
147 N$="R":GOSUB 24:5T$(Y,Y)="?":N$="T
":GOSUB 24:5T$(Y,Y)="?":GOTO 28
148 HO=C0:FOR HT=C8 TO C15:IF CL$(HT,H
T)="?" THEN HO=HO+C1:IF HO<C4 THEN HO(
HO)=HT
149 NEXT HT:RETURN
150 GOSUB 23:IF NOT X THEN 161
151 IF N$="U" THEN 116
152 IF N$="G" THEN ? "The door won't b
udge.":RETURN
153 IF N$="P" OR N$="Q" THEN 44
154 IF N$="R" AND USR(LOOK,5T,ADR("L"),
C4) THEN DR=C2:GOTO 44
155 IF N$="R" THEN 115
156 IF N$="N" AND M$(396,396)="*" THEN
CL$(X+C7,X+C7)="O":NOUN$(52,52)="O":G
OTO 28
157 IF N$="N" THEN ? "Bolts won't let
you.":RETURN
158 IF N$<"V" THEN 161
159 N$="?" :X5=X:GOSUB 23:IF NOT X THE
N 21
160 CL$(X5+C7,X5+C7)="W":NOUN$(72,72)=
"W":CL$(X+C7,X+C7)="Y":GOSUB 123:GOTO
28
161 GOSUB 25:IF N$="P" OR N$="Q" THEN
44
162 GOTO 20
163 IF N$<"G" THEN 20
164 GOSUB 23:IF NOT X THEN 22
165 IF CL$(C1,C1)<"K" THEN ? "There's
no keyhole!":RETURN
166 Y=USR(LOOK,5T,ADR("F"),C4):IF NOT
Y THEN ? "You don't have a key.":RETU
RN
167 CL$(C3,C3)="J":CL$(C8,C8)="?":GOSU
B 168:POP :GOTO 78
168 ? "The door slides open and disapp
ears!":RETURN
169 Y=USR(LOOK,5T,ADR("C"),C4):IF NOT
Y THEN ? "You don't have any paint.":
RETURN
170 PAINT=VAL(M$(391,391)):IF NOT PAI
NT THEN ? "Can is empty!":RETURN
171 GOSUB 23:IF NOT X THEN GOSUB 25
172 PAINT=PAINT-C1:M$(391,391)=STR$(PA
INT):IF N$="A" THEN CL$(X+C7,X+C7)="B"
:GOTO 28
173 ? "What a nice color!":RETURN
174 IF NOT USR(LOOK,ADR("DJKXYZ"),N,6
) THEN 20
175 GOSUB 23:GOSUB 24:IF NOT X AND N
OT Y THEN 22
176 GOTO 95
177 IF N$<"R" THEN 20
178 GOSUB 23:GOSUB 24:IF NOT X AND N
OT Y THEN 22
179 IF NOT USR(LOOK,5T,ADR("L"),C4) T
HEN ? "You have nothing to unscrew it
with.":RETURN
180 DR=C2:GOTO 44
181 IF N$<"I" THEN 20
182 GOSUB 23:IF NOT X THEN 22
183 IF NOT USR(LOOK,5T,ADR("M"),C4) T
HEN ? "Bolts are too tight.":RETURN
184 CL$(C10,C10)="?":M$(396,396)="*":P
OP :? OK$:GOTO 80
185 GOSUB 23:IF NOT X THEN 22
186 IF N$<"U" THEN 188
187 CL$(C4,C4)="Y":? "You found someth
ing!":POP :GOTO 78
188 ? "Why bother?":RETURN
189 GOSUB 23:IF NOT X THEN 22
190 CC=398:C5=C0:IF CL$(1,1)="Z" THEN
CC=399:C5=C5
191 CODE=VAL(M$(CC,CC)):IF CODE=C6 THE
N 188
192 IF N$<"C":CI$(C5+CODE,C5+CODE) THEN 2
08
193 CODE=CODE+C1:M$(CC,CC)=STR$(CODE):
IF CODE<C6 THEN ? "The button beeps so
ftly.":RETURN
194 GOSUB 168:IF CL$(C1,C1)="R" THEN C
L$(C3,C3)="V":CL$(C9,C9)="?":M$(317,31
7)="R":M$(323,323)="?":GOTO 197
195 IF CL$(C1,C1)="V" THEN CL$(C2,C2)=
"R":CL$(C8,C8)="?":M$(258,258)="V":M$(
264,264)="?":GOTO 197
196 CL$(C6,C6)="W":CL$(C8,C8)="?"
197 POP :GOTO 78
198 GOSUB 23:IF NOT X THEN GOSUB 25
199 IF NOT USR(LOOK,5T,ADR("E"),C4) T
HEN ? "You have nothing to cut it with
.":RETURN
200 IF N$="Q" OR N$="T" THEN ? "It's a
lready cut.":RETURN
201 IF N$="D" OR N$="J" OR N$="K" THEN
188
202 IF N$="P" THEN 205
203 IF N$<"S" THEN 20
204 NOUN$(64,64)="T":CL$(X+C7,X+C7)="T
":GOTO 207
205 GOSUB 148:IF HO<C2 THEN 21

```

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206 CL$(X+C7,X+C7)="Q":NOUN$(56,56)="Q
":CL$(HO(C1),HO(C1))="R":CL$(HO(C2),HO
(C2))="S"
207 ? OK$:POP :GOTO 80
208 ? "You hear a siren!"
209 M$(394,394)="*":RETURN
210 IF M$(394,394)="?" THEN RETURN
211 DR=C3:GOTO 44
212 READ OFF,FLAG,C0,C1,C2,C3,C4,C5,C6
,C7,C8,C9,C10,C12,C14,C15,C16,C60,C709
,C710
213 GOSUB 14:POKE 752,C1:? "K↑↑↑↑↑)To
M Hudson's":? "↓ ADVENTURE at Vande
rberg A.F.B."
214 ? "↓" (C)1984 ANALOG Computing:P
OSITION C12,C16:? " INITIALIZING"
215 DIM M$(406),CL$(15),K$(24),N$(4),V
$(4),VERB$(68),NOUN$(92),C$(9),5T$(5)
216 DIM HO(3),OK$(5),DH$(20),CE$(10),C
I$(10):OK$="Okay.":DH$="You don't have
that."
217 FOR X=C1 TO C10:CE$(X)="W":CI$(X)=
"H":IF RND(C0)<0.5 THEN CE$(X)="G":CI$(
X)="I"
218 NEXT X:IF CI$(C1,C5)=CI$(C6,C10) T
HEN 217
219 NOUN$="CAMACANCNOTDSCIEKEYFDOOGWHI
HGRAIBLUJPIKNSCRLWREMHATNBAGPPANRWIR5C
RAUCABUSIGXCLOYBOL(BUT\PAPI)"
220 VERB$="EXAALOOATAKBGETBDROCLEACOPE
DUNLESPRFPAIFREAGUNSHREMIMOVJPUSKPREKC
UTL"
221 C$="NSEMUDIQ":LOOK=1605:CL=ADR(CL$
):CL7=CL+C7:V=ADR(V$):M=ADR(M$):5T=ADR
(5T$):FAD=1712:MM=C0:55=C0
222 RESTORE 235:M$(C1)="?":M$(406)="?"
:M$(C2)=M$:FOR I=C1 TO 376 STEP C15:RE
AD CL$:M$(I,I+LEN(CL$))=CL$:NEXT I
223 M$(391,405)="??????11?????I":CL$=
M$(121):FOR I=1536 TO 1753:READ Q:POKE
I,Q:NEXT I
224 POSITION C4,C16:? " Press START
to begin new game.":? "↓ Press OPTIO
N to restore old game.↓"
225 IF PEEK(53279)=C6 THEN 11
226 IF PEEK(53279)=C3 THEN 228
227 GOTO 225
228 CLOSE #C1:POKE 559,34:POSITION C8,
20:? "Load from Disk or Tape":INPUT
N$:IF N$("<"D" AND N$("<"T" THEN 228
229 POKE 559,C0:POKE 54272,C0:TRAP 228
:K$="D1:SAVE.DAT":IF N$="T" THEN K$="C
"
230 OPEN #C1,C4,C0,K$:TRAP 32767:FOR I
=325 TO C1 STEP -81
231 INPUT #C1,M$:M$(I,I+80)=M$:NEXT I:
M$(406,406)="":INPUT #C1,NOUN$:INPUT #
C1,CE$:INPUT #C1,CI$
232 INPUT #C1,MM:INPUT #C1,55:INPUT #C
1,5C:CLOSE #C1:5T$=M$(401,405):GOSUB 2
7:CL$=M$(Q,Q+C14)
233 5FLG=C1:POKE 559,34:GOTO 11
234 DATA 40000,0,0,1,2,3,4,5,6,7,8,9,1
0,12,14,15,16,60,709,710
235 DATA ADFBA,BB?BA?N,C?H??UF,DLAEK,
EEIFD,FAKFE,GHKHG,HCGHG,IE????CV,JK??
??UD,KF?GD??G,L?D????AJ
236 DATA MNNMQ,NMRMB?A,OSSTO,P?????SA
E,QMRQQ?AL,RN?SQ??AGHI, SORTOP, TTSUO,U
U??TC?MXI,U?X??J?GHI
237 DATA W????ZAPK,XV????AU,Y??ZX??M
,Z??Y??GHI
238 DATA 104,104,133,206,104,133,205,1
04,133,204,104,133,203,169,0,133,213,1
62,25,202,240,42,24,165,205
239 DATA 105,4,133,205,165,206,105,0,1
33,206,24,160,0,177,203,209,205,208,23
1,200,177,203,209,205,208
240 DATA 224,200,177,203,209,205,208,2
17,200,177,205,133,212,96,169,0,133,21
2,96
241 DATA 104,104,133,206,104,133,205,1
04,133,204,104,133,203,169,0,168,133,2
13,177,203,133,207,104,104,168
242 DATA 136,48,10,165,207,209,205,208
,247,200,132,212,96,169,0,133,212,96

```

```

243 DATA 104,104,141,1,2,104,141,0,2,1
73,48,2,133,203,173,49,2,133,204,160,2
4,169,130,145,203
244 DATA 169,0,141,243,2,96,0,72,138,7
2,169,0,162,10,141,10,212,141,24,208,1
42,23,208,230,208
245 DATA 165,208,41,16,74,74,74,141,1,
212,104,170,104,64
246 DATA 104,104,104,170,165,88,133,20
3,165,89,133,204,216,24,202,48,15,165,
203,105,40,133,203,165,204
247 DATA 105,0,133,204,24,144,238,160,
159,169,0,145,203,136,208,251,96
248 DATA Surveillance camera
249 DATA Painted camera
250 DATA Spray can
251 DATA Note
252 DATA Scissors
253 DATA Keys
254 DATA Door
255 DATA White button
256 DATA Gray button
257 DATA Blue paper
258 DATA Pink paper
259 DATA Screwdriver
260 DATA Wrench
261 DATA Hatch
262 DATA Open hatch
263 DATA Bag
264 DATA Bag with gaping hole
265 DATA Metal panel
266 DATA Wire
267 DATA Severed Wire
268 DATA Wooden crate
269 DATA Closed cabinet
270 DATA Open cabinet
271 DATA Sign
272 DATA Clock
273 DATA Broken clock
274 DATA Bolts

```

CHECKSUM DATA.

(see page 8)

```

10 DATA 344,840,379,501,975,780,167,51
1,94,559,669,532,529,485,291,7656
25 DATA 933,494,50,131,406,537,515,962
,880,484,918,500,115,591,92,7608
40 DATA 669,608,550,92,909,903,752,433
,598,572,252,77,190,341,970,7916
55 DATA 280,772,439,662,804,359,127,14
9,558,227,610,940,56,666,260,6909
70 DATA 764,858,784,336,594,270,961,81
0,270,411,552,853,804,651,631,9549
85 DATA 137,784,345,643,988,683,980,51
,586,945,297,708,831,821,215,9014
100 DATA 154,148,416,575,528,246,822,6
3,826,673,464,244,318,529,293,6299
115 DATA 558,277,410,553,60,532,862,62
9,305,764,806,854,85,955,995,8645
130 DATA 988,799,952,229,572,429,1,227
,831,721,67,459,115,782,664,7836
145 DATA 769,417,328,255,70,111,812,54
2,791,855,811,709,400,810,305,7985
160 DATA 475,954,502,930,864,181,177,6
10,823,703,271,710,352,453,46,8051
175 DATA 326,538,959,329,709,297,974,8
68,562,265,871,840,81,296,875,8790
190 DATA 963,599,198,803,637,116,745,3
70,723,822,8,936,795,938,938,9591
205 DATA 757,759,86,216,325,122,280,41
0,677,985,296,555,584,458,383,6893
220 DATA 729,834,940,348,505,632,846,7
11,164,476,164,687,600,177,358,8171
235 DATA 88,919,144,662,260,231,953,64
3,504,551,816,481,497,322,957,8028
250 DATA 149,308,19,307,312,846,463,34
9,374,640,586,255,369,877,83,5937
265 DATA 472,314,623,705,33,593,311,28
6,661,350,4348

```

Assembly listing.

```

0100 ; NOUN/VERB DECODER
0105 ;
0110 ; Syntax: N=USR(NL,TL-4,NL)
0115 ; NL=addr of this routine
0120 ; TL=addr of lookup table
0125 ; NL=addr of current noun/verb
0130 ;
0135 ; Program equates
0140 ;
0145 NOUN=#CB ; noun addr pointer
0150 TABLE=#CD ; table addr pointer
0155 NRET=#D4 ; BASIC return addr
0160 ;
0165 ; PLA ; # arguments
0170 ; PLA ; msb of table addr
0175 STA TABLE+1
0180 PLA ; lsb
0185 STA TABLE
0190 PLA ; msb of noun addr
0195 STA NOUN+1
0200 PLA ; lsb
0205 STA NOUN
0210 LDA #000
0215 STA NRET+1 ; zero msb
0220 LDX #019 ; noun/verb count
0225 NEXT DEX
0230 BEQ NOPE ; illegal entry
0235 CLC
0240 LDA TABLE ; +5 to pointer
0245 ADC #004
0250 STA TABLE
0255 LDA TABLE+1
0260 ADC #000
0265 STA TABLE+1
0270 CLC
0275 LDY #000 ; init index
0280 LDA (NOUN),Y ; get 1st char
0285 CMP (TABLE),Y ; equal?
0290 BNE NEXT ; not next noun
0295 INY ; in-line for speed
0300 LDA (NOUN),Y
0305 CMP (TABLE),Y
0310 BNE NEXT
0315 INY
0320 LDA (NOUN),Y ; try 3rd char
0325 CMP (TABLE),Y
0330 BNE NEXT
0335 INY ; must be legal
0340 LDA (TABLE),Y ; get iden #
0345 STA NRET ; give to BASIC
0350 RTS ; and return
0355 NOPE LDA #000 ; @=illegal entry
0360 STA NRET ; give to BASIC
0365 RTS ; and return

0100 ; CHARACTER SEARCH ROUTINE
0105 ;
0110 ; Syntax: X=USR(NL,SVT,V,R)
0115 ; NL=addr of this routine
0120 ; SVT=addr of * to be searched
0125 ; V=addr of search character
0130 ; R=# bytes to search
0135 ;
0140 ; Program equates
0145 ;
0150 CADR=#CB ; char addr pointer
0155 TABLE=#CD ; verb table pointer
0160 CHAR=#CF ; character buffer
0165 BRET=#D4 ; BASIC return addr
0170 ;
0175 ; PLA ; # arguments
0180 ; PLA ; msb of table addr
0185 STA TABLE+1
0190 PLA ; lsb
0195 STA TABLE
0200 PLA ; msb of verb addr
0205 STA CADR+1
0210 PLA ; lsb
0215 STA CADR
0220 LDA #000
0225 TAY
0230 STA BRET+1 ; zero msb
0235 LDA (CADR),Y ; get the char
0240 STA CHAR ; save for later
0245 PLA ; msb of range (ignore)
0250 PLA ; lsb
0255 TAY ; use as the index
0260 NEXT DEY
0265 BHI NOPE ; must be illegal
0270 LDA CHAR ; get char
0275 CMP (TABLE),Y ; match?
0280 BNE NEXT ; not try another
0285 INY ; yes! give position
0290 STY BRET ; to BASIC
0295 RTS ; and return
0300 NOPE LDA #000 ; @=char not found
0305 STA BRET ; give to BASIC
0310 RTS ; and return

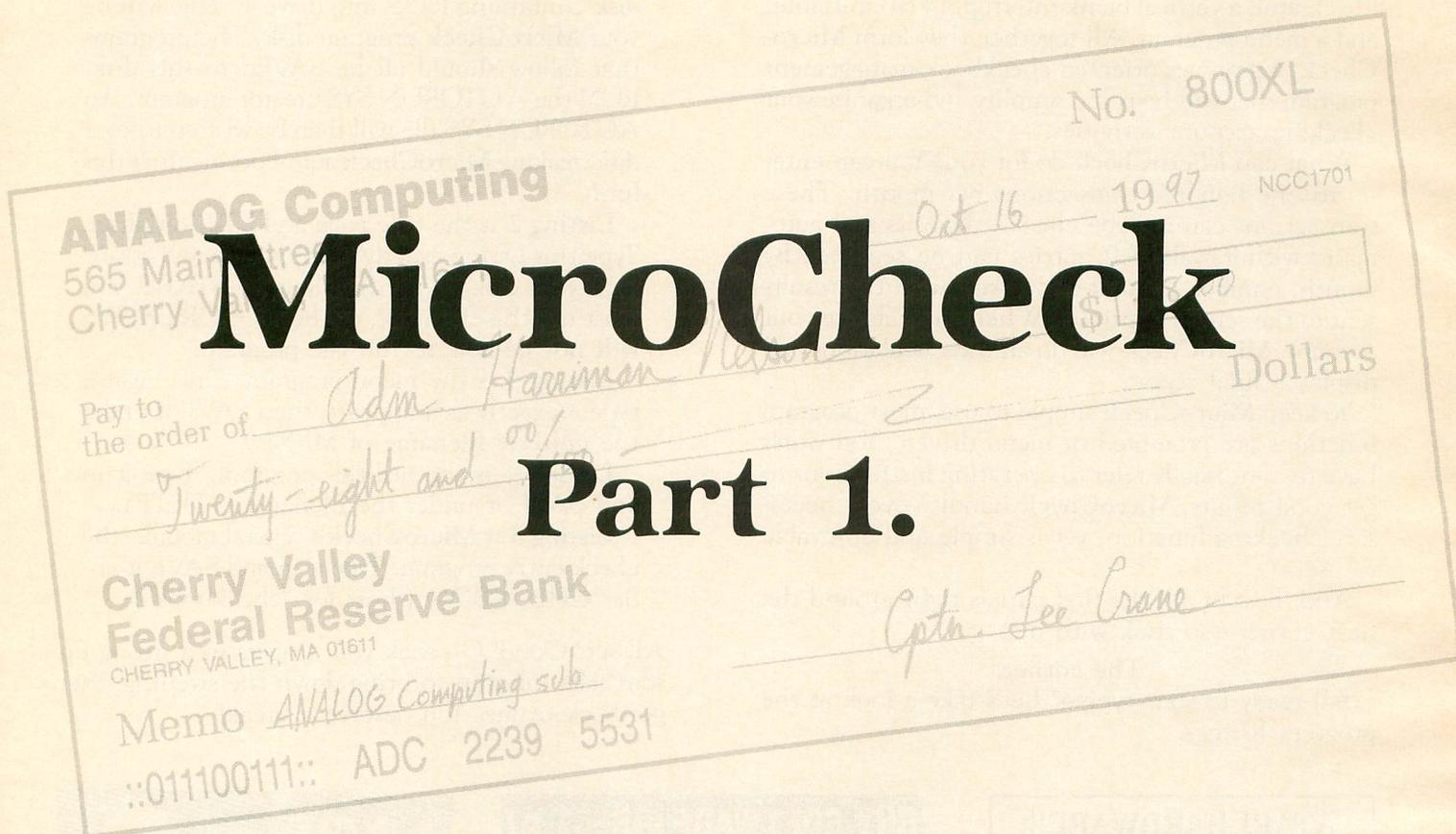
0100 ; DLI/BLINK ROUTINE
0105 ;
0110 ; Syntax: USR(DLI,DLI+X)
0115 ; DLI=addr of this routine
0120 ; X=offset to DLI handler
0125 ;
0130 ; Program equates
0135 ;
0140 COLPF1=#D017
0145 COLPF2=#D018
0150 WSYNC=#D40A
0155 SDLSTL=#D230
0160 VDSLST=#D200
0165 CHACTL=#D401
0170 CHACT=#D2F3
0175 BUFFER=#CB
0180 BLINCT=#D0
0185 ;
0190 ; First set up the DLI
0195 ;
0200 ; PLA ; # arguments
0205 ; PLA ; msb of DLI addr
0210 STA VDSLST+1
0215 PLA ; lsb
0220 STA VDSLST
0225 LDA SDLSTL ; find start of
0230 STA BUFFER ; display list
0235 LDA SDLSTL+1
0240 STA BUFFER+1
0245 LDY #018 ; mode line 20
0250 LDA #082 ; DL instruction
0255 STA (BUFFER),Y
0260 LDA #000 ; turn off
0265 STA CHACT ; inverse video
0270 RTS
0275 BRK ; mark end of init
0280 ;
0285 ; This is the actual DLI handler
0290 ;
0295 PHA ; save accumulator
0300 TXA
0305 PHA ; save X
0310 LDA #000 ; black bkgrnd
0315 LDX #00A ; white chars
0320 STA WSYNC
0325 STA COLPF2
0330 STX COLPF1 ; Blink cursor
0335 INC BLINCT
0340 BLINCT
0345 AND #010
0350 LSR A
0355 LSR A
0360 LSR A
0365 STA CHACTL
0370 PLA ; restore A and X
0375 TXA
0380 PLA
0385 RTI ; back to BASIC

0100 ; SCREEN ERASE SUBROUTINE
0105 ; CLEARS IN 4-LINE BLOCKS
0110 ;
0115 ; Syntax: X=USR(NL,ST)
0120 ; NL=addr of this routine
0125 ; ST=starting line number
0130 ;
0135 ; PROGRAM EQUATES
0140 ;
0145 BUFFER=#CB ; scr address buffer
0150 SAVHSC=#5B ; screentop pointer
0155 ;
0160 ; PLA ; # arguments
0165 ; PLA ; msb of line#: ignore
0170 ; PLA ; lsb
0175 TXA ; save in x-register
0180 LDA SAVHSC ; get screen
0185 STA BUFFER ; address
0190 LDA SAVHSC+1
0195 STA BUFFER+1
0200 CLD ; clear decimal mode
0205 DEX
0210 ADD40 DEX ; find window addr
0215 BHI CLEAR
0220 LDA BUFFER ; add 40
0225 ADC #028
0230 STA BUFFER
0235 LDA BUFFER+1
0240 ADC #000
0245 STA BUFFER+1
0250 CLC
0255 BCC ADD40
0260 CLEAR LDY #09F ; clear 4 lines
0265 LDA #000 ; space char
0270 SPACE STA (BUFFER),Y
0275 DEY
0280 BNE SPACE
0285 RTS

```

Next issue:

DEMON BIRDS



32K Disk

by Clayton Walnum

Once upon a time there was an Atari owner who had the most horrendous time balancing his checking account. Each month, upon the arrival of his statement, he would slink to his desk in despair. There he would spend hours cursing and whining, as he tried in vain to bring his figures into agreement with the bank's.

One day he could tolerate the situation no longer. He packed a loaf of bread and a flagon of wine and sallied forth into the magical Land of Software, intent on hunting up a Personal Checking Program.

The Land of Software was a dazzling and wonderful place. There were many fine programs to choose from. Unfortunately, none seemed quite right. There was one that was relatively simple to use, but didn't support a memo field. There was another that supported memos, but its printouts would have shamed a beggar. There was still another that had printouts of royal quality and even a place for memos, but the instruction scroll had been enchanted by an evil sorcerer so that it had no end and read as if in a foreign language.

The Atari owner cursed and whined in a familiar manner. All the programs he reviewed seemed to be bewitched in one way or another. There were graphs and budgets and reports and printer drivers, and so many extra "features" that one could set up finances for an entire kingdom. "Now that may be all right for some people," mumbled our hero, "but I just want to keep my checking account in order, not work out the national budget!"

He was about to give up in despair when an idea occurred to him. Why not create his own Personal Checking Program? With a screech of delight, he began to weave his spells. After several months of cursing and whining (mandatory for any enchanter), his sorcery was completed. He named his creation **Micro-Check** and lived happily ever after. The End.

The end?

Well, not really. This is just the beginning. This month, we will start to put together a complete checking system, including a check entry program, a check search program, an account balancer and a utilities module.

There are also three smaller programs that initialize and tie the system together: an AUTORUN.SYS file creator, a vertical blank interrupt (VBI) initializer and a menu program. All together, they form **MicroCheck**, a graphics oriented checkbook management program that will help you simplify and organize your checking account activities.

What can **MicroCheck** do for you? You can enter up to one hundred transactions per month. These transactions can include checks, deposits and automatic withdrawals. All entries can be searched by month, number, amount and payee, with the results sent to the screen or printer. When you balance your account, **MicroCheck** will do all the calculations and display a final report.

To keep **MicroCheck** simple to use, most program functions are prompted or menu driven. You won't have to continually refer to operating instructions to get good results. **MicroCheck** handles every necessary checking function, yet is simple and enjoyable to use.

And, best of all, the first part is right around the next corner—so stick with me!

The corner.

All ready to start typing? Let's take a look at the program listings.

Listing 1 is the AUTORUN.SYS creator. Type this program in and SAVE it to disk. Put a new disk containing DOS into drive 1. This will be your **MicroCheck** program disk. The programs that follow should all be SAVED to this disk. RUN the AUTORUN.SYS creator program. An AUTORUN.SYS file will then be written to your disk, making **MicroCheck** auto-booting. Isn't this fun?

Listing 2 is the title page and VBI initializer. Type this listing exactly as it appears and SAVE it to your disk under the filename START. You must use this filename, or the AUTORUN.SYS will not be able to run the program.

Listing 3 is the menu program. Once again, type it exactly as it appears, then SAVE it under the unlikely filename of MENU.

Listing 4 is the utilities program. Type it in and SAVE it under the filename UTILITY.

Listing 5 is **MicroCheck**'s central module, the check entry program. Type it in and SAVE it under CHECKBOO (short for "checkbook").

All set? Good! Go soak your fingers in a strong Epsom salts solution to bring down the swelling, then get back to me. You deserve a break!

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Off and running.

Now that all the work is done, let's start using MicroCheck. Put the disk containing your new programs into your drive, then turn on the computer. Presto! MicroCheck is now on your screen. (If it isn't, you may curse and whine, then go back and check your typing.)

After the program is finished showing off its name, the menu should load and run. Use the SELECT key to choose utilities, then press START. Your drive will keep happily as it loads the utility module.

MicroCheck uses monthly files to store its information. Before you can begin entering transactions, these files must be created on a data disk. Remove your program disk from the drive and insert a blank disk. *The disk you use will be completely erased!* Make sure it contains no information you wish to retain.

It is possible to have your data files on the program disk. If you wish to do this, hit SYSTEM RESET and change Lines 440 and 450 to REM statements. Now, when you run the program, the disk will not be formatted. However, you should be aware that there is much less room for data. If you write a lot of checks, you may run out of space.

Use the SELECT key to choose the new disk option, then press START. When formatting is complete, you'll be asked for your name, address, starting balance and the year. The starting balance is the last balance shown in your checkbook.

When you've entered the necessary information, your monthly data files will be created. This takes a minute or two, so you may want to soak those swollen fingers a little more. When the files are complete, you'll be prompted to reinsert the program disk. Do so, then press any key. The menu will load and run.

Entering checks.

Use the SELECT key to choose the enter checks option, then press START. When prompted, remove the program disk from your drive and insert your data disk. If your data is on the same disk as the program, just press any key.

Enter the month as a two-digit number (for example, 01 for January), then press RETURN. After the data for that month has loaded, you will see your balance and a number of options at the bottom of the screen.

To enter your first check (oh, boy!), press RETURN. You will be prompted to enter the day, the check number, the payee, the amount and a memo.

Enter the day as a two-digit number and press RETURN. If you have other checks to enter with the same date, when you're prompted for their dates, simply press RETURN.

There are four types of check numbers you may enter. The first is simply the number of your check in four digits (like this: 0001).

The second type uses the letters DEP. This is a deposit, and the amount entered will be added to your

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balance, rather than deducted. You will also note that PAYEE will be automatically filled in as DEPOSIT.

A third possible entry is AUTO. This type of check will become part of a special file containing AUTOMATIC transactions. Each of these transactions will be deducted from your account automatically, every time you start a new month. The transaction will also be deducted from the current month at the time you enter it. You may have up to five AUTOMATIC transactions on your data disk.

The final type of check number is simply 0000. Use this whenever the other three don't apply—for instance, to make a change in your balance or to enter a transaction made through an electronic teller.

You may enter whatever you like as the PAYEE.

Check amounts may be entered as simple decimal numbers (for example: 10 or 21.9). MicroCheck will format them automatically.

After entering the amount of the check, you may enter a memo. If you don't wish to have a memo, just press RETURN.

When you finish entering the check, you will be given new options at the bottom of the screen. If you're satisfied with what you've entered, press RETURN. The check will be entered and your balance updated. If you wish to make a change, use the edit option.

Editing checks.

To edit your entry, press the OPTION key, then hit the appropriate letter from the choices at the bottom of the screen. The cursor will appear in the portion of the check you have chosen.

Type in the new entry, or press RETURN for no change. When you're satisfied with all entries, press E, and you'll be asked again to PUSH RETURN IF OK. Press RETURN to enter the check, or press OPTION to return to the editing function.

To review your checks.

If you pressed RETURN, you'll again be presented with the original options at the bottom of the screen. Press the SELECT key to advance through the month, check by check. If you wish to change something, press OPTION, then follow the same procedures for editing as outlined above.

When you reach the last check for that month, MicroCheck will return you to the original options. If you want to stop reviewing your checks before you reach the end, just press the letter E to end.

When you have finished entering, editing and reviewing your checks, press OPTION and SELECT simultaneously. The new data for that month will be saved to disk.

Editing the AUTO file.

Sometimes you may find it necessary to change one of the entries in your AUTO file. You can do this by entering the letter A in response to the ENTER MONTH prompt. After the file has loaded, use the

SELECT key to choose the entry you need to work on. Editing is then accomplished in the same manner as above.

You may erase an entire AUTO file and start fresh, by choosing the new auto option from the utilities menu.

Starting a new year.

The MicroCheck year runs from January to December, so when Father Time turns his job over to that chubby little guy in the diaper, it's time to clean up your checking files.

To do this, load the utilities module, then select the new year option. *Make sure you have backed up your data disk before continuing!*

After being suitably warned that you'd better know what you're doing, you will be asked to insert your data disk. If your data is on the same disk as the program, just press any key. MicroCheck will then go happily on its way, moving all uncanceled checks into a special file known as MONTH00.DAT. At the same time, it will create new monthly files and clear out all of the last year's transactions (you *did* make that backup disk, right?) Your AUTO file, balance and personal information will, of course, remain unchanged.

Until we meet again.

There you have it! Next month, we'll finish off the system by adding the account balancer and the check search program. You'll see that balancing a checking account doesn't have to remove ten years from your life. It can actually be fun. Until then, happy checking! □

Listing 1.

```

10 DIM A$(1)
20 GRAPHICS 0:?"PUT DISK CONTAINING D
05 IN DRIVE"
30 ? "THEN PUSH <RETURN>":INPUT A$
40 OPEN #1,8,0,"D:AUTORUN.5Y5"
50 READ A:IF A=-1 THEN 70
60 PUT #1,A:GOTO 50
70 CLOSE #1:?"ALL DONE!"
80 DATA 255,255,0,6,142,6,162,0,189,26
,3,201,69,240,5,232,232,232,208,244,23
2,142,105,6,189,26,3
90 DATA 133,205,169,107,157,26,3,232,1
89,26,3,133,206,169,6,157,26,3,160,0,1
62,16,177,205,153,107,6,200,202
100 DATA 208,247,169,67,141,111,6,169,
6,141,112,6,169,11,141,106,6,96,172,10
6,6,240,9,185,131,6,206,106,6,160
110 DATA 1,96,138,72,174,105,6,165,205
,157,26,3,232,165,206,157,26,3,104,170
,169,155,160,1,96,7,0,251,243,51
120 DATA 246,67,6,163,246,51,246,60,24
6,76,228,243,0,32,32,32,32,32,32,32
,32,84,82,65,84,83,58,68,34,78
130 DATA 85,82,226,2,227,2,0,6,-1

```

CHECKSUM DATA.

(see page 8)

```

10 DATA 579,597,733,32,330,673,373,862
,823,335,99,956,685,7077

```

Listing 2.

```

10 DIM R$(1),R(5):RA=ADR(R$)+1
20 FOR I=0 TO 27:READ A:POKE RA+I,A:NE
XT I
30 DATA 104,104,104,162,255,160,58,202
,208,9,136,208,6,170,202,138,208,241,9
6,142,10
40 DATA 212,142,22,208,24,144,235
50 FOR X=1536 TO 1580:READ A:POKE X,A:
NEXT X
60 DATA 104,169,6,170,160,13,32,92,228
,96,0,12,0
70 DATA 174,12,6,165,20,201,7,208,11,1
69,0,133,20,232,224,2,208,2,162
80 DATA 0,189,10,6,141,199,2,142,12,6,
76,95,228
90 D=USR(1536)
100 GRAPHICS 17:POKE 559,0:DL=PEEK(560
)+256*PEEK(561)+4
110 POKE DL-1,71:POKE DL+2,7:POKE DL+3
,7
120 POKE DL+11,2:POKE DL+12,2:POKE DL+
18,65:POKE DL+19,PEEK(560):POKE DL+20,
PEEK(561)
130 POKE 708,12:POKE 752,1
140 POKE 87,0:POSITION 25,0:? "MICROCH
ECK":POSITION 28,1:? "THE"
150 POSITION 25,2:? "ELECTRONIC":POSIT
ION 25,3:? "CHECKBOOK"
160 POSITION 13,5:? "Copyright 1984":P
OSITION 19,6:? "by"
170 POSITION 3,8:? #6;"CLAYTON WALNUM"
:POKE 559,34
180 POKE RA+23,22:A=USR(RA,7)
190 GRAPHICS 0:POKE 559,0:RUN "D:MENU"

```

```

190 IF OLDROW=4 THEN POSITION 3,4:? #6
;"ENTER CHECKS":POSITION 3,6:? #6;"[C]
nch checks"
200 IF OLDROW=6 THEN POSITION 3,6:? #6
;"SEARCH CHECKS":POSITION 3,8:? #6;"[S]
tance account"
210 IF OLDROW=8 THEN POSITION 3,8:? #6
;"BALANCE ACCOUNT":POSITION 3,10:? #6;
"Utilities"
220 IF OLDROW=10 THEN POSITION 3,10:?
#6;"UTILITIES":POSITION 3,12:? #6;"[E]
nd"
230 IF OLDROW=12 THEN POSITION 3,12:?
#6;"END":POSITION 3,4:? #6;"[E]nter cheq
RS"
240 GOTO 70
250 START=6:SELECT=5:POKE 559,0
260 FOR X=1664 TO 1700:READ A:POKE X,A
:NEXT X
270 DATA 72,138,72,238,159,6,174,159,6
,189,128,6,141,10,212,141,26,208,224,3
6,208,5,169,31
280 DATA 141,159,6,104,170,104,64,31
290 DATA 10,0,112,0,0
300 GRAPHICS 17:POKE 559,0:DL=PEEK(560
)+256*PEEK(561)+4
310 POKE DL-1,198:POKE DL+2,135:POKE D
L+3,134:POKE DL+14,134:POKE DL+18,134
320 POKE DL+19,2:POKE DL+20,2:POKE DL+
21,2:POKE DL+22,2
330 POKE DL+23,65:POKE DL+24,PEEK(560)
:POKE DL+25,PEEK(561)
340 POKE 512,128:POKE 513,6:POKE 54286
,192
350 POKE 708,218:POKE 712,0:POKE 710,1
78
360 POKE 1546,112:POKE 1547,12:POKE 15
55,2:POKE 559,34:POKE 20,0
370 GOTO 20

```

CHECKSUM DATA.

(see page 8)

```

10 DATA 749,302,643,640,707,113,153,91
4,840,849,205,537,199,197,785,7833
160 DATA 16,331,734,878,1959

```

CHECKSUM DATA.

(see page 8)

```

10 DATA 446,103,101,491,795,413,964,73
,264,337,611,669,597,861,408,7133
160 DATA 371,169,508,697,567,394,626,2
6,506,358,696,398,997,488,853,7654
310 DATA 216,997,27,127,50,879,507,280
3

```

Listing 3.

```

10 GOTO 250
20 POSITION 8,1:? #6;"MENU":POSITION 3
,4:? #6;"[E]nter checks":POSITION 3,6:?
#6;"SEARCH CHECKS"
30 POSITION 3,8:? #6;"BALANCE ACCOUNT"
:POSITION 3,10:? #6;"UTILITIES"
40 POSITION 3,12:? #6;"END"
50 POSITION 7,18:? #6;"USE [S]ELECT TO C
HOOSE ITEM":POSITION 9,22:? #6;"[P]RESS
[S]TART TO BEGIN"
60 ROW=4:COL=1:POSITION COL,ROW:? #6;"
=>"
70 CONSOL=PEEK(53279):IF CONSOL<>START
AND CONSOL<>SELECT THEN 70
80 IF CONSOL=SELECT THEN 160
90 IF CONSOL=START THEN CHOICE=ROW/2-1
:GRAPHICS 0:POKE 559,0
100 ON CHOICE GOTO 110,120,130,140,150
110 RUN "D:CHECKBOO"
120 RUN "D:CHECKPRT"
130 RUN "D:CHECKBAL"
140 RUN "D:UTILITY"
150 POKE 559,34:NEM :END
160 OLDROW=ROW:ROW=ROW+2:IF ROW=14 THE
N ROW=4
170 FOR X=1 TO 40:NEXT X
180 POSITION COL,OLDROW:? #6;" ":POSI
TION COL,ROW:? #6;"=":POKE 53279,0

```

Listing 4.

```

10 GOTO 200
20 CLOSE #1:OPEN #1,4,0,"K":POKE 764,
255:POKE 702,64:POKE 694,0
30 IF PEEK(764)=255 THEN 30
40 IF PEEK(764)=39 OR PEEK(764)=60 THE
N 30
50 GET #1,A:CLOSE #1:RETURN
60 REM ***** BRKDIS *****
70 I=PEEK(16):IF I>127 THEN I=I-128:PO
KE 16,I:POKE 53774,I
80 RETURN
90 REM *****SND1*****
100 SOUND 0,100,12,8:FOR X=1 TO 250:NE
XT X:SOUND 0,0,0,0:RETURN
110 REM *****DELAY*****
120 FOR X=1 TO 2000:NEXT X:RETURN
130 REM *****INSDAT*****
140 GRAPHICS 17:GOSUB BRKDIS:POSITION
3,8:? #6;"please insert":POSITION 3,10
:? #6;"your data disk"
150 POSITION 3,12:? #6;"into drive #1"
:POSITION 3,22:? #6;"[P]RESS ANY KEY":GO
SUB 20:RETURN
160 REM *****INSPRO*****

```

```

170 GRAPHICS 17:GOSUB BRKDIS:POSITION
3,5:? #6;"please insert":POSITION 3,7:
? #6;"program disk"
180 POSITION 3,16:? #6;"PRESS ANY KEY"
:GOSUB 20:TRAP 1200:RUN "D:MENU"
190 REM *****INITIALIZE*****
200 DIM NAME$(20),ADDRESS$(20),CITY$(2
0),BALANCE$(8),MONTHFILE$(13),B$(20),C
HECK$(63)
210 INSDAT=140:INSPRO=170:NODAT=1230:5
ND1=100:DELAY=120:BRKDIS=70
220 REM *****MENU*****
230 GRAPHICS 2:GOSUB BRKDIS:POKE 710,0
:POKE 752,1:POKE 1555,2:ROW=3
240 POSITION 6,3:? #6;"new year":POSIT
ION 6,4:? #6;"new disk":POSITION 4,3:?
#6;"=">"
250 POSITION 6,5:? #6;"new auto"
260 ? " USE SELECT TO PICK ITEM":
? ? " PRESS START TO BEGIN"
270 IF PEEK(53279)<>5 AND PEEK(53279)<
>6 THEN 270
280 IF PEEK(53279)=5 THEN 310
290 CHOICE=ROW-2
300 ON CHOICE GOTO 800,390,1000
310 OLDROW=ROW:ROW=ROW+1:IF ROW=6 THEN
ROW=3
320 IF ROW=5 THEN POSITION 6,4:? #6;"n
ew disk":POSITION 6,5:? #6;"new auto"
330 IF ROW=4 THEN POSITION 6,3:? #6;"n
ew year":POSITION 6,4:? #6;"new disk"
340 IF ROW=3 THEN POSITION 6,3:? #6;"n
ew year":POSITION 6,5:? #6;"new auto"
350 POSITION 4,OLDROW:? #6;" ":POSITI
ON 4,ROW:? #6;"=">"
360 FOR X=1 TO 50:NEXT X:POKE 53279,8:
GOTO 270
370 GOTO 370
380 REM *****NEW DISK*****
390 MONTHFILE$="D:MONTH .DAT":B$="
"
400 GRAPHICS 0:GOSUB BRKDIS:POKE 752,1
:POKE 710,50:POSITION 0,0:? "
INITIALIZE NEW DISK
410 POSITION 8,18:? "DISK WILL BE FORW
ATTED":GOSUB 1110
420 GRAPHICS 17:GOSUB BRKDIS:POSITION
2,8:? #6;"please insert a":POSITION 2,
10:? #6;"blank disk into"
430 POSITION 6,12:? #6;"drive #1":POSI
TION 3,22:? #6;"PRESS ANY KEY":GOSUB 2
0
440 TRAP 450:OPEN #1,4,0,"D:MENU":CLOS
E #1:GOTO 760
450 GRAPHICS 18:GOSUB BRKDIS:POSITION
2,5:? #6;"FORMATTING DISK":XIO 254,#1,
0,0,"D1:"
460 GRAPHICS 0:GOSUB BRKDIS:POSITION 2
,8:? "ENTER YOUR NAME":INPUT NAME$:?
470 IF LEN(NAME$)<20 THEN NAME$(LEN(NA
ME$)+1)=B$
480 ? "ENTER YOUR STREET ADDRESS":INPU
T ADDRESS$:?
490 IF LEN(ADDRESS$)<20 THEN ADDRESS$(
LEN(ADDRESS$)+1)=B$
500 ? "ENTER CITY, STATE, AND ZIP":INP
UT CITY$:?
510 IF LEN(CITY$)<20 THEN CITY$(LEN(CI
TY$)+1)=B$
520 ? CHR$(125):POKE 752,1:POSITION 2,
8:? "IS THIS CORRECT"? :? :? NAME$:? AD
DRESS$:? CITY$
530 GOSUB 20:IF A<>ASC("Y") AND A<>ASC
("N") THEN 530
540 IF A=ASC("N") THEN 460
550 OPEN #1,8,0,"D:NAME.DAT":? #1;NAME
$:? #1;ADDRESS$:? #1;CITY$:CLOSE #1
560 TRAP 560:? CHR$(125):POKE 752,0:PO
SITION 2,8:? "ENTER YOUR STARTING BALA
NCE"
570 INPUT BALANCE: BALANCE$=STR$(BALANC
E)
580 FOR X=1 TO LEN(BALANCE$):IF BALANC
E$(X,X)<>"." THEN NEXT X: BALANCE$(LEN(
BALANCE$)+1)="00":GOTO 610
590 IF X=LEN(BALANCE$) THEN BALANCE$(L
EN(BALANCE$)+1)="00"

```

```

600 IF X=LEN(BALANCE$)-1 THEN BALANCE$
(LEN(BALANCE$)+1)="0"
610 POKE 752,1:? :? "IS THIS YOUR CORR
ECT"? "STARTING BALANCE"? :? :? "$";BA
LANCE$
620 GOSUB 20:IF A<>ASC("Y") AND A<>ASC
("N") THEN 620
630 IF A=ASC("N") THEN 560
640 TRAP 640:? CHR$(125):POSITION 2,10
:? "ENTER THE YEAR (EXAMPLE: 84)":INPU
T YEAR
650 IF YEAR<0 OR YEAR>99 THEN 640
660 TRAP 4000:POKE 752,1:? :? "IS THI
S THE CORRECT YEAR"? :? "19";YEAR
670 GOSUB 20:IF A<>ASC("Y") AND A<>ASC
("N") THEN 670
680 IF A=ASC("N") THEN 640
690 OPEN #1,8,0,"D: BALANCE.DAT":? #1;B
ALANCE$:? #1;YEAR:CLOSE #1
700 GRAPHICS 17:GOSUB BRKDIS:POKE 708,
14:POKE 712,98
710 POSITION 1,8:? #6;"CREATING FILE F
OR":POSITION 6,10:? #6;"MONTH #":
720 FOR X=0 TO 12:POSITION 13,10:? #6;
X:IF X<10 THEN MONTHFILE$(8,8)="0":MON
THFILE$(9,9)=STR$(X):GOTO 740
730 MONTHFILE$(8,9)=STR$(X)
740 OPEN #1,8,0,MONTHFILE$:? #1;"END":
CLOSE #1:NEXT X
750 OPEN #1,8,0,"D:AUTO.DAT":? #1;"END
":CLOSE #1:GOTO INSPRO
760 GRAPHICS 17:GOSUB BRKDIS:POSITION
4,8:? #6;"PROGRAM DISK":POSITION 6,10:
? #6;"STILL IN"
770 POSITION 6,12:? #6;"DRIVE #1":GOSU
B 5ND1:GOSUB DELAY:GOTO 420
780 GOTO INSPRO
790 REM *****NEW YEAR*****
800 GRAPHICS 0:GOSUB BRKDIS:POKE 752,1
:POKE 710,50:POSITION 0,0:? "
START NEW YEAR
810 GOSUB 1110:MONTHFILE$="D:MONTH .D
AT"
820 GOSUB INSDAT:TRAP 980:OPEN #2,4,0,
"D:MONTH01.DAT":TRAP 4000
830 CLOSE #2:OPEN #2,8,0,"D:MONTH00.TM
P"
840 GRAPHICS 17:GOSUB BRKDIS:POKE 708,
14:POKE 712,98:POSITION 5,8:? #6;"WORK
ING ON":POSITION 6,10:? #6;"MONTH #":
850 FOR X=0 TO 12:POSITION 13,10:? #6;
X:IF X<10 THEN MONTHFILE$(8,8)="0":MON
THFILE$(9,9)=STR$(X):GOTO 870
860 MONTHFILE$(8,9)=STR$(X)
870 OPEN #1,4,0,MONTHFILE$
880 INPUT #1;CHECK$:IF CHECK$="END" TH
EN 910
890 IF CHECK$(1,1)="*" THEN 880
900 ? #2;CHECK$:GOTO 880
910 CLOSE #1:OPEN #1,8,0,MONTHFILE$:?
#1;"END":CLOSE #1:NEXT X
920 ? #2;"END":CLOSE #2
930 XIO 33,#1,0,0,"D:MONTH00.DAT":XIO
32,#1,0,0,"D:MONTH00.TMP,MONTH00.DAT"
940 OPEN #1,4,0,"D: BALANCE.DAT":INPUT
#1;BALANCE$:INPUT #1;YEAR:YEAR=YEAR+1
950 CLOSE #1:OPEN #1,8,0,"D: BALANCE.TM
P":? #1;BALANCE$:? #1;YEAR:CLOSE #1
960 XIO 33,#1,0,0,"D: BALANCE.DAT":XIO
32,#1,0,0,"D: BALANCE.TMP, BALANCE.DAT"
970 GOTO INSPRO
980 GOSUB NODAT:GOTO 820
990 REM *****NEW AUTO*****
1000 GRAPHICS 17:GOSUB BRKDIS:POSITION
4,6:? #6;"DO YOU WISH":POSITION 4,8:?
#6;"TO CREATE A"
1010 POSITION 3,10:? #6;"NEW AUTO FILE
?"
1020 GOSUB 20:IF A<>ASC("Y") AND A<>AS
C("N") THEN 1020
1030 IF A=ASC("N") THEN TRAP 1200:RUN
"D:MENU"
1040 GOSUB INSDAT:TRAP 1090:OPEN #2,4,
0,"D:AUTO.DAT":CLOSE #2
1050 GRAPHICS 17:GOSUB BRKDIS:POSITION
4,8:? #6;"CREATING NEW":POSITION 5,10
:? #6;"AUTO FILE"

```

```

1060 OPEN #2,8,0,"D:AUTO.DAT":? #2;"EN
D":CLOSE #2
1070 GRAPHICS 17:GOSUB BRKDIS
1080 POSITION 6,8:? #6;"NEW AUTO":POSIT
ION 4,10:? #6;"FILE CREATED":FOR X=1
TO 750:NEXT X:GOTO INSPRO
1090 GOSUB NODAT:GOTO 1040
1100 REM *****WARNING SCREEN*****
1110 POSITION 16,5:? "WARNING!":POSITI
ON 7,9:? "THIS PROGRAM WILL DESTROY"
1120 POSITION 7,11:? "ANY MICROCHECK D
ATA FILES":POSITION 7,13:? "THAT MAY B
E ON YOUR DISK!"
1130 POSITION 0,23:? "PRESS 'C' TO CO
NTINUE OR 'M' FOR MENU"
1140 FOR X=1 TO 16:POKE 710,50:SOUND 0
,100,10,8:SOUND 1,101,10,8:FOR Y=1 TO
15:NEXT Y
1150 POKE 710,0:SOUND 0,240,10,8:SOUND
1,241,10,8:FOR Y=1 TO 15:NEXT Y:NEXT
X
1160 SOUND 0,0,0,0:SOUND 1,0,0,0:POKE
710,50
1170 GOSUB 20:IF A<>ASC("C") AND A<>AS
C("M") THEN 1170
1180 TRAP 1200:IF A=ASC("M") THEN RUN
"D:MENU"
1190 RETURN
1200 GRAPHICS 17:GOSUB BRKDIS:POSITION
4,8:? #6;"PROGRAM DISK":POSITION 7,10
:? #6;"NOT IN"
1210 POSITION 6,12:? #6;"DRIVE #1":GOS
UB SND1:GOSUB DELAY:TRAP 1200:GOTO IN
SPRO
1220 REM *****NODAT*****
1230 CLOSE #2:GRAPHICS 17:GOSUB BRKDIS
:POSITION 4,8:? #6;"THIS IS NOT":POSIT
ION 4,10:? #6;"A microcheck"
1240 POSITION 5,12:? #6;"DATA DISK!":G
OSUB SND1:GOSUB DELAY:RETURN
    
```

CHECKSUM DATA.
(see page 8)

```

10 DATA 436,734,347,148,873,861,201,76
6,780,48,951,725,27,200,138,7235
160 DATA 67,950,531,325,145,424,820,81
7,309,517,765,984,542,532,960,8688
310 DATA 253,788,735,629,933,996,733,2
74,897,122,159,642,409,482,707,8759
460 DATA 169,894,217,254,630,19,478,42
1,76,987,445,625,900,350,296,6761
610 DATA 506,422,76,798,305,751,442,88
7,861,862,213,680,644,571,7226
760 DATA 119,612,377,90,756,286,193,20
4,46,235,691,369,352,744,167,5241
910 DATA 726,746,288,666,152,222,378,4
30,49,820,816,410,824,882,434,7843
1060 DATA 981,888,197,351,679,777,829,
932,657,525,86,368,830,791,363,9254
1210 DATA 470,649,372,718,2209
    
```

Listing 5.

```

10 N1=1:N2=2:N3=3:N4=4:N5=5:N6=6:N7=7:
N8=8:N9=9:N10=10:N11=11:N12=12:N13=13:
N14=14:N15=15:N16=16:N17=17:N18=18
20 N19=19:N20=20:GOTO 2090
30 REM *****DELAY*****
40 FOR X=N1 TO 1750:NEXT X:RETURN
50 REM *****BRKDIS *****
60 I=PEEK(N16):IF I>127 THEN I=I-128:P
OKE N16,I:POKE 53774,I
70 RETURN
80 REM *****IN*****
90 L=N0:TEMP$="":POKE 764,255
    
```

```

100 GOSUB IN2:IF A=RETRN THEN POKE 752
,N1:RETURN
110 IF D=N1 THEN D=N0:POSITION 38,N5:?
" "
120 IF N=N1 THEN N=N0:POSITION 36,N2:?
" "
130 POKE 752,N0:IF A=BACKSP THEN 160
140 L=L+N1:IF L>L1 THEN POKE 752,N1:RE
TURN
150 POSITION COL+L-N1,ROW:? CHR$(A):;T
EMP$(L,L)=CHR$(A):GOTO 100
160 IF L>N0 THEN ? "4";:L=L-N1:IF L=N0
THEN TEMP$=""
170 IF L>N0 THEN TEMP$=TEMP$(N1,L)
180 GOTO 100
190 REM ***** IN2 *****
200 OPEN #N1,N4,N0,"K":POKE 764,255:P
OKE 702,64:POKE 694,N0
210 IF PEEK(764)=255 THEN 210
220 IF PEEK(764)=39 OR PEEK(764)=60 OR
PEEK(764)=124 OR PEEK(764)=103 THEN P
OKE 764,255:GOTO 210
230 GET #N1,A:CLOSE #N1:RETURN
240 REM ***** SND1 *****
250 SOUND N0,N20,N10,N8:FOR X=N1 TO N2
0:NEXT X:SOUND N0,N0,N0,N0:RETURN
260 REM *****SND2*****
270 SOUND N0,75,N12,N8:FOR X=N1 TO 30:
NEXT X:SOUND N0,N0,N0,N0:RETURN
280 REM *****SND3*****
290 SOUND N0,100,N12,N8:FOR X=N1 TO 20
0:NEXT X:SOUND N0,N0,N0,N0:RETURN
300 REM *****EDIT*****
310 POSITION 21,N16:? "Pick field to e
dit":SUE=N1
320 FOR X=N17 TO N20:POSITION N0,X:? B
$:NEXT X
330 POSITION N8,N18:? "A = AMOUNT
N = NUMBER":POSITION N8,N19:? "D = DAT
E
P = PAYEE"
340 POSITION N8,N20:? "M = MEMO
E = END"
350 EDTFLAG=N1:GOSUB IN2
360 IF A<>ASC("A") AND A<>ASC("D") AND
A<>ASC("E") AND A<>ASC("M") AND A<>AS
C("N") AND A<>ASC("P") THEN 350
370 FOR X=N17 TO N20:POSITION N0,X:? B
$:NEXT X
380 IF A=ASC("A") THEN 440
390 IF A=ASC("D") THEN GOSUB DATE:GOTO
310
400 IF A=ASC("E") THEN EDTFLAG=N0:GOTO
500
410 IF A=ASC("M") THEN GOSUB MEMO:GOTO
310
420 IF A=ASC("N") THEN GOSUB CHNUM:GOT
O 310
430 IF A=ASC("P") THEN GOSUB PAYEE:GOT
O 310
440 IF MONTHFILE$="D:AUTO.DAT" THEN GO
SUB AMOUNT:GOTO 310
450 IF FLAG2 THEN GOSUB AMOUNT:GOTO 31
0
460 OLDAMNT=VAL(AMOUNT$):GOSUB AMOUNT:
DIF=OLDAMNT-VAL(AMOUNT$):IF CHNUM$="DE
P" THEN DIF=-DIF
470 BALANCE$=STR$(VAL(BALANCE$)+DIF)
480 TEMP$=BALANCE$:GOSUB DOLFORMAT:BA
LANCE$=TEMP$
490 POSITION 31,N15:? BALANCE$;" "
GOTO 310
500 CHECK$(N2)=CHNUM$:CHECK$(N6)=DATE$
:CHECK$(N14)=PAYEE$:CHECK$(35)=AMOUNT$
:CHECK$(42)=MEMO$
510 FOR X=N17 TO N20:POSITION N0,X:? B
$:NEXT X:RETURN
520 REM ***** DOLFORMAT *****
530 FOR X=N1 TO LEN(TEMP$):IF TEMP$(X,
X)<>"." THEN NEXT X:TEMP$(X)="00":RE
TURN
540 IF LEN(TEMP$)=X THEN TEMP$(X+N1,X+
N2)="00"
550 IF LEN(TEMP$)=X+N1 THEN TEMP$(X+N2
,X+N2)="0"
560 RETURN
570 REM ***** DATE *****
    
```

```

580 GOSUB SND1:POSITION 21,N16:? "
enter day";
590 COL=33:ROW=N5:LOCATE COL,ROW,Z:POK
E 752,N1:L1=N2
600 POSITION COL,ROW:? CHR$(Z+128):D=N
1:GOSUB IN
610 IF BEGIN AND TEMP$="" THEN 690
620 IF TEMP$="" THEN 680
630 IF LEN(TEMP$)<N2 THEN 690
640 FOR X=N1 TO N2:IF TEMP$(X,X)<"0" O
R TEMP$(X,X)>"9" THEN 690
650 NEXT X
660 DATE$(N4,N5)=TEMP$:T$=TEMP$
670 IF VAL(T$)<N1 OR VAL(T$)>DAYS THEN
690
680 POSITION 30,ROW:? DATE$;" ":BEGIN=
N0:RETURN
690 GOSUB SND2:Z=32:POSITION 33,N5:? "
";:POSITION COL,ROW:GOTO 600
700 REM ***** CHNUM *****
710 GOSUB SND1:POSITION 21,N16:? "ente
r check number"
720 COL=32:ROW=N2:POSITION COL,ROW:? C
HNUM$
730 LOCATE COL,ROW,Z:POSITION COL,ROW:
? CHR$(Z+128):L1=N4:M=N1:GOSUB IN
740 IF TEMP$="" THEN 810
750 IF TEMP$="DEP" THEN TEMP$(N4)=" ":
GOTO 800
760 IF TEMP$="AUTO" THEN 800
770 IF LEN(TEMP$)<N4 THEN 820
780 FOR X=N1 TO LEN(TEMP$):IF TEMP$(X,
X)<"0" OR TEMP$(X,X)>"9" THEN 820
790 NEXT X
800 CHNUM$=TEMP$
810 POSITION 32,N2:? CHNUM$;" "::RETUR
N
820 GOSUB SND2:POSITION 32,N2:? " "
:GOTO 730
830 REM ***** PAYEE *****
840 COL=N8:ROW=N8:IF CHNUM$="DEP" THE
N PAYEE$="DEPOSIT":GOTO 9
00
850 GOSUB SND1:POSITION 21,N16:? "
enter payee";
860 POKE 752,N1:LOCATE COL,ROW,Z
870 POSITION COL,ROW:? CHR$(Z+128);:L1
=21:GOSUB IN
880 IF TEMP$="" AND EDTFLAG THEN 900
890 PAYEE$=TEMP$:IF LEN(PAYEE$)<21 THE
N FOR X=LEN(PAYEE$)+N1 TO 21:PAYEE$(X,
X)=" ":NEXT X
900 POSITION COL,ROW:? PAYEE$;" ":POKE
752,N1:RETURN
910 REM ***** AMOUNT *****
920 GOSUB SND1:POSITION 21,N16:? "
enter amount";
930 DE=N0:COL=31:ROW=N8:LOCATE COL,ROW
,Z
940 POSITION COL,ROW:? CHR$(Z+128);:L1
=N7:GOSUB IN
950 IF TEMP$="" AND (FLAG OR EDTFLAG)
THEN 1070
960 IF TEMP$="" THEN 1080
970 GOSUB DOLFORMAT:AMOUNT$=TEMP$
980 FOR X=N1 TO LEN(AMOUNT$)
990 IF (AMOUNT$(X,X)<"0" OR AMOUNT$(X,
X)>"9") AND AMOUNT$(X,X)<>"." THEN 108
0
1000 IF AMOUNT$(X,X)="." AND DE=N0 THE
N DE=X:GOTO 1020
1010 IF AMOUNT$(X,X)="." AND DE>N0 THE
N 1080
1020 NEXT X
1030 IF DE=N0 OR DE>N5 THEN 1080
1040 IF LEN(AMOUNT$)>DE+N2 THEN 1080
1050 IF LEN(AMOUNT$)=N7 THEN 1070
1060 FOR X=LEN(AMOUNT$)+N1 TO N7:AMOUN
T$(X)=" ":NEXT X
1070 POSITION COL,ROW:? AMOUNT$;:TRAP
40000:RETURN
1080 GOSUB SND2:POSITION 31,N8:? "
";:POKE 752,N1:GOTO 930
1090 REM ***** MEMO *****
1100 GOSUB SND1:POSITION 21,N16:? "
enter memo";

```

```

1110 COL=N7:ROW=N11:POKE 752,N1:LOCATE
COL,ROW,Z
1120 POSITION COL,ROW:? CHR$(Z+128);:L
1=22:GOSUB IN
1130 IF TEMP$="" AND EDTFLAG THEN 1160
1140 IF TEMP$="" AND FLAG THEN 1160
1150 MEMO$=TEMP$:IF LEN(MEMO$)<22 THEN
FOR X=LEN(MEMO$)+N1 TO 22:MEMO$(X)="
":NEXT X
1160 POSITION COL,ROW:? MEMO$:RETURN
1170 REM ***** START *****
1180 IF MONTHFILE$(<)"D:AUTO.DAT" THEN
POSITION N7,N17:? "RETURN = ENTER NEXT
CHECK"
1190 POSITION N12,N18:? "SELECT = REVI
EW":POSITION N9,19:? "OPTION & SELECT
= END":GOSUB SND1
1200 POKE 764,255:POKE 53279,N8
1210 IF PEEK(764)=N12 AND MONTHFILE$(<
)"D:AUTO.DAT" THEN SVE=N1:GOTO 1260
1220 IF PEEK(53279)=START AND NOT ENT
RED THEN 1200
1230 IF PEEK(53279)=SELECT THEN 1600
1240 IF PEEK(53279)=OPTSEL THEN 1830
1250 GOTO 1210
1260 FOR X=N17 TO N19:POSITION N0,X:?
B$:NEXT X
1270 ENTRED=N0
1280 IF CHNUM$="DEP " OR CHNUM$="AUTO"
OR CHNUM$="0000" THEN 1320
1290 V=VAL(CHNUM$):V=V+N1:IF V>9999 TH
EN V=0
1300 CHNUM$=STR$(V):IF LEN(CHNUM$)=N4
THEN 1320
1310 L=LEN(CHNUM$):FOR X=N1 TO N4-L:TE
MP$(X)="0":NEXT X:TEMP$(X)=CHNUM$:CHNU
M$=TEMP$
1320 GOSUB DATE:GOSUB CHNUM:GOSUB PAYE
E:GOSUB AMOUNT:GOSUB MEMO
1330 POSITION N10,N19:? "OPTION = EDIT
CHECK"
1340 GOSUB SND1:POSITION 21,N16:? "retu
rn if ok";:POKE 764,255:POKE 53
279,N8
1350 IF PEEK(764)=N12 THEN 1380
1360 IF PEEK(53279)=OPTION THEN 1590
1370 GOTO 1350
1380 IF CHNUM$="AUTO" AND AUTOCNT=N5 T
HEN FULL$="AUTO":GOTO 1500
1390 IF COUNT=100 THEN FULL$="CHECK":G
OTO 1500
1400 ENTRED=N1:POSITION 21,N16:? B$(N2
0):POSITION N10,N19:? B$(N19)
1410 CHECK$(N1)=" ":CHECK$(N2)=CHNUM$:
CHECK$(N6)=DATE$:CHECK$(N14)=PAYEE$:CH
ECK$(35)=AMOUNT$:CHECK$(42)=MEMO$
1420 MONTHDAT$(LEN(MONTHDAT$)+N1)=CHEC
K$
1430 IF CHNUM$="AUTO" THEN AUTOCNT=AUT
OCNT+N1:AUTO$(AUTOCNT*63-62,AUTOCNT*63
)=CHECK$
1440 POKE 752,N1:POSITION N8,N8:? B$(N
16):POSITION 31,N8:? B$(30)
1450 COUNT=COUNT+N1
1460 POSITION N7,N11:? B$(N15)
1470 IF CHNUM$="DEP " THEN BALANCE$=ST
R$(VAL(BALANCE$)+VAL(AMOUNT$)):GOTO 14
90
1480 BALANCE$=STR$(VAL(BALANCE$)-VAL(A
MOUNT$))
1490 TEMP$=BALANCE$:GOSUB DOLFORMAT:BA
LANCE$=TEMP$:POSITION 31,N15:? BALANCE
$;" ":GOTO 1180
1500 GOSUB SND2:FOR X=N17 TO N19:POSIT
ION N0,X:? B$:NEXT X
1510 FOR X=N1 TO LEN(FULL$):FULL$(X,X)
=CHR$(ASC(FULL$(X,X))+160):NEXT X
1520 POKE 1547,52:POSITION 21,N16:? "
";FULL$;" DATE=7/11":POSITION N8,N18
?: "PRESS RETURN TO CONTINUE"
1530 POKE 764,255
1540 IF PEEK(764)=255 THEN 1540
1550 IF PEEK(764)<>N12 THEN 1530
1560 POSITION N0,N18:? B$:POSITION 21,
N16:? B$(N18):POKE 1547,N12
1570 POKE 752,N1:POSITION N8,N8:? B$(N
16):POSITION 31,N8:? B$(30):POSITION N
7,N11:? B$(N15)

```

```

1580 CHNUM$=CHECK$(N2,N5):GOTO 1180
1590 FLAG2=N1:GOSUB EDIT:FLAG2=N0:POKE
751,N1:GOTO 1330
1600 FOR X=N17 TO N19:POSITION N0,X:
B$:NEXT X: CNT=N0
1610 IF COUNT>N0 THEN 1640
1620 POSITION N20,N16:? "no checks to
review":GOSUB SND2
1630 GOSUB DELAY:POSITION N20,N16:? "
":GOTO 1180
1640 POSITION 21,N16:? " ENTRY #
"
1650 POSITION N10,N18:? "SELECT = NEXT
CHECK":POSITION N13,N19:? "OPTION = E
DIT":POSITION N16,N20:? "E = END"
1660 IF EDT THEN EDT=N0:GOTO 1720
1670 CNT=CNT+N1:IF CNT>COUNT THEN 1780
1680 CHECK$=MONTHDAT$(CNT*63-62,CNT*63
)
1690 CHNUM$=CHECK$(N2,N5):PAYEE$=CHECK
$(N14,34):AMOUNT$=CHECK$(35,41):MEMO$=
CHECK$(42):DATE$=CHECK$(N6,N13)
1700 POSITION 32,N2:? CHNUM$:POSITION
30,N5:? DATE$:POSITION N8,N8:? PAYEE$
1710 POSITION 31,N8:? AMOUNT$:POSITION
N7,N11:? MEMO$
1720 POSITION 33,N16:? CNT
1730 POKE 764,255
1740 IF PEEK(764)=42 THEN 1780
1750 IF PEEK(53279)=SELECT THEN 1660
1760 IF PEEK(53279)=OPTION THEN GOSUB
EDIT:MONTHDAT$(CNT*63-62,CNT*63)=CHECK
$:EDT=N1:GOTO 1640
1770 GOTO 1740
1780 POSITION N10,N18:? B$(N19):POSITI
ON N13,N19:? B$(25):POSITION N16,N20:?
B$(30):POSITION 21,N16:? B$(N20)
1790 CHECK$=MONTHDAT$(COUNT*63-62,COUN
T*63)
1800 POKE 752,N1:POSITION N8,N8:? B$(N
16):POSITION 31,N8:? B$(30)
1810 POSITION N7,N11:? B$(N14)
1820 CHNUM$=CHECK$(N2,45):GOTO 1180
1830 IF NOT 5VE THEN 1970
1840 TEMPFILE$=MONTHFILE$:TEMPFILE$(LE
N(TEMPFILE$)-N2,LEN(TEMPFILE$))="TMP":
CLOSE #N1:OPEN #N1,N8,N0,TEMPFILE$
1850 FOR X=N1 TO COUNT:? #N1:MONTHDAT$
(X*63-62,X*63):NEXT X
1860 ? #N1:"END":CLOSE #N1
1870 XIO 33,#N1,N0,N0,MONTHFILE$:MONTH
FILE$=MONTHFILE$(N3)
1880 GRAPHICS N0:POKE 559,N0:? :? :? "
XIO 32,#1,0,0,";CHR$(34);TEMPFILE$;"
;MONTHFILE$
1890 ? :? :? "CONT":POSITION N0,N0:POK
E 842,N13:STOP
1900 POKE 842,N12:CLOSE #N2:OPEN #N2,N
8,N0,"D:BALANCE.DAT":? #N2;BALANCE$:?
#N2;YEAR:CLOSE #N2
1910 IF MONTHFILE$="AUTO.DAT" THEN 197
0
1920 IF AUTOCNT=N0 THEN 1970
1930 OPEN #N2,N8,N0,"D:AUTO.TMP"
1940 FOR X=N1 TO AUTOCNT:? #N2;AUTOS(X
*63-62,X*63):NEXT X
1950 ? #N2:"END":CLOSE #N2
1960 XIO 33,#N1,N0,N0,"D:AUTO.DAT":XIO
32,#N1,N0,N0,"D:AUTO.TMP,AUTO.DAT"
1970 GRAPHICS N18:GOSUB BRKDIS:POSITIO
N N3,N4:? #6;"n = new month":POSITION
N5,N6:? #N6;"M = menu"
1980 GOSUB IN2:IF A=ASC("M") THEN 2010
1990 IF A=ASC("N") THEN 5VE=N0:MONTHDA
T$="":GOTO 2210
2000 GOTO 1980
2010 GRAPHICS N17:GOSUB BRKDIS:POSITIO
N N3,N5:? #N6;"please insert":POSITION
N3,N7:? #N6;"program disk"
2020 POSITION N3,N16:? #N6;"PRESS ANY
KEY"
2030 GOSUB IN2:TRAP 2040:RUN "D:MENU"
2040 GRAPHICS N17:POSITION N4,N8:? #N6
;"PROGRAM DISK":POSITION N7,N10:? #N6;
;"NOT IN"
2050 POSITION N6,N12:? #N6;"DRIVE #1":
GOSUB SND3:GOSUB DELAY:GOTO 2010

```

```

2060 REM *****
2070 REM * INITIALIZE *
2080 REM *****
2090 DIM PAYEE$(21),AMOUNT$(N7),MEMO$(
22),MONTHFILE$(N13),MONTHDAT$(6300),CH
NUM$(N4),CHECK$(63),B$(37),T$(N8)
2100 DIM TEMP$(22),CH$(40),NAME$(N20),
ADDRESS$(N20),CITY$(N20),BALANCE$(N8),
DATE$(N8),TEMPFILE$(N13),A$(22)
2110 DIM AUTO$(315),AUTOFILE$(N13),FUL
L$(N5)
2120 RETRN=155:BACKSP=126:IN=90:START=
N6:OPTION=N3:SELECT=N5:OPTSEL=N1:SND1=
250:ENTRED=N0:BEGIN=N1
2130 DOLFORMAT=520:DATE=580:CHNUM=710:
PAYEE=840:EDIT=310:AMOUNT=920:MEMO=110
0:FLAG=N0:FLAG2=N0:SND2=270:5VE=N0
2140 BRKDIS=60:IN2=200:DELAY=40:SND3=2
90
2150 CH$="|
|"
2160 B$(N1)=" ":B$(37)=B$:B$(2)=B$
2170 GRAPHICS 17:GOSUB BRKDIS:POSITION
3,8:? #6;"please insert":POSITION 3,1
0:? #6;"your data disk"
2180 POSITION 3,12:? #6;"into drive #1
":POSITION 3,22:? #6;"PRESS ANY KEY":G
OSUB IN2
2190 TRAP 2730:OPEN #N1,N4,N0,"D:NAME.
DAT":INPUT #N1;NAME$:INPUT #N1;ADDRESS
$:INPUT #N1;CITY$:CLOSE #N1
2200 OPEN #N1,N4,N0,"D:BALANCE.DAT":IN
PUT #N1;BALANCE$,YEAR:CLOSE #N1
2210 AUTOCNT=N0:COUNT=N0
2220 OPEN #N1,N4,N0,"D:AUTO.DAT"
2230 INPUT #N1;CHECK$:IF CHECK$="END"
THEN TRAP 4000:CLOSE #N1:GOTO 2250
2240 AUTOCNT=AUTOCNT+N1:AUTO$(AUTOCNT*
63-62,AUTOCNT*63)=CHECK$:GOTO 2230
2250 GRAPHICS N0:GOSUB BRKDIS:POKE 559
,N0:DL=PEEK(560)+256*PEEK(561)+N4
2260 POKE DL+N15,130:POKE DL+N16,N6:PO
KE DL+N17,N6:POKE DL+N18,N6:POKE DL+N1
9,N6
2270 POKE DL+24,65:POKE DL+25,PEEK(560
):POKE DL+26,PEEK(561)
2280 RESTORE 2290:FOR X=1664 TO 1692:R
EAD A:POKE X,A:NEXT X
2290 DATA 72,138,72,152,72,169,10,162,
0,160,56,141,10,212
2300 DATA 141,24,208,142,24,208,140,23
,208,104,168,104,170,104,64
2310 POKE 709,N0:POKE 710,N8:POKE 711,
N12
2320 POKE 1546,0:POKE 1555,7:REM COLOR
AND TIME
2330 POKE 512,128:POKE 513,N6:POKE 542
86,192:POKE 20,0:POKE 752,N1
2340 POSITION N0,N0:? "
"
2350 FOR X=N1 TO N13:POSITION N0,X:? C
H$:NEXT X
2360 POSITION N0,N14:? "
"
2370 POSITION N2,N2:? NAME$:"
#":POSITION N2,N3:? ADDRESS$:"
"
2380 POSITION N2,N4:? CITY$:POSITION 2
5,N5:? "DATE":POSITION 30,N6:? "
"
2390 POSITION N2,N8:? "PAYEE":POSITION
30,N8:? "$":POSITION N8,N9:? "
"
2400 POSITION N2,N11:? "MEMO":POSITION
N7,N12:? "
":POK
E 559,34
2410 MONTHFILE$="D:MONTH .DAT":GOSUB
SND1:POSITION N20,N16:? "
ENTER MON
TH"
2420 COL=30:ROW=N5:L1=N2:POKE 751,N1
2430 POSITION COL,ROW:? "":GOSUB IN
2440 IF TEMP$="A" THEN MONTHFILE$="D:A
UTO.DAT":POSITION 30,N5:? "AUTO":GOTO
2540
2450 IF LEN(TEMP$)<N2 THEN GOSUB SND2:
POSITION COL,ROW:? " ":GOTO 2430

```

```

2460 FOR X=N1 TO N2:IF TEMP$(X,X)<"0"
OR TEMP$(X,X)>"9" THEN GOSUB SND2:POSI
TION COL,ROW:? " " "":GOTO 2430
2470 NEXT X
2480 DATE$=TEMP$:IF VAL(DATE$)<N1 OR V
AL(DATE$)>N12 THEN GOSUB SND2:POSITION
COL,ROW:? " " "":GOTO 2430
2490 M=VAL(DATE$):IF M=N4 OR M=N6 OR M
=N9 OR M=N11 THEN DAYS=30:GOTO 2520
2500 IF M=N2 THEN DAYS=29:GOTO 2520
2510 DAYS=31
2520 DATE$(N3,N6)="// /":DATE$(N7,N8)=
STR$(YEAR):POSITION 30,N5:? DATE$
2530 MONTHFILE$(N8,N9)=DATE$
2540 TRAP 2170:OPEN #N2,N4,N0,MONTHFIL
E$:TRAP 40000
2550 INPUT #N2;CHECK$:IF CHECK$="END"
THEN CLOSE #N2:GOTO 2580
2560 COUNT=COUNT+N1
2570 MONTHDAT$(COUNT*63-62,COUNT*63)=C
HECK$:GOTO 2550
2580 IF COUNT>N0 THEN CHECK$=MONTHDAT$
(COUNT*63-62,COUNT*63):DATE$=CHECK$(N6
,N13):DAYS=31:GOTO 2700
2590 IF COUNT=N0 AND MONTHFILE$="D:AUT
O.DAT" THEN 2760
2600 POSITION N2,N16:? "START MONTH "
DATE$(N1,N2);"?":POSITION 24,N16:? "
(Y/N) "
2610 GOSUB IN2:IF A=A5C("N") THEN 1970
2620 IF A<>A5C("Y") THEN 2610
2630 POSITION N0,N16:? B$
2640 CHNUM$="0000":OPEN #N2,N4,N0,"D:A
UTO.DAT"
2650 INPUT #N2;CHECK$:IF CHECK$="END"
AND COUNT>N0 THEN SVE=N1
2660 IF CHECK$="END" THEN CLOSE #N2:GO
TO 2710
2670 CHECK$(N6,N7)=DATE$(N1,N2)
2680 BALANCE$=STR$(VAL(BALANCE$)-VAL(C
HECK$(35))):TEMP$=BALANCE$:GOSUB DOLFO
RMAT:BALANCE$=TEMP$
2690 COUNT=COUNT+N1:MONTHDAT$(COUNT*63
-62,COUNT*63)=CHECK$:GOTO 2650
2700 CHNUM$=CHECK$(N2,N5)
2710 POSITION 21,N16:? B$(N20):POKE 55
9,34:TRAP 40000
2720 POSITION 22,N15:? "BALANCE:$";BAL
ANCE$:GOTO 1180
2730 GRAPHICS N17:GOSUB BRKDIS:POSITIO
N N3,N6:? #N6;"NO microcheck":POSITION
N3,N8:? #N6;"DATA FILES ON"
2740 POSITION N5,N10:? #N6;"THIS DISK"
:GOSUB SND3:GOSUB DELAY:CLOSE #N1:GOTO
2170
2750 SOUND N0,100,N12,N8:FOR X=N1 TO 5
0:NEXT X:SOUND N0,N0,N0,N0:GOSUB DELAY
:CLOSE #N1:GOTO 2170
2760 POSITION 22,N16:? "auto file empt
y":GOSUB SND2:GOSUB DELAY:CLOSE #N2:GO
TO 2410

```

CHECKSUM DATA.

(see page 8)

```

10 DATA 16,196,129,914,859,545,764,452
,558,763,618,656,768,764,357,8359
160 DATA 644,499,707,456,361,512,350,2
44,755,435,342,290,799,302,641,7337
310 DATA 185,280,339,597,469,177,295,6
7,380,396,373,645,650,870,441,6164
460 DATA 657,787,47,818,589,287,947,73
,883,957,607,546,427,96,507,8228
610 DATA 338,158,597,23,783,256,499,43
8,718,655,658,246,662,149,993,7173
760 DATA 796,605,622,797,454,494,768,8
56,477,262,352,616,676,178,934,8887
910 DATA 939,652,779,683,670,401,928,0
,249,656,179,531,647,568,194,8076
1060 DATA 2,966,797,536,43,413,659,517
,92,381,331,614,721,56,879,7007

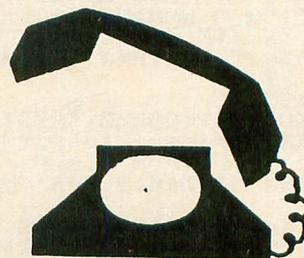
```

```

1210 DATA 36,355,477,527,711,231,912,7
46,495,757,946,931,888,754,905,9671
1360 DATA 560,725,526,100,593,549,428,
273,826,904,645,852,185,204,838,8208
1510 DATA 930,339,21,871,678,698,347,3
98,346,306,173,275,540,851,115,6888
1660 DATA 269,978,10,168,841,939,316,2
7,579,512,189,739,354,802,834,7557
1810 DATA 649,323,150,89,320,79,933,32
7,406,706,38,919,891,282,86,6198
1960 DATA 415,694,601,641,723,205,857,
910,678,90,538,993,540,221,481,8587
2110 DATA 309,191,189,366,428,700,509,
807,311,876,511,809,386,509,774,7675
2260 DATA 699,452,538,979,671,820,963,
873,599,122,412,799,791,281,592,9591
2410 DATA 621,835,247,953,340,143,550,
787,417,416,682,706,947,406,674,8724
2560 DATA 910,797,565,32,146,608,381,3
10,881,989,503,100,223,917,458,7820
2710 DATA 285,535,891,487,10,415,2623

```

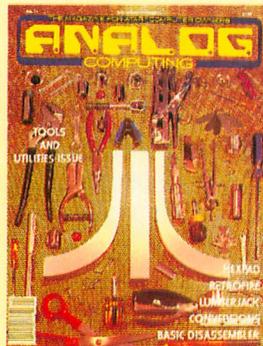
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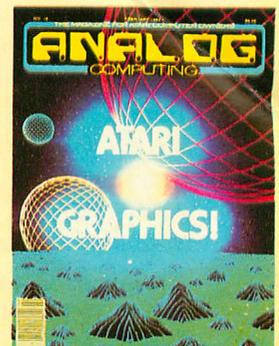
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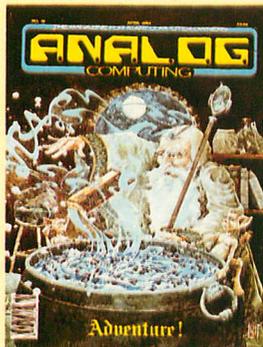
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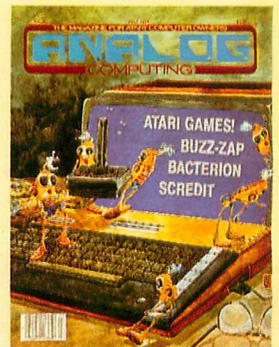
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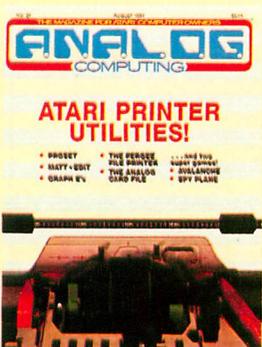
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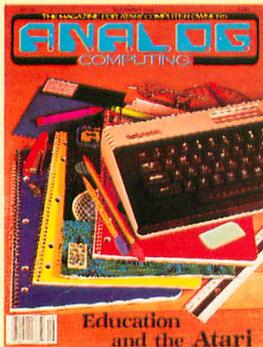
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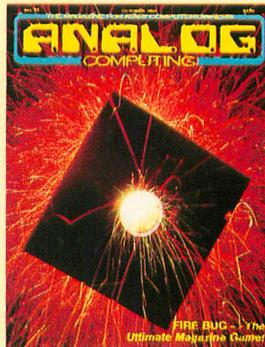
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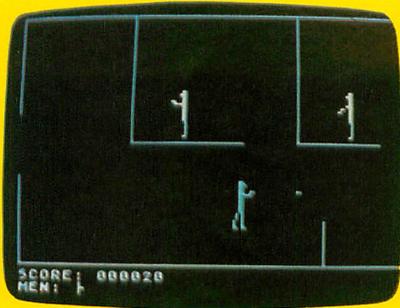
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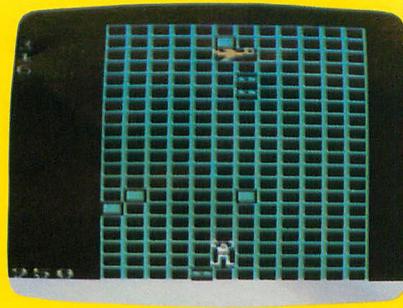
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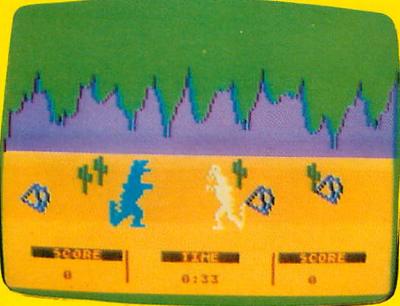
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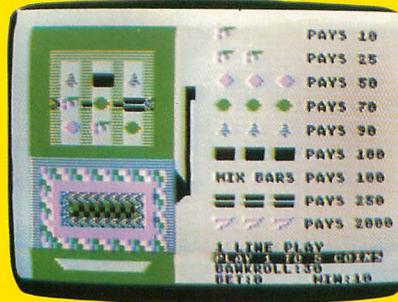
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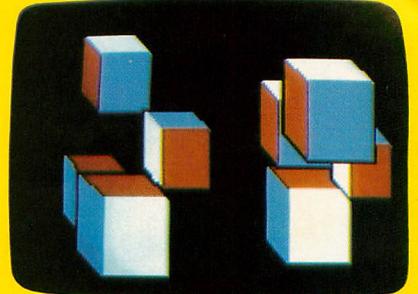
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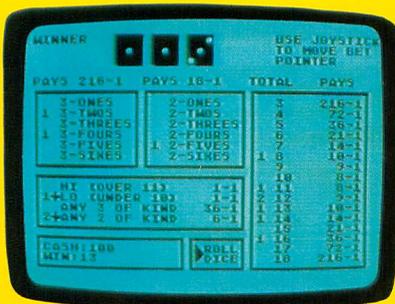


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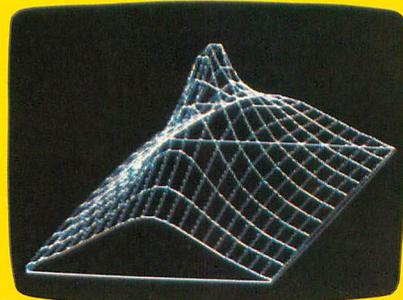


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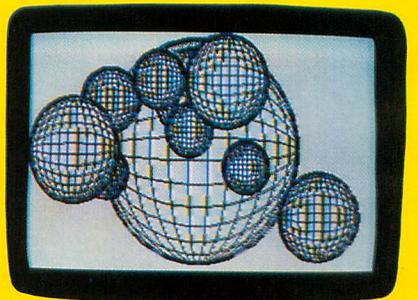
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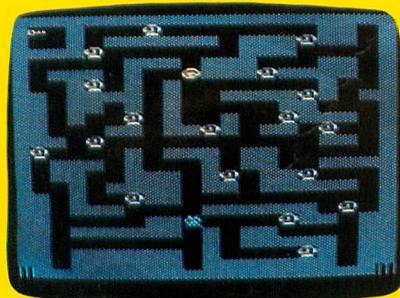
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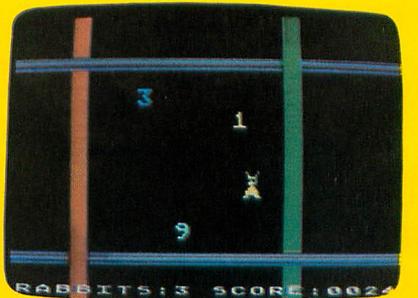
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