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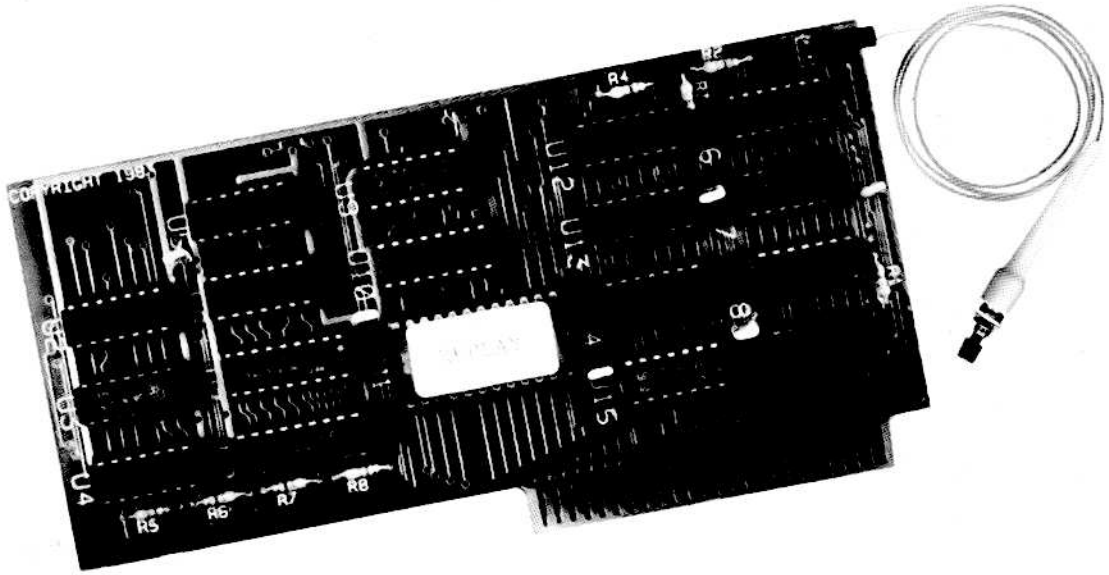

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For all the avid readers who have patiently (and impatiently) awaited the arrival of the phantom "Best of Hardcore," please bear with us a little while longer.

'Best of Hardcore" will be a compilation of the finest articles and programs from the first three issues of HARDCORE COMPUTING, plus the four update newsletters.

Coming up next month: HARDCORE COMPUTIST #5

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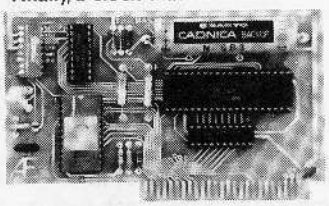

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- A rechargeable NiCad battery will keep the TIMEMASTER running for over ten years.
- Powerful 2K ROM driver — No clock could be easier to use.
- Full emulation of most other clocks, including Mountain Hardware's Appleclock (but you'll like the TIMEMASTER mode better).
- Basic, Machine Code, CP/M and Pascal software on 2 disks!
- Eight software controlled interrupts so you can execute two programs at the same time (many examples are included).
- On-board timer lets you time any interval up to 48 days long down to the nearest millisecond.

The TIMEMASTER includes 2 disks with some really fantastic time oriented programs (over 25) plus DOS dater so it will automatically add the date when disk files are created or modified. The disk is over a $200.00 value alone — we give the software others sell. All software packages for business, data base management and communications are made to read the TIMEMASTER.

If you want the most powerful and the easiest to use clock for your Apple, you want a TIMEMASTER.

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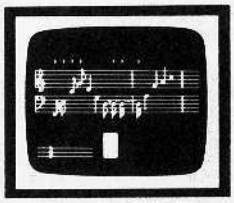
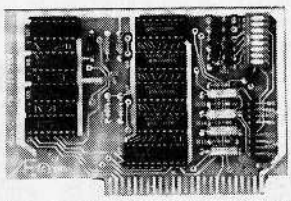
Super Music Synthesizer
Improved Hardware and Software





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- It's easy to program music with our compose software. You will start right away at inputting your favorite songs. The Hi-Res screen shows what you have entered in standard sheet music format.
- Now with new improved software for the easiest and the fastest music input system available anywhere.
- We give you lots of software. In addition to Compose and Play programs, 2 disks are filled with over 30 songs ready to play.
- Easy to program in Basic to generate complex sound effects. Now your games can have explosions, phaser zaps, train whistles, death cries. You name it, this card can do it.
- Four white noise generators which are great for sound effects.
- Plays music in true stereo as well as true discrete quadraphonic.
- Full control of attack, volume, decay, sustain and release.
- Will play songs written for ALF synthesizer (ALF software will not take advantage of all our card's features. Their software sounds the same in our synthesizer.)
- Our card will play notes from 30HZ to beyond human hearing.
- Automatic shutoff on power-up or if reset is pushed.
- Many many more features.

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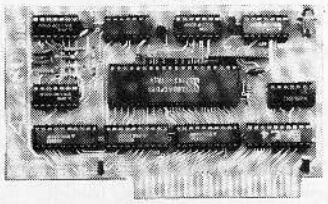
Z-80 PLUS!



- TOTALLY compatible with ALL CP/M software.
- The only Z-80 card with a special 2K "CP/M detector" chip.
- Fully compatible with microsoft disks (no pre-boot required).
- Specifically designed for high speed operation in the Apple IIe (runs just as fast in the II+ and Franklin).
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- A semi-custom I.C. and a low parts count allows the Z-80 Plus to fly thru CP/M programs at a very low power level. (We use the Z-80A at fast 4MHZ.)
- Does EVERYTHING the other Z-80 boards do, plus Z-80 interrupts.

Don't confuse the Z-80 Plus with crude copies of the microsoft card. The Z-80 Plus employs a much more sophisticated and reliable design. With the Z-80 Plus you can access the largest body of software in existence. Two computers in one and the advantages of both, all at an unbelievably low price.

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There used to be about a dozen 80 column cards for the Apple, now there's only ONE.

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- 80 characters by 24 lines, with a sharp 7x9 dot matrix.
- On-board 40/80 soft video switch with manual 40 column override
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WIZARD80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEOTERM	MORE	NO	NO	YES	NO	YES	YES	NO	YES

The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

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- Permits your IIe to use the new double high resolution graphics.
- Automatically expands Visicalc to 95 K storage in 80 columns! The 64K config. is all that's needed, 128K can take you even higher.
- PRO-DOS will use the MemoryMaster IIe as a high speed disk drive.
- Lowest power consuming 128K card AVAILABLE.
- Complete documentation included, we show you how to use all 128K.

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LETTER FROM THE PUBLISHER

This is CORE #3, the one devoted to Home Computer Games.

Sure the computer is a business tool for busy executives and a super typewriter for bustling secretaries, but it is also just a toy for grownups and kids alike. Someone should find out how many home computers are sold just for entertainment's sake.

But, if you know your computer, you know that there is entertainment even in doing your tax returns on your Apple's Personal Finance Manager.

This CORE is unabashedly for the toy side of the thing, however. Here we will not bother you with the "serious" side of the machine.

But let's be serious about our games.

Our staff at CORE delved into the existing library of home computer games and pretended to be working as they played the games to review them for you. That is serious work!

The result was CORE's review of the best games currently available on the market. We have rated them on a scale from one to ten and took everything into consideration that you might want to ask. All you have to do is read the reviews, select your favorite (or favorites) and go out and buy it (or them).

Closely related to our review of games is our staff's "Top 20." This is a list of what they think is the all-time best among the games on the market. It was another excuse for them to pretend they were working because they insisted they had to have first-hand knowledge of what they were recommending to our readers. Serious business!

Then, we have a series of special articles. One of them instructs you on how to save money (after having bought your computer, monitor, printer and one or two disk drives) and construct your own joystick. Well, you will need it if you're going to play most of these games.

Next, we have two brand new games for you to play. They were created by our resident whiz kid Ray Darrah. The first, "Destructive Forces," is a strategy game in which the Earth and a few aliens fight it out nuclear-style and the second, "Dragon Dungeon," is an arcade-type adventure set in ancient, mythical times.

We also feature an article about Eamon, the open-ended adventure game that is in the public domain. This is the article to read to start you on creating your own Eamon adventure.

A more serious article is one which tells you how a compiler can speed up the execution of your games written in Applesoft and there are two introductory reviews on games (and related) utilities: one introduces you to the "Graphics Magician," a best-selling graphics simplifier, and the other to GraFORTH, a complete programming language.

Charles Haight

Announcing a price breakthrough on backing-up 64k PROTECTED SOFTWARE

★

Introducing

COPY MASTER II

a disk copy system for the Apple II, Apple II+ & Apple IIe that makes a back-up copy with the push of a button.

- ★ **COPY MASTER II** makes back-up copies of all memory resident software, at the press of a button. (64k copy requires a language card or a IIe).
- ★ Bit copiers and nibble copiers, such as Locksmith, Nibbles Away and others, are hard to use because a different set of complex parameters must be discovered for each program that the user wants to back-up. **COPY MASTER II** requires just the press of a button to copy all of memory onto a standard DOS 3.3 initialized disk. The copy produced is unprotected and can be loaded back into memory with standard DOS commands.
- ★ Previously hidden code becomes accessible and subject to change or study.
- ★ Freeze games and then restart them days later. Or save the winning display on disk.
- ★ Single-step and trace through any program.
- ★ Special utility program allows the copies to run without a copy board.
- ★ The **COPY MASTER II** set comes complete with plug-in, slot-independent board, operating software on disk and an instruction manual. Since **COPY MASTER II** has on-board RAM rather than unchangeable ROM it supports both the COPY as well as the STEP and TRACE programs. **Unlike some copy boards, there is no extra utility software or expensive EPROM to buy.** There are no chips to pull.
- ★ **COPY MASTER II** does not change any memory.
- ★ 48k copy made in less than 15 seconds, 64k in less than 20 seconds.
- ★ All hardware is made with the finest components. There are no shortcuts taken: 18 chip board.
- ★ System Requirements: an Apple II, Apple II Plus, or an Apple IIe, 1 disk drive and DOS 3.3. Most Apple compatible systems are also supported.

*We believe that **COPY MASTER II** is the most advanced copy system available.*

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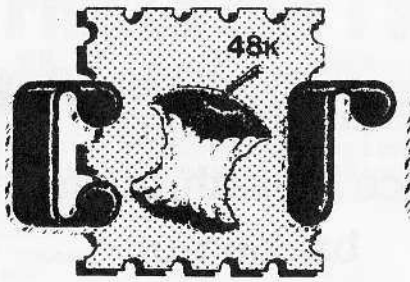
Important Notice: COPY MASTER II has many uses. However, **THE COPYING ABILITIES OF COPY MASTER II SHOULD BE USED SOLELY FOR ARCHIVAL PURPOSES.** Any other copying use may be illegal.



COREspondence

Cheap 80 Columns?

I enjoyed reading the premiere issue of CORE, "All About Graphics," which was very informative and helpful. Robb Canfield's hi-res character generator (HCG), "Quick Draw 1.0," proved to be an especially important addition to an arcade game I was writing. The Low Resolution Color Character Chart on page 17 also was very useful.

In the article on text graphics, it was mentioned that your Applesoft program must be moved up in memory in order to use text page 2. But I didn't catch how to know if you are using page 2 and if it uses the normal text page commands. Also, is it possible to "flip between the two text pages" for added graphic effects or use them side by side as a simulated 80-column package? As a beginning assembly language programmer, I would also like to request the name of the assembler used for source code listings in your magazine. I have been using the Big Mac Macro Assembler, which does not seem to be compatible with it.

Your magazines have been thoroughly enjoyed, to the dismay of the many computer stores refusing to sell them. I am desperately looking forward to your upcoming issues, which hopefully will contain a response to my statements and questions. Keep 'em coming, SoftKey.

Jared Middleton
Everett, WA

***Jared**-- Most programs don't use text page 2. If $C054 is accessed, text page 1 is being displayed, and if $C055 is accessed, text page 2 is in use. It is possible to flip between the two text pages and to use them side-by-side, although there is no quick and easy method for doing either.*

The assembler used for the source code listings in CORE 1 was the S-C Assembler, by the S-C Software Corporation. We used a modified version, so change our BLT to BCC and our BGE to BCS [see CORE Utilities COREspondence column]. We have started using the standard version to avoid any confusion.

CORE in Canada

I am enclosing a check for a new one-year subscription to HARDCORE COMPUTIST and CORE which I saw advertised in the premiere issue of CORE which I was able to obtain at a recent computer show. I have not been able to locate a local (Toronto area) distributor, but would like a full set of what appears to be a tremendous magazine. I would certainly appreciate it if you could start my subscription. I would also like to know the cost and availability of back issues and other materials you publish.

Glen Halina
Bramalea, ON
Canada

***Glen**--Thanks for your sentiments. We appreciate our readers' comments. You should have received your subscription issues by now. Our distributor in your area is Arkon Electronics, Ltd., 409 Queen St. W, Toronto, Ontario, M5V 2A5.*

As for back issues, here is a list of what is available. For the information of other readers I am appending the prices (in U.S. dollars) for both domestic U.S. and foreign orders (which would apply in your case). The extra charge on foreign orders is to cover postage costs:

Issue	*U.S*	*Foreign*
CORE 1 (Graphics)	*6.00*	*9.00*
HARDCORE COMPUTIST 1	*3.50*	*6.50*
CORE 2 (Utilities)	*6.00*	*9.00*
HARDCORE COMPUTIST 3	*3.50*	*6.50*
HARDCORE COMPUTIST 4	*3.50*	*6.50*

HARDCORE COMPUTIST 2 is no longer available, while selections from the magazines published before CORE 1 (i.e., HARDCORE COMPUTING 1, 2, 3 and their newsletter/updates 1.1, 2.1, 3.1 and 3.2) will be made available in our forthcoming BEST OF HARDCORE which should be published soon. Please follow our ads for this one, or write to our subscriptions department for additional information about it.

Quick Draw Suggestion

I have enjoyed CORE and wish to thank you for such an excellent magazine.

A comment about Robb Canfield's program "Quick Draw." The code could be made more efficient, I believe, by replacing the routines GOODBYE and CR with a jump to $FDF0. This idea has its advantages because it would shorten the code and save the character to the text screen.

Tim Lewis
Morgan Hill, CA

Praise from a Parent

As a man with two preschool children I have been incensed by the unsatisfactory backup or replacement policies of most of the producers of software for children. By restricting the usage of disks to when mother or father is available to boot, I found that the kids did not utilize those programs and did not care to use them even with adult supervision.

This brings me to lavish praise on a particular software company, Software Productions, Inc., of Columbus, Ohio. I purchased two of their excellent programs for preschool children (under the Classic Family Software trademark) and find them impressive in that, in this day and age, they encourage the purchaser to backup their disks (knowing that children don't always wash all the peanut butter off their fingers) and go so far as to include a duplicate name label for the backup copy!

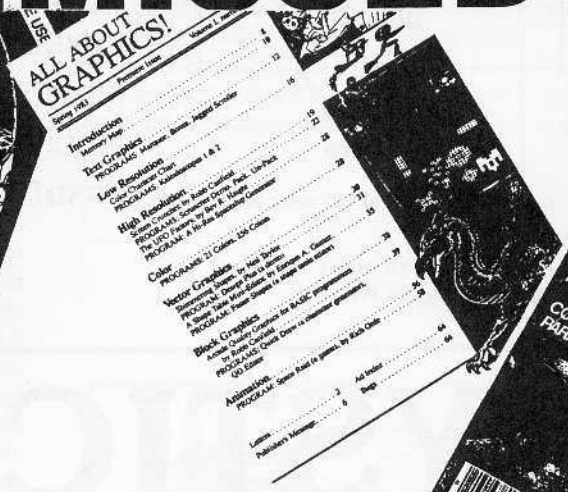
If any of your readers have had any success backing up any of the Spinnaker products: Kinder Comp, Hey Diddle Diddle, or Story Machine, I would appreciate the publication of their techniques.

Once again, I am most impressed with your magazine and look forward to upcoming issues.

Edward Rigel
Gainesville, GA

You're Reading Us For The First Time?

LOOK WHAT YOU'VE MISSED!



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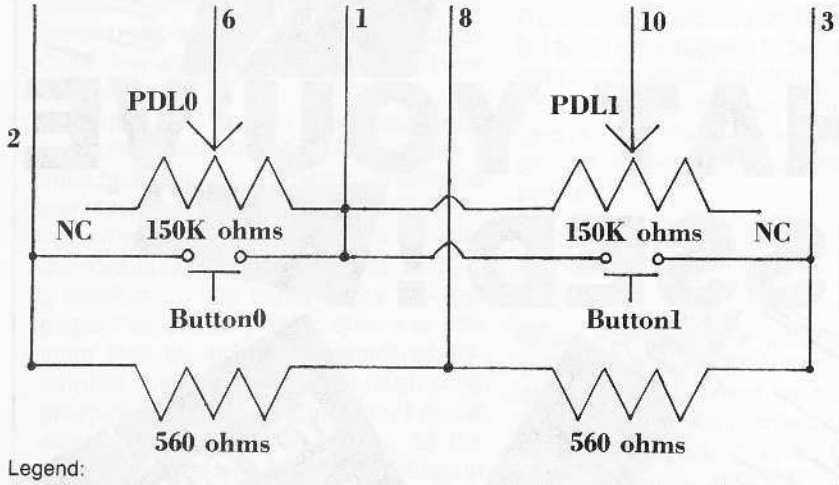
The biggest step is finding the parts.

Then it is easy to

CONSTRUCT YOUR OWN

Figure 1

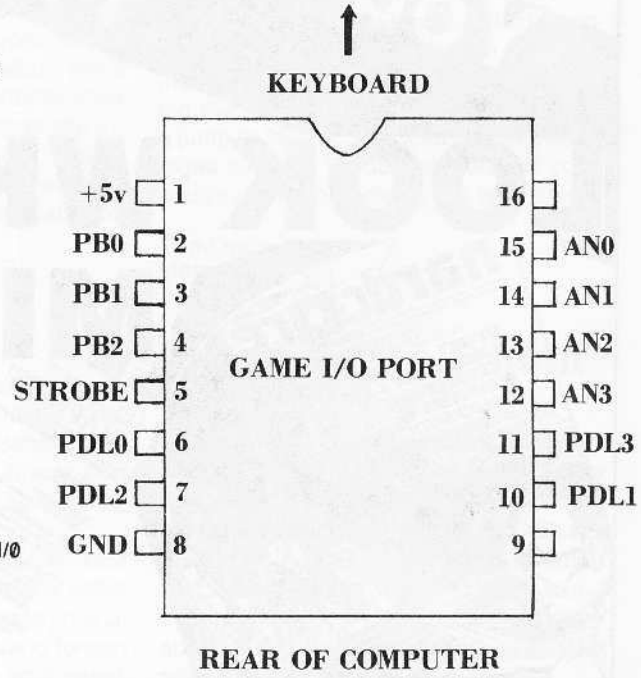


Legend:

NC = Not connected
PDL0 = Rheostat on game controller #0
PDL1 = Rheostat on game controller #1
PB0 = Switch on game controller #0
PB1 = Switch on game controller #1

Numbers along top refer to game I/0 pins.

= Wires that aren't connected
= Connected Wires



JOYSTICK

By Gary Peterson

After spending upwards of $1500 for an Apple II computer with disk drive and monitor, I suspect a lot of people are in situations similar to mine: finding it hard to justify to wives, accountants, etc., the $40-50 expense of a joystick.

The joystick mechanism used in the Apple computer really consists of just two of the paddle potentiometers (variable resistors), which are hooked to the knob of the joystick so they can both be moved at once. Since these joystick mechanisms are available for under $5.00 each, I could see no reason why I should have to spend $40-$50 to buy a commercially built model.

FINDING THE PARTS

Constructing your own joystick is really not very difficult. Finding the parts can be a bother, however. Once you have the right parts, the only requirements are that you be a bit handy with a soldering iron (one with a fine point tip) and that you are able to read the simple schematics provided with this article.

The joystick mechanism is the hardest part to find because Apple chose to use 150K ohm potentiometers (a potentiometer is a variable resitor), which are not readily available. The only source I have found for these joystick mechanisms is JAMECO Electronics (1355 Shoreway Road, Belmont, CA 94002, phone (415) 592-8097). The joystick mechanism itself costs only $4.75, but JAMECO has a $10 minimum order so you might as well get all the parts you need from them.

However, most of the other parts needed should be available at almost any Radio Shack store, if you can find another source for the 150K ohm joystick mechanism. The parts' list at the end of the article gives the JAMECO part numbers for all the needed parts, except for the plastic construction box which you can get at Radio Shack.

CONSTRUCTING THE JOYSTICK

1) Decide where you want to situate the pushbuttons on the construction box and cut or drill out two 1/4" holes to accept the buttons.

2) Decide where you will mount the joystick mechanism and cut a 1 & 1/4" hole for the handle. Also mark off and drill four 1/16" mounting holes the the mechanism.

3) You only need to use 6 of the 9 conductors on the ribbon cable, so peel off the extra 3 strands so they won't get accidentally connected to anything.

4) Solder the connections for the joystick and its pushbuttons, using figure **1** for reference. Each of the two potentiometers has three terminals on it, but you only need to use two of them. The middle terminal on each connects to one of the paddle inputs (pins 2 or 3), and one of the end terminals on each must be connected to +5V (pin 1). Notice that both pin 1 (+5V) and pin 8 (ground) need to be connected to several different points, so plan accordingly. Most games are set up to accept paddle 0 as horizontal input and paddle 1 as vertical input, so take note which input each potentiometer is connected to.

5) After you have soldered all the connections, check to see that you have not created any solder bridges on the DIP header or anywhere else. Also, tape as many of the open connections as you can with electrically-insulating tape.

6) Before you seal everything up in the construction box, check to see that the pushbuttons and joystick are working properly. If the joystick movement seems to be backwards in one or both dimensions then remedy the situation by unsoldering the +5V connection on the affected potentiometer and resolder it to the other free terminal on the potentiometer. If you encounter any other problem, again check for solder bridges and make sure you have inserted the DIP header into the game port properly.

7) Mount the joystick and pushbuttons in the construction box, making sure you orient the joystick in the proper direction.

8) Mount the cover on the DIP header with a little Elmer's glue or some other sticky material which you can remove easily should emergency repairs become necessary later.

9) Seal up the construction case and place the joystick handle on the joystick.

Once you have your home-brew joystick working properly you are set to play CHOPLIFTER, MINER 2049'er and all those other games that won't work unless you have a joystick. The $10 joystick may not be self-centering like some of the fancy commerical models but at least you can have the satisfaction of saying: "I did it my way!"

JOYSTICK PARTS LIST

1) One 150K ohm joystick mechanism (Jameco #JS150K-$4.75.)

2) Joystick handle (Jameco # JSKNOB-$.99)

3) Two 560 ohm (green-blue-brown-gold) 1/4 watt resistors (Jameco #560-$.30/5.)

4) One 16 pin DIP header connector (Jameco #16 pin HP-$.69.)

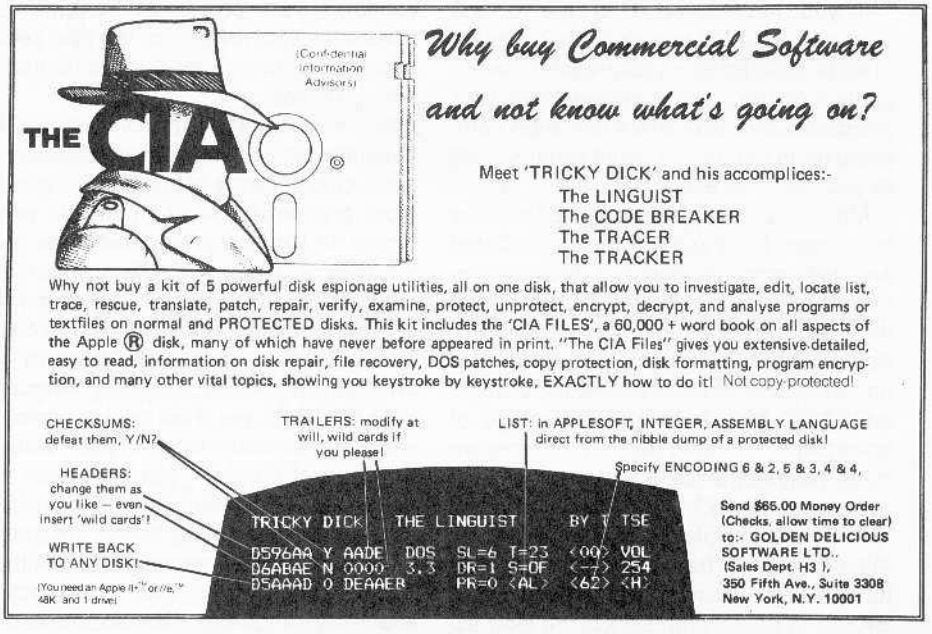
5) One 16 pin header cover (Jameco #16 pin HC-$.17.)

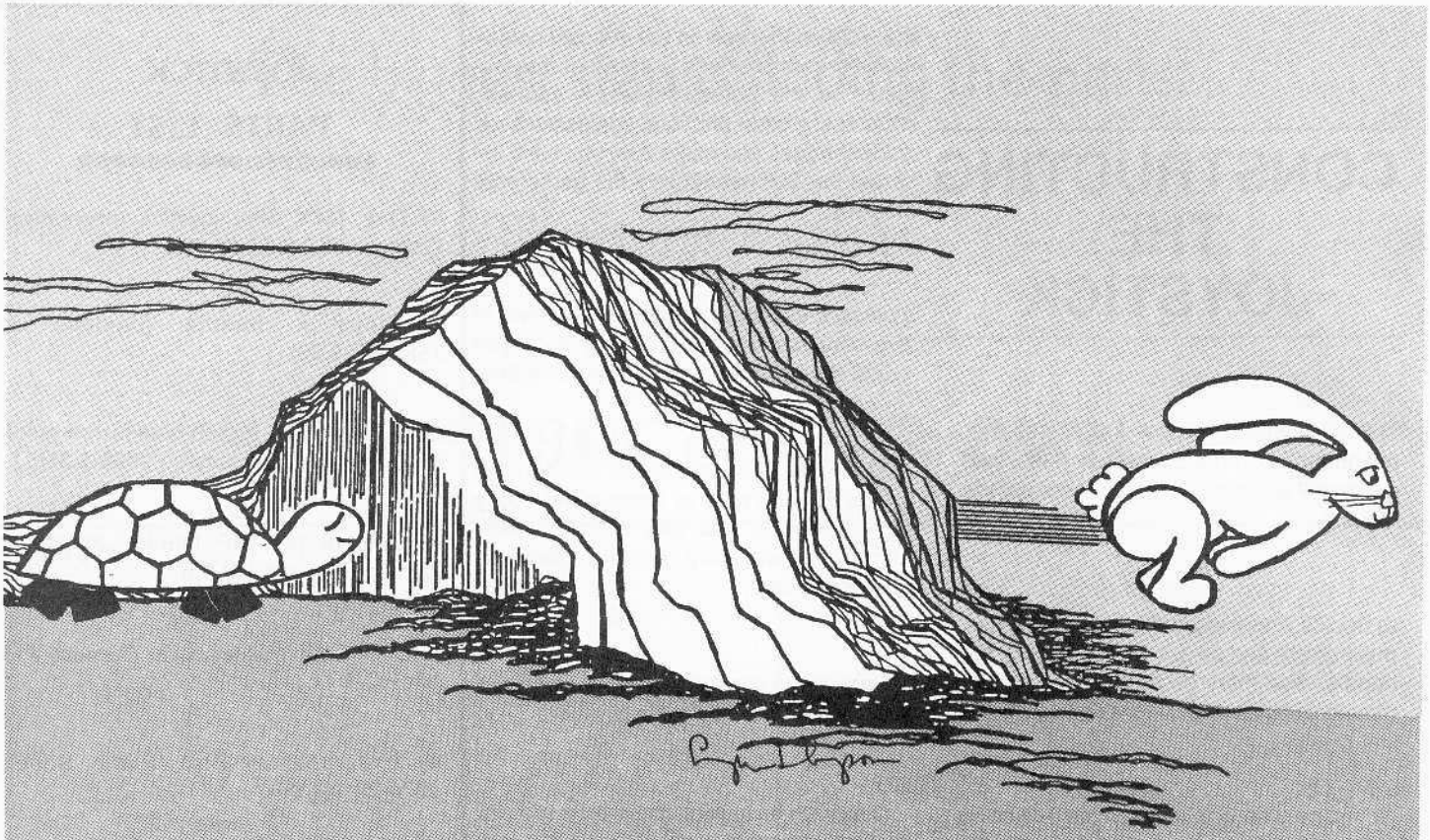
6) Experimenter Box (Radio Shack #270-231-$1.69)

7) Two, normally-open SPST miniature push buttons (Jameco #MS102-$.39/each.)

8) Two caps for above: one black,one red (Jameco #MSRCAP & MSBCAP-$.20/ea)

9) Five feet of 9 conductor ribbon cable (JAMECO #171-9 [specify length] $.19/ft.)





COMPILING GAMES

WAYS TO SPEED THEM UPPPPPPPP

By Gary Peterson

If you have ever used the BASIC language on a mini or mainframe computer at work or at college you probably had to go through the process of developing your programs on a text editor and then compiling them before you could see the fruits of your labor in action.

Most other high-level computer languages, like Pascal, Fortran and Cobol are also compiled. This is a different process from the one you would have to go through when developing programs on an Apple or other microcomputer which uses an interpreted version of BASIC. Compiled BASIC may have the advantage of speed but interpreted BASIC programs are more compact and easier to debug.

Because BASIC is so easy to use and learn, most people who have access to microcomputers have some proficiency in its use. The main drawback with using BASIC on microcomputers is the slow execution of the programs. For this very reason the vast majority of the best selling commercial programs are distributed in binary format.

Learning to program well in assembly language would seem to be a necessity for producing software of commercial quality. Most programs written in BASIC would simply run too slowly and could never stand the competition in the software market.

However, just because a commercial program is distributed and runs as a binary file does not mean that the program was originally written in assembly language. With the use of any of the several compilers which are available for the Apple, virtually any type of program can be written and debugged in Applesoft and then translated to a quicker executing binary program.

All this can be accomplished without ever learning a bit (pun intended) of assembly language. One example of a commercially available, compiled BASIC program is the arcade game Night Falls, from Omega, which was compiled by Microsoft's TASC compiler.

The reason interpreted BASIC is so slow is due to the extra step of translating (interpreting) each BASIC statement and calling an appropriate subroutine in ROM. A compiled BASIC program does not have to translate each step of the program;it simply executes it.

An analogous situation to interpreting vs. compiling would be trying to read a novel written in a foreign language you do not understand.

Suppose you are given a copy of a brand new novel written in Russian and would like to read it. Assuming that you don't read Russian and that there are not yet any English translations of the novel there are basically two ways to go about reading the novel.

The first method would be to get an English/Russian dictionary and sit down with the novel and laboriously translate each word from Russian into English as you go along. This method would be analogous to a BASIC interpreter as long as you did not take any notes as you translated. If you wanted to reread any part of the novel, you would have to go back and use the English/Russian dictionary all over again. This is essentially the way a BASIC interpreter works; each time a program line needs to be executed it has to be interpreted to executable machine code first. A FOR/NEXT loop can be especially time-consuming since it has to be reinterpreted for each iteration.

The second method of reading the new novel would involve finding someone who could read Russian and have them translate and transcribe the novel into English for you (perhaps Alexander Solzhenitsyn would be available). You might have to wait a little while for the translation to be completed but at least you could do something else in the meantime. Once you had the translation in hand you could read the novel in English as many times as you wanted and not have to worry about doing any retranslations. A BASIC compiler is able to accomplish this translation step for you. The compiler takes the original, or source, BASIC program and completely translates it into machine code. The compiling process ideally should only have to take place but once. Your compiled program is then able to immediately execute as machine code, therefore bypassing the extra step of interpretation.

The increase in speed of a compiled BASIC program will vary, depending upon the compiler and the types of statements used in the source BASIC program. Generally, however, execution time will be 2 to 10 times faster.

Given a particular Applesoft program, the different compilers available for the Apple will produce machine code that varies both in size and speed of execution. See table 1 for a quick comparision of some of the capabilities of the Hayden and TASC compilers. For a more in-depth review of five compilers for the Apple, see the September 1982 issue of BYTE magazine.

The size of a compiled program will generally be larger than the original BASIC program mainly because the compiled program also needs a series of runtime subroutines, or library, to be present in memory when the compiled program executes. The amount of memory required by the runtime library for most of the Apple

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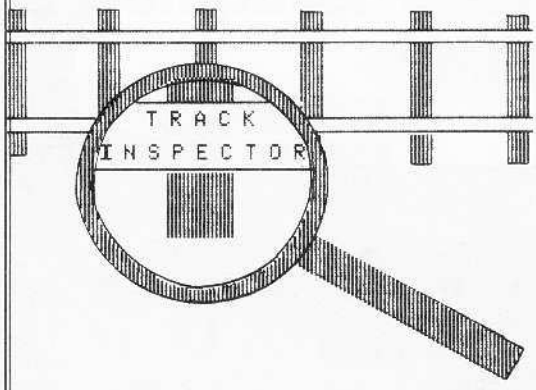

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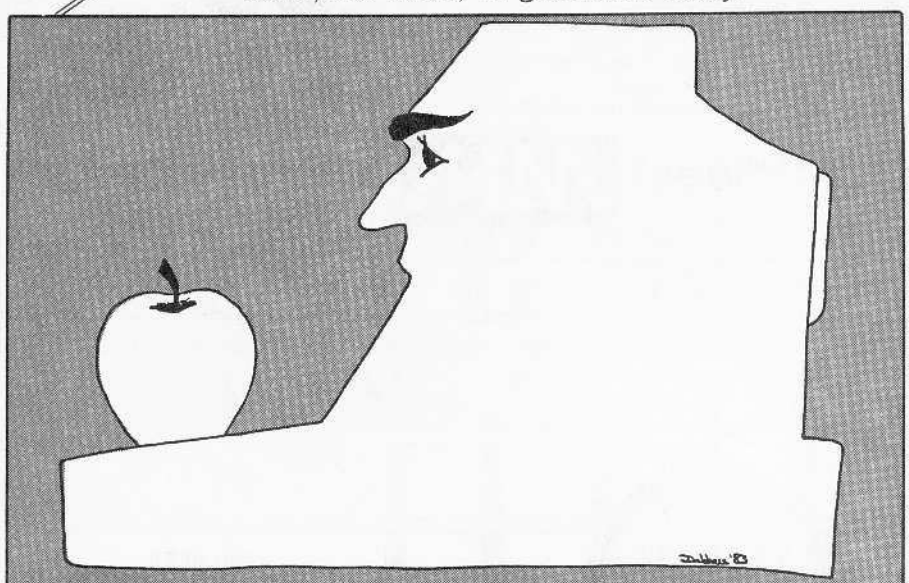

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compilers is about 2K-4K. Very long programs may, therefore, have to be broken up into separate modules which can be chained together.

One other restriction that applies to Applesoft compilers is that not all Applesoft statements are supported. For instance, Microsoft's TASC compiler does not support such statements as LIST, CONT, TRACE, NOTRACE, LOMEM, DEL or the cassette I/O statements. Other compilers also have similar restrictions on the Applesoft statements they support. The compilers will not compile any Applesoft program containing unsupported statements.

Most of the available compilers offset the unsupported statements by supplying enhancements to the Applesoft language. For instance, TASC provides true integer arithmetic and the ability to easily pass variables between chained program modules. These options can be invoked in TASC by inserting special REM statements into the Applesoft source program.

A good Applesoft compiler gives Apple users the best of both worlds. Using the interpreter in ROM you can develop and debug your Great American Arcade Game, or whatever, in Applesoft, using its convenient features. When satisfied with the program's execution you can use the compiler to produce the speedy machine code that might give your program that extra polish it needs to compete in the commercial market.

LIST OF COMPILERS

The Applesoft Compiler (TASC)
Microsoft
400 108th Ave NE
Bellevue, WA 98004
$160

Speedstar
Southwestern Data Systems
10761 Woodside Suite E
Santee, CA 92071
$135

Applesoft Compiler
Hayden Book Company
50 Essex St.
Rochelle Park, NJ 07662
$175

Einstein Compiler
Einstein Corporation
11340 W. Olympic Blvd.
Los Angeles, CA 90064
$129

Table 1

Compiler:	Hayden	TASC
Compile time for 48 sector Applesoft file	67 sec.	560 sec.
Object code length.	48 sect.	48 sect.
Runtime size.	15 sect.	17 sect.
Total size of code.	63 sect.	65 sect.
Execution time of benchmark in BASIC.*	337 sec.	337 sec.
Exection time of compiled benchmark.*	63 sec.	57 sec.
Speed increase.	5.3x	5.9x

* Eratosthenes seive benchmark. ("A High Level Language Benchmark ;" BYTE Magazine, September 1981).

This chart compares only a few aspects of the two compilers. There are many other factors to consider before purchasing a compiler.

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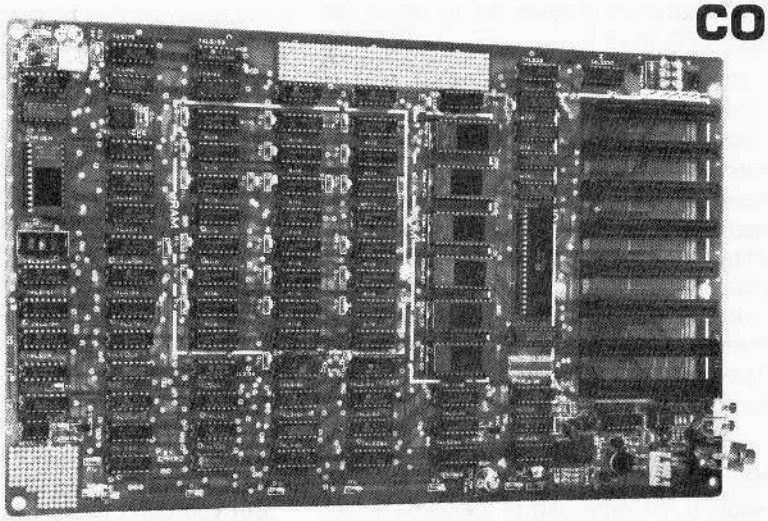

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Wonder if the game's really as good as its cover? Will you get bored in ten minutes -- after spending $40 on the game? CORE reviews help you find your way through the GAMES' maze. If it's good we'll tell you, if it's bad we won't hide it.

The highlight of this special Games issue is on the following pages.

There you will find CORE's up-to-the-minute review of computer games that are on the market for Apple, and Apple-compatible, machines. They have been reviewed by our expert computists and rated to help you decide which one (or more) to indulge in.

We found many games well worth their price. The three games reviewed on the next page are recent releases that will give computer gamers continued playing satisfaction.

In all, over 30 games have been reviewed. They range from simple arcade games where almost all you have to do is shoot down invaders from outer space, to adventure and/or fantasy games in which you find yourself in situations requiring some thought to escape from.

All of them, however, have something to offer and everybody should be able to find something somewhere to enjoy.

Each review lists the name and address of the manufacturing company as well as the price of the game (where available).

The review also provides information on the type of the game: arcade, adventure, etc. and lists what hardware is necessary to play the game, including the need for joystick, etc.

In an introductory paragraph, the review briefs the reader on the overall purpose of the game: what is its goal, how is it played and what kinds of obstacles the player can expect to have to overcome in playing it.

The review, then, provides a few lines of description and critique. The game is described in a critical fashion where the different aspects that set it apart from any other game are reviewed. These are highly committed reviews that are not afraid to chop the game down to size if our reviewers think this is necessary.

At the end of each review, these comments are translated into numerical ratings. The game is rated on a scale from one to ten as to a number of specific features.

These features are: the graphic quality of the game (how well is it artistically executed); the originality of the game's idea (how inspired or otherwise is its purpose and whether it has something new to offer or is it just a rehash of worn-out games); the level of difficulty involved in the game (how challenging is it to play); the interest level of the on-going action (in simple words, how long it took our seasoned reviewers to get bored with playing that particular game); the playability of the game (how much of a "major project" is it to play the game).

Finally, an overall rating is given for each game reviewed that takes into account all the above considerations.

The review also pays attention to any special considerations in each game. If the sound effects, for example, are particularly good (or particularly bad) the review will mention it. Similarly, if our reviewers had any opinions as to how they think a particular game could be improved upon, they said so.

However, they never forgot that these are only games, after all. The object is to enjoy.

Then, again, are they only games? Anyone who has played a computer game knows that there is more than passing the time involved in these creatures.

But you don't need anyone to tell you that!

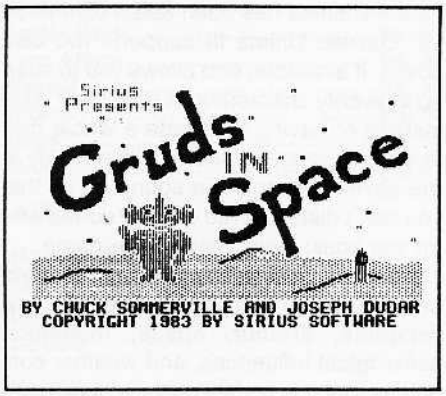
Here are three new games sure to delight, fright and excite — maybe even keep you up at night.

Gruds in Space

Sirius Software Inc.
10364 Rockingham Drive
Sacramento, CA 95827
$39.95

Hardware Required:
48K Apple-compatible
At least one disk drive
One extra disk for the scenario side

Game Type: Adventure
Language: Machine



Grud - A small green alien creature which first appeared in the arcade game Borg. Gruds are seen frequently on every planet of our solar system except the Earth. They are unfriendly, but harmless unless provoked.

As the Valley-speaking pilot of a spacecraft in Gruds In Space, you can be rewarded $1,000,000 for delivering fuel to a ship stranded on Pluto.

Sounds easy enough, but unfortunately you first must figure out how to operate your craft's navigation, communication, teletransportation, and computer equipment so you can move around the solar system. Be careful when you operate the teletransportion equipment, because its improper use can be deadly.

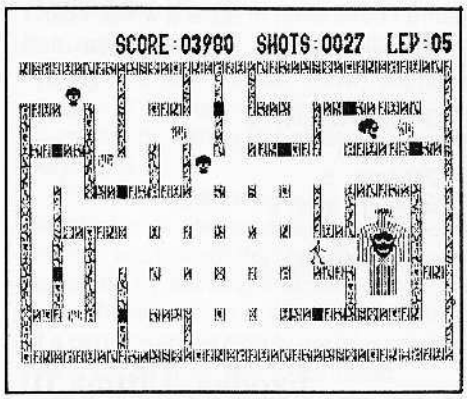
After figuring out how to use the equipment, you visit the planets of our solar sytem looking for clues on how to find both fuel and the coordinates of Pluto. In the course of your travels you must deal with many beings, both humanoid and grudoid.

Lady Tut

California Pacific
757 Russell Blvd.
Davis, CA 95616
$29.95

Hardware Required:
48K Apple II+
At least one disk drive
Joystick optional

Game Type: Arcade
Language: Machine



If video games could mate and produce offspring, Lady Tut would be the mutant progeny of Castle Wolfenstein and Ms. Pacman.

Now, just because I labeled Lady Tut "mutant" doesn't mean I don't like it, because I do. Remember, there are good mutations and bad mutations. Lady Tut happens to be the result of a good mutation (video game mutations arise from the rearrangement of the machine code, not the genetic code).

In Lady Tut, you must battle your way through nine different mazes inside the tomb of Lady Meritre Tutankhamen, mother of the famed boy pharaoh, to find her mummy. Along the way you must avoid or destroy poisonous spiders, serpents, and disembodied skulls.

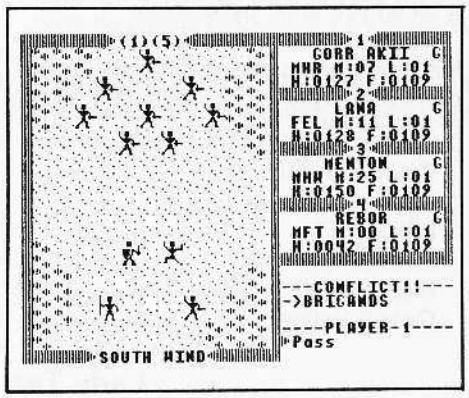
The mazes in Lady Tut are extraordinary because you can change the layout of each one as you travel, by activating the swivelling walls of the tomb. This feature can be used to trap and avoid any creatures in your vicinity.

Exodus, Ultima III

Origin Systems Inc.
P.O. Box 58009
Houston, TX 77258
$54.95

Hardware Required:
48K Apple-compatible
One disk drive

Game Type: Fantasy/Adventure
Language: Machine

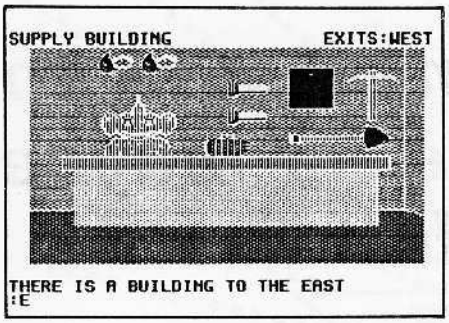


I know, I know. You haven't even finished playing Ultima II, or even Ultima I, and now Lord British releases Ultima III/Exodus. A lot of you are probably wondering how Lord British, a.k.a. Richard Garriot, ever could improve on Ultima II, the Revenge of the Enchantress.

Well, the list of improvements is quite an impressive one. For starters, there are now five races (human, elf, dwarf, bobbit, and fuzzy), 11 professions (fighter, cleric, wizard, thief, paladin, barbarian, lark, illusionist, druid, alchemist, and ranger), and three sexes (male, female, and other).

Lord British must have been playing Wizardry in his spare time, because in Exodus several characters can band together for an adventure (six in Wizardry; four in Exodus).

The graphics display in Ultima III has changed quite a bit from the earlier scenarios in that the display of the current scene uses only about two thirds of the screen. The remainder is used to display the current status of the characters and the



Gruds In Space

Continued

Gruds In Space and Critical Mass, also from Sirius, are the first illustrated adventures I have seen with animation built into their hi-res displays. In Gruds In Space, the computer panel of the spacecraft has several flashing lights on it. This touch of animation adds a lot to the enjoyment of playing the game.

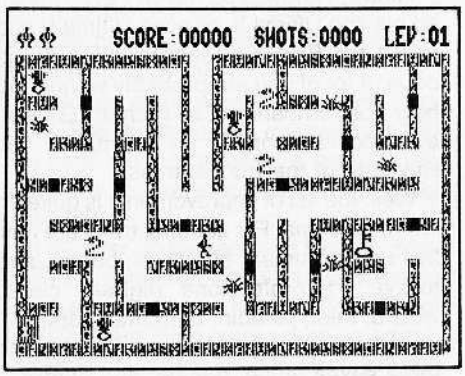
There are also more sound effects in Gruds In Space than in other illustrated adventures. The effects are great, especially when you enter hyperspace.

Gruds In Space is one of the best illustrated adventures marketed for the Apple. It should provide you with many hours of enjoyment.

Graphic Quality: 9
Originality: 9
Difficulty: 7
Interest Level: 8
Playability: 6
Overall Rating: 7

Lady Tut

Continued



No arcade game would be complete without weapons and treasures, and of course Lady Tut has both. Treasures are in the form of gems and keys, and your weapon is a special gun, or "heater," which can operate in the cursed atmosphere of the tomb. You begin the game weaponless and must search through the mazes to find your "heater." Once you are armed, the number of gems you have acquired is multiplied by ten and converted to ammunition for your weapon. The keys are needed to gain entrance to successive mazes in the tomb.

The documentation alludes to a graphic reward received upon mastering all nine mazes of the tomb and finding the mummy of Lady Tut, although I never did get good enough at the game to verify this.

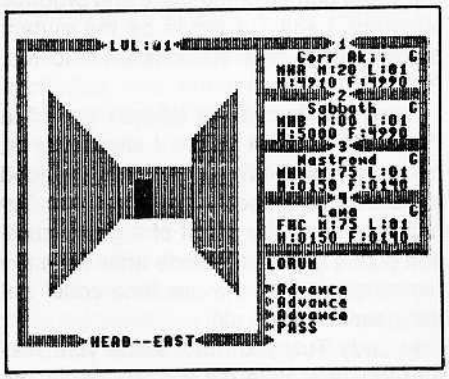
While on the subject of documention, I might as well voice my criticism of the storylines which sometimes are included with computer games. Lady Tut comes with a pamphlet detailing the horrors the lady has unleashed upon the earth, and there is a reference to her tomb not having been disturbed in over 7000 years. Someone obviously never bothered to check on the fact that Tutankhamen lived circa 1300 B.C., a mere 3300 years ago. It never ceases to amaze me that a company can put so much work into a program and its slick packaging and then overlook details such as this.

With that off my chest, Lady Tut is one of the best implementations of a maze game I have seen in quite a while. I can't wait until someone breeds Zaxxon and Ultima II.

Graphic Quality: 9
Originality: 8
Difficulty: 5
Interest Level: 8
Playability: 8
Overall Rating: 9

Exodus, Ultima III

Continued



game's input and output (this also bears some similarity to Wizardry).

When two or more characters are on an adventure, the leader of the party normally controls the movement of the group and is the only player represented on the display. When combat situations are encountered, however, a special combat screen is used in which all the characters in the party are seen and allowed to move and fight individually.

The animation of the characters on the combat screen is also an innovation for Ultima. During combat, fighters will flex their muscles, clerics will wave their crosses, and wizards pound their staff on the ground.

The graphics display in dungeons has also been improved to provide a more realistic perspective. The walls of the dungeons now appear to be solid rather than just line drawings.

Another new aspect of Ultima III that takes some getting used to is the perspective from which you view the game scenes. You are not shown a pure overhead view of the scene, but instead only that part of the landscape which would not be blocked by trees or mountains. For instance, if you are in a valley between two mountain ranges, you are not shown what is on the other side of the mountains. As a result, you constantly must be on your guard for attackers who may be blocked from your view.

A couple of aggravating aspects of the earlier Ultimas has been taken care of by Mr. Garriot. Ultima III supports two disk drives, if available, and allows you to store up to twenty characters on the player disk, instead of having to devote a whole disk to each character. Another little nicety is the ability to toggle the sound off so that you don't disturb loved ones or co-workers (or the boss) while playing the game.

I could go on detailing all the other improvements in the game, like the new weapons, armour, spells, monsters, astrological influences, and weather conditions, but this review could take up more space than we have alloted to all of the game reviews.

Besides, I haven't described the basic scenario of Exodus.

Exodus takes place in Sosaria, a formerly peaceful and prosperous land which has fallen on evil times and is besieged by orcs, zombies and other vile creatures. The wellspring of this evil is thought to be the result of an unholy coupling between the late Mondrian and Minax, the Enchantress of Evil. Needless to say, many adventures await you before this evil power has been dispatched.

Yes, Lord British has outdone himself again. If you enjoyed Ultima I and II, I can guarantee you will love Exodus.

Graphic Quality: 9
Originality: 4
Difficulty: 7
Interest Level: 9
Playability: 6
Overall Rating: 8

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Alibi

Hayden Software
600 Suffolk Street
Lowell, MA 08154
$24.95

Hardware Required:
48K Apple-compatible
One disk drive

Game Type: Detective Simulation
Language: Machine

In Alibi you are the detective trying to discover who killed the colonel, and when and where the murder was committed.

Like any other detective, you may ask the various suspects questions (where they were and at what time) and examine your notebook. The notebook stores information recorded for you automatically when you question a suspect, and has a sketch of the layout of the house.

These aids were not enough help for me ever to solve the crime. If your nickname is "Sherlock," you would probably like Alibi. My nickname isn't Sherlock.

Graphic Quality: text
Originality: 7
Difficulty: 7
Interest Level: 6
Playability: 8
Overall Rating: 5

Alphabet Beasts & Co.

Classic Family Software
2357 Southway Drive
P.O. Box 21341
$29.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Young children

Game Type: Educational
Language: Machine

An excellent educational package for youngsters (age six and below), Alphabet Beasts & Co. teaches the alphabet and numbers by letting the child type on the keyboard.

The letter typed will cause the program to display a corresponding picture and rhyme, and prompt the child to type the letter again by showing a picture of it on the key. The letter then is drawn on screen as if a pencil were writing it, and the program waits for another key to be typed.

If a number is entered, the program draws a picture of a dragon trying to look like the number, and beside the picture shows that number of dragons. The rest is like the procedure for the letters; a picture of the number key is shown, and when the child types the correct key the program draws the number on the screen.

Included in the Alphabet Beasts & Co. package is a game called Creature Features. You create a creature by selecting various head, body, and leg parts from several different creatures. The game then displays the creature you created in a random background setting. The result can be very humorous. The graphics are very good throughout.

Alphabet Beasts & Co. is an excellent way of introducing computers to youngsters.

Graphic Quality: 9
Originality: 9
Difficulty: 1
Interest Level: 7 (for children)
Playability: 9
Overall Rating: 8

Asteroid Belt

Superior Software Inc.
P.O Box 261
Kenner, LA. 70063
$24.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick optional

Game Type: Arcade
Language: Machine

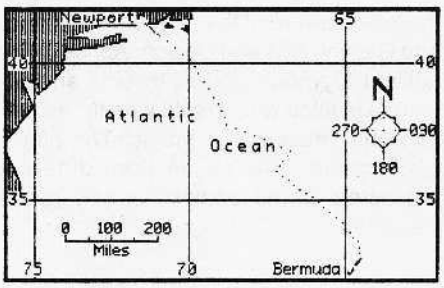
Of all the asteroid games I have played, Asteroid Belt is probably the worst. There are only four asteroids, which fly across the screen from left to right in a wave-like path, and that number never increases.

The game flickers between page 1 and 2 of hi-res graphics to create the stars behind the spaceships. This gets annoying after a short time.

I played the game to about level 20, and although at high levels there are supposed to be enemy spacecraft, I encountered none.

One good thing about the game is that it is unprotected, and comes with complete source code listings.

Graphic Quality: 2
Originality: 1
Difficulty: 2
Interest Level: 0
Playability: 2
Overall Rating: 1



Bermuda Race

Howard W. Sams & Co., Inc.
4300 W. 62nd Street
Indianapolis, IN 46268
$29.95

Hardware Required:
48K Apple-compatible
At least one disk drive

Game Type: Educational/Simulation
Language: Applesoft

Continued on page 20

The following is a list of our staff's Top 20; their favorite all-time greats from among the many computer games on the market. They have been divided into the three main sections: simple arcade games, strategy games which require thinking and planning and adventure games which involve more than shooting down aliens from outer space. We have supplied information about game manufacturers and prices, as well as brief notes describing each game in the list. Enjoy!

PICK OF THE PACK

ADVENTURE

Eamon
Public Domain
$4.00

Collectively, the EAMON series are some of the best and most diverse text adventures available. They are written in Applesoft and are fully listable and copyable. Currently, there are over thirty EAMON adventures available at a price that can't be topped.

Temple of Aphsai
Epyx/Automated Simulations
1043 Kiel Ct
Sunnyvale CA 94086
$30.00

Winner of the 1981 "Computer Game of the Year" award of the Academy of Adventure Gaming Arts and Design. Aphsai is the ancient Egyptian god of insects and his temple is filled with untold wealth, as well as with monsters and magic. The player can create over a million different characters as he battles his way to the treasure.

Ultima II: The Revenge of the Enchantress
Sierra-On-Line
Sierra-On-Line Building
Coarsegold CA 93614
$59.95

Offers the chance to travel across time and space in an animated, hi-res fantasy adventure. Includes a host of different adventures ranging from the most magical to the most realistic, including meeting a prostitute in a bar!

Wizardry: Proving Grounds of the Mad Overlord
Sir-tech
6 Main St
Ogdensburg NY 13669
$49.95

This is the one voted most popular program ever by readers of Softalk. It lacks the ingenuity of the hi-res graphics of other popular games but outpaces many of them with its variety of experiences and moods. Hard to get bored with.

Zork I
Infocom
55 Wheeler St
Cambridge MA 02138
$39.95

An all-text adventure game in which the player confronts an underground empire. Enormous quantities of treasure lie hidden in a labyrinth near the underground empire and the adventurer is invited to acquire some of it.

ARCADE

Alien Typhoon
Broderbund
1938 4th St
San Rafael CA 94901
$24.95

This is a high-speed version of Galaxian with more aliens swooping down to battle the defender.

Apple Panic
Broderbund
1938 4th St
San Rafael CA 94901
$29.95

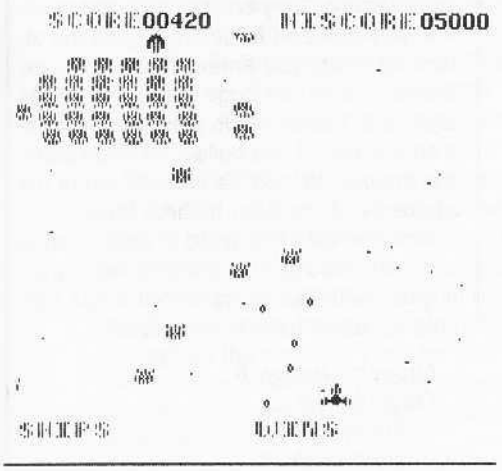
Crawling apples and butterflies have taken over a five-storey building and your job is to get rid of them by running up and down connecting ladders and laying traps for your enemies. Very good graphics.

Choplifter
Broderbund
1938 4th St
San Rafael CA 94901
$34.95

With a chopper, you try to rescue 64 hostages held by terrorists as you avoid jet fighters, tanks and drone satellites. Impressive graphics.

Gorgon
Sirius
10364 Rockingham Dr
Sacramento CA 95827
$39.95

This is the Apple version of the arcade game "Defender." The player has to save the kidnapped inhabitants of a planet by shooting down and escaping its invaders.

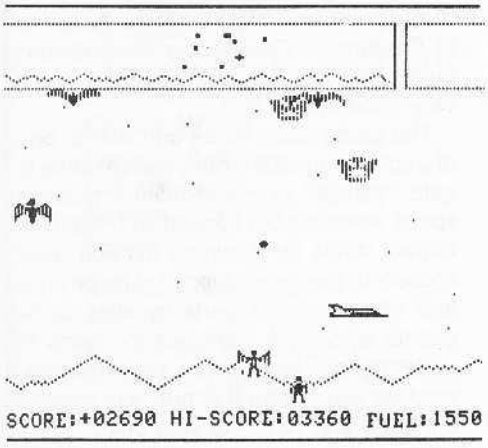


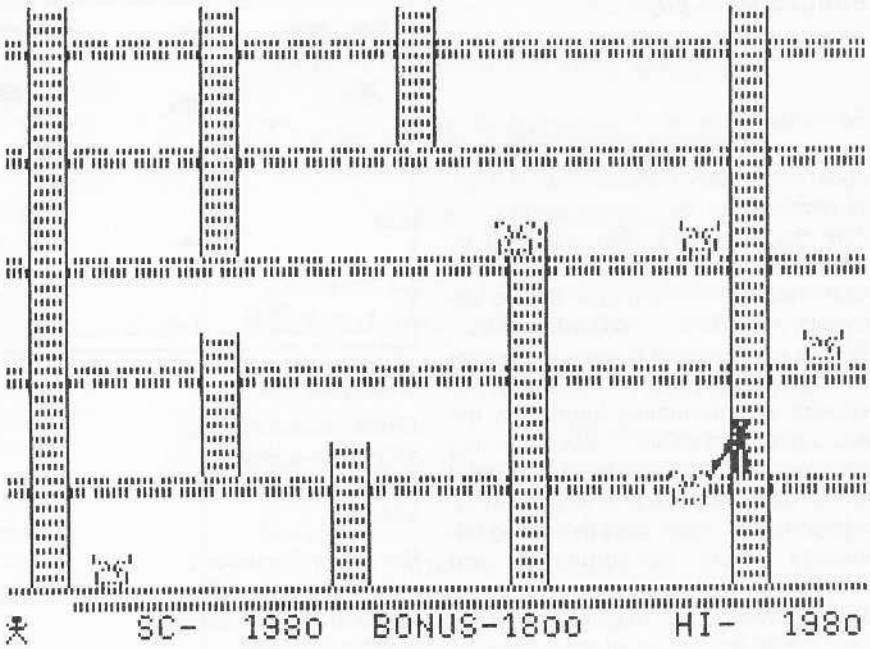
Lady Tut
California Pacific
757 Russell Blvd
Davis CA 95616
$29.95

An arcade cross between Castle Wolfenstein and Ms Pacman. Here, you must battle your way through nine different mazes inside an old Egyptian tomb in search of the mummy of the mother of the famed boy pharaoh, Tutankhamen.

Miner 2049er
Micro Lab
2699 Skokie Valley Rd
Highland Park IL 60035
$39.95

One of the best jump, hop, slide, Donkey Kong-type games on the market. Each level of the game must be completed within a given period of time and the adventurer, Bounty Bob, must avoid contact with numerous mutants as he tries to reclaim the 10 structures which they have taken over.





Raster Blaster
BudgeCo
428 Pala Ave
Piedmont CA 94611
$29.95

This is the best yet computer simulation of a pinball game. It was voted the most popular program of 1981 by readers of Softalk.

Sabotage
On-Line Systems
36575 Mudge Ranch Rd
Coarsegold CA 93614
$24.95

You command a powerful gun base, shooting helicopters and aircraft out of the air while the opposing forces try to sabotage your base.

Continued on page 62

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Continued from page 17

Bermuda Race is a simulation of a Newport, Rhode Island to Bermuda sailboat race which, coincidentally enough, was received for our review on the day before the America's Cup was won by Australia. This well-done simulation was coauthored by two long-time sailing enthusiasts, John Biddle and Gordon Mattox.

Before attempting to engage in the race simulation, landlubbers have the option of reviewing an informative tutorial on the basic concepts of sailing. It covers sailing terminology for the various parts of the boat and how each part interacts with the wind. It is important to understand the sailing terminology before attempting a race simulation.

Prospective racers may also want to check the performance of their boat by viewing the performance tables which display windspeed vs. boatspeed, windspeed vs. maximum sail area and other data which are useful under racing conditions.

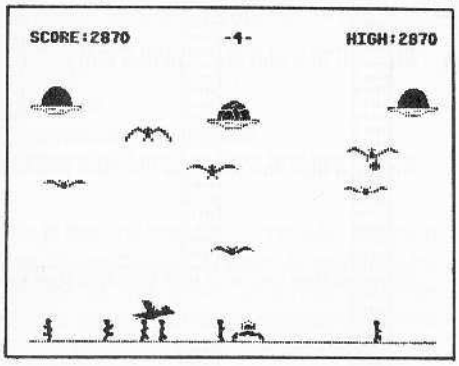
The race simulation can be played by one or two people (each in command of their own boat). Each boat is programmed to respond like an 80-foot "maxi-racer" sailboat.

The race course starts off Brenton Reef Light on Rhode Island Sound. You are given 20 seconds to jockey and gauge sailing conditions before the starting gun is fired. On each turn, a screen full of the current sea conditions (wind speed, direction, wave size) and boat readings (compass heading, centerboard setting, etc.) is displayed for the captains' scrutinization. To maintain a proper course for Bermuda, the players must constantly adjust the boat according to the prevailing conditions.

The players also may view a chart which plots the progress of the boats toward Bermuda. This hi-res chart will display clearly the results of running a tight or sloppy ship.

Although there are no real-time graphics in Bermuda Race, it is one of the better computer simulations I have seen since Sublogic's Flight Simulator. Both educational and entertaining, it should be a welcome relief to those who are tired of zapping mutants and mingling with dwarves and hobbits in fantasy adventures.

Graphic Quality: 5
Originality: 8
Difficulty: 8
Interest Level: 5
Playability: 7
Overall Rating: 6



Buzzard Bait

Sirius Software Inc.
10364 Rockingham Dr.
Sacramento, CA 95827
$34.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick optional

Game Type: Arcade
Language: Machine

Buzzard Bait might be described as a nightmare arcade game. Large buzzards are using the local human populace as food for their recently hatched chicks. These buzzards are ferrying the hapless humans from ground level to their lofty nests and gruesomly dropping them into the mouths of the ever-hungry hatchlings. You command a spaceship which protects the humans from ever becoming food for fowl.

As the game begins, there are six buzzards (3 male and 3 female) who soon mate (don't worry Moms, no graphic buzzard sex is depicted) to produce one egg each. These large eggs soon hatch to reveal the large and hungry buzzard babies.

The parents are soon swooping down to snatch the humans, and you must fire your ship in order to deter the attack. If a buzzard grabs one of the humans, the person can be saved if you can blast the buzzard and catch the falling human before he hits the ground.

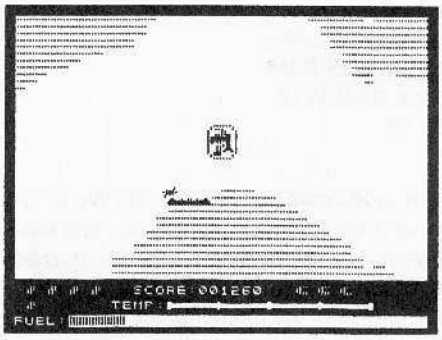
To keep things interesting, the buzzards seem to be in cahoots with a flock of flying penguins (come on guys, even James Watt knows penguins can't fly). These peculiar penguins don't seem to be fond of human flesh, but they are deadly if they touch your craft. Your only hope of avoiding the penguins as they swoop low to the ground is to leap your craft over the top of them. Yes, in Buzzard Bait your craft is capable of temporarily leaping off the ground.

After the chicks have dined on a few humans, they take off on their own. Because these newly hatched buzzards are smaller and faster than their adult counterparts, they are much harder to hit.

If you succeed in destroying all the attacking birds, you enter the bonus round where you must dodge penguins, mines and other debris, while collecting parts of a spacecraft. If you collect all three parts, the spacecraft can be used to battle the buzzards at the next highest level.

Buzzard Bait is a good arcade offering with very good graphics and sound. My only gripe with the game is that it has very little variation from level to level.

Graphic Quality: 8
Originality: 8
Difficulty: 6
Interest Level: 4
Playability: 7
Overall Rating: 6



Caverns of Callisto

Origin Systems
P.O. Box 58009
Houston, TX 77258
$34.95

Hardware Required:
48K Apple II+
At least one disk drive
Joystick

Game Type: Arcade
Language: Machine

Chuckles, author of Lunar Leeper and Lafpak, has migrated (like Lord British) from Sierra On-Line to the new Texas-based publisher Origin Systems. As author of Caverns of Callisto, he has provided Origin with its first arcade offering, and a very good one at that.

The game takes place on Callisto, one of Jupiter's moons where the valuable liquid "plimsil" is mined (plimsil protects space vessels from contact with alien life forms). While on a mining mission, your spacecraft has been stripped of its ion drive and other valuable parts by alien delinquents who have scattered the parts in underground chambers. Your mission, whether you accept it or not, is to recover the parts and return to your ship.

While underground, you must maneuver through the caverns with the aid of your James Bond-style jetpack, searching for the parts and avoiding contact with the resident aliens. The alien life forms are numerous and any contact with them is deadly.

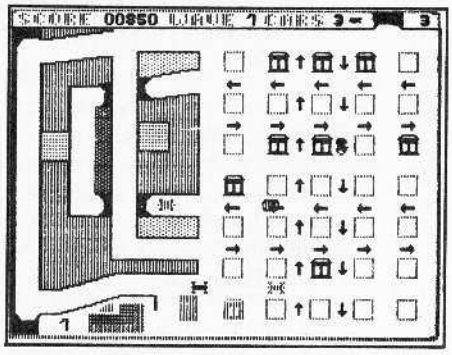
For protection, you have the use of a plasma rifle but it will overheat if used too liberally. The aforementioned plimsil can be used to provide temporary shielding from the aliens, if you can land in one of the liquid pools which are scattered throughout the caverns. Fuel for your jetpack can be obtained by recovering canisters which were left behind by the plimsil miners.

Points are scored by destroying the aliens and recovering the parts of your ship. The game can be won by returning all of the ship's parts to the mouth of the caverns.

A joystick is needed to fly through the caverns, which scroll by very smoothly ala-Gorgon. The joystick can be used quite precisely to point and fire at the aliens or to set down and pick up the pieces of the craft. To aid in your mission, Chuckles thoughtfully has provided a map of the caverns.

Caverns of Callisto is a very challenging and enjoyable arcade game. I hope Origin Systems can continue to provide products of such quality.

Graphic Quality: 6
Originality: 8
Difficulty: 7
Interest Level: 8
Playability: 8
Overall Rating: 7



Crime Wave
Penguin Software
830 4th Ave.
Geneva, IL 60134
$19.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick or paddle optional

Continued on page 22

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Continued from page 21

Game Type: Arcade
Language: Machine

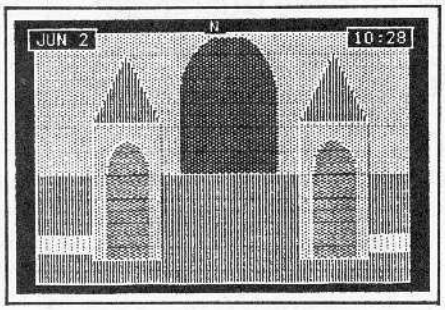
You are a police officer in a lawless town. To stop the Crime Wave you must prevent criminals from robbing the banks, either by arriving in time to catch the culprits with your cage gun or by catching them in their getaway car and towing them to the police station for incarceration.

If you miss one, you're in for a surprise. The felon will buy a cop-killer known as the Robot Rammer. With this, the criminal is almost invincible, because if the Robot Rammer touches your car you will die.

One way to stop a "Rammer" is to activate one of the shields for your car and run into the Rammer while it's still in effect. You can also drop a bomb behind your car. Both will destroy the cop-killer, but both have a limited number of uses.

Crime Wave is tough to play, but if you're patient it's worth the challenge.

Graphic Quality: 7
Originality: 8
Difficulty: 8
Interest Level: 5
Playability: 7
Overall Rating: 5



Critical Mass

Sirius Software Inc.
10364 Rockingham Drive
Sacramento, CA 95827
$39.95

Hardware Required:
48K Apple-compatible
At least one disk drive
One extra disk for the scenario side

Game Type: Adventure
Language: Machine

It is June 1st, and the United Nations has just received the following message: "At precisely 8 P.M., June 5th, the five largest cities in the world will be destroyed by thermo-nuclear devices. This is not a request for ransom. The purpose of this warning is to create a worldwide panic and thereby sweeten my revenge."

The call was traced to a pay phone at the Central Park Zoo, where a search yielded no clues. Fortunately, the news media are cooperating and not publicizing a similar written message. You must find a way to neutralize this threat. Your contact is in London.

In Critical Mass, an illustrated adventure game from Sirius Software, you must prevent the above mentioned catastrophe from occuring. As your alter ego, Steve Stone, ace private eye, you have exactly four and one-half days (108 hours) to search for clues and find the crazed sender of this anonymous message.

Because you are on a very tight time schedule, the game displays the current time prominently at the top of each game illustration. Each turn of the adventure generally consumes one minute of the clock. But some activities, such as a cab or airplane ride, can consume more.

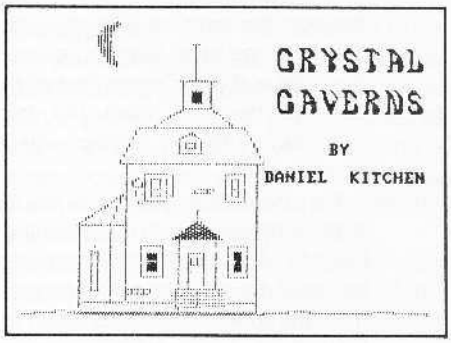
Since you are in New York and your intelligence contact is in London, it is necessary for you to make one or more trans-Atlantic voyages. You will also need to visit and sleuth-around several other cities.

Critical Mass is the first adventure game I have seen in which it is sometimes necessary to make real time responses to events which occur during the course of your adventures. You learn quickly that the penalty for hesitation is often death. Of course, if you don't solve the adventure within the alloted period of time, the combined populace of London, New York, Paris, Rome and Miami are turned to crispy critters by the detonating atomic devices.

The graphics in Critical Mass are nicely done hi-res pictures, and some of the illustrations, such as a descending elevator, even have limited animation built in. Whenever a new picture is displayed, it fills in very quickly so there is no delay, as there is in some of the the older illustrated adventures.

If you are looking for a good illustrated adventure game to fulfill your Jim Rockford fantasies, check out Critical Mass. You may not get to drive a gold Trans-Am with reckless abandon, but Rockford never got a chanch to save the lives of 30 million people, either.

Graphic Quality: 8
Originality: 8
Difficulty: 7
Interest Level: 7
Playability: 6
Overall Rating: 7



Crystal Caverns

Hayden Software
600 Sufolk Street
Lowell, MA 08154
$34.95

Hardware Required:
48K Apple-compatible
One disk drive

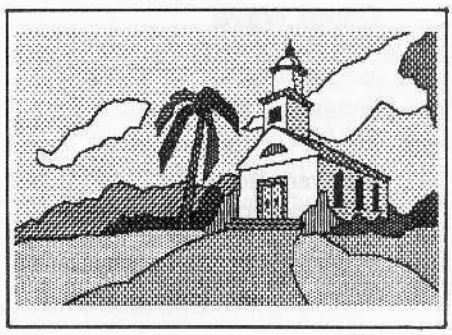
Game Type: Adventure
Language: Machine

The Crystal Caverns lie under an old Victorian mansion, but play begins outside the gate where your first concern is finding a way inside. Once in the mansion, your goal is to discover a way to the Crystal Caverns below, where treasure can be found and stashed.

Lack of information makes The Crystal Caverns overly difficult. Text descriptions displayed during the game are very uninformative. Possible directions of travel, where doors are located, and similar instructions usually are not given.

The biggest mystery, however, is the point of the game, which I never was able to figure out.

Graphic Quality: text
Originality: 7
Difficulty: 8
Interest Level: 5
Playability: 5
Overall Rating: 5



Death in the Caribbean

Microlab Inc.
Skokie Valley Road
Highland Park, IL 60035
$35.00

Hardware Required:
48K Apple-compatible
At least one disk drive

Game Type: Adventure
Language: Machine

No, Virginia, Death in the Caribbean is not the code name of our latest Latin American diplomatic effort! It is the title of the first illustrated adventure game from Microlab, of Highland Park, Illinois.

The folks at Microlab sure seem to be a well-rounded bunch of programmers because their three recent releases, Miner 2049er, Highrise, and Death in the Caribben, fall into the arcade, strategy, and adventure categories, respectively.

In Death in the Caribbean, you have your wits and an incomplete map to guide you in your search for buried treasure on a desert island. The island seems to be uninhabited, except for a pirate ghost who is fond of appearing briefly on the hi-res display.

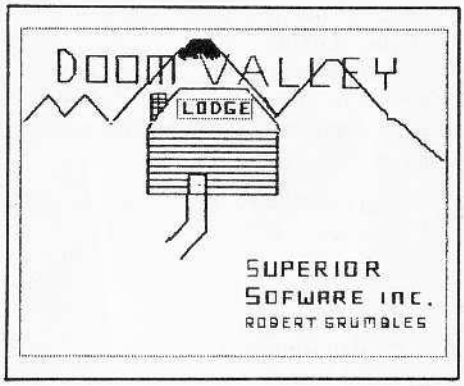
Illustrated adventure games have come a long way in the past couple of years. Almost every one on the market has very good hi-res graphics. The graphics in Death in the Caribbean are no exception; the game is visually very pleasing, especially if you can play on a color TV or monitor to view the blue of the sky and the greens of the jungle vegetation.

As you search the island for treasures some of the obstacles you must avoid and overcome are quicksand, crocodiles, man-eating ants, and a complex maze. These obstacles, plus other puzzles in the game, should provide a challenge for the intermediate-level adventurer.

Death in the Caribbean accepts only two-word commands, so I sometimes had difficulty in communicating with the game. I still think more adventure games should respond as the Eamon series does and tell you exactly what commands it will understand.

If you think you are up to being stranded on a desert island with a thieving pirate ghost as your only companion, you might want to check out Death in the Caribbean. As Count Floyd would say, "Veerry Scaary."

Graphic Quality: 9
Originality: 6
Difficulty: 8
Interest Level:7
Playability: 8
Overall Rating: 7



Doom Valley

Superior Software Inc.
P. O. Box 261
Kenner, LA 70063
$19.95

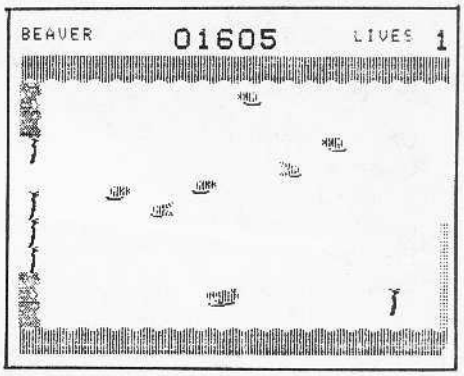
Hardware Required:
32K Apple-compatible
At least one disk drive

Game Type: Adventure
Language: BASIC

A plane carrying a number of U.N. ambassadors has crashed in Doom Valley, near your aunt's ski resort. Your job is to locate and rescue the survivors (generously setting aside all personal politics). Dangers and obstacles include the dreaded Yeti, which dwells in the hills surrounding the valley (or so it is rumored).

Although the story line is something new, as an adventure game, Doom Valley, fails in several areas. The game knows few words and this places heavy limitations on the excitement level and no limitations on the frustration level. I didn't do much more than move around, as I couldn't find out how to make the main figure, or "puppet," do anything else. It's too bad the idea wasn't better used.

Graphic Quality: text
Originality: 7
Difficulty: 9
Interest Level: 2
Playability: 2
Overall Rating: 3



Evolution

Sydney
600-1385 West 8th Avenue
Vancouver, B.C. V6H 3V9
Canada
$39.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick optional

Game Type: Arcade
Language: Machine

Evolution is one game I can guarantee has not been endorsed by the Moral Majority or the Institue for Creation Research.

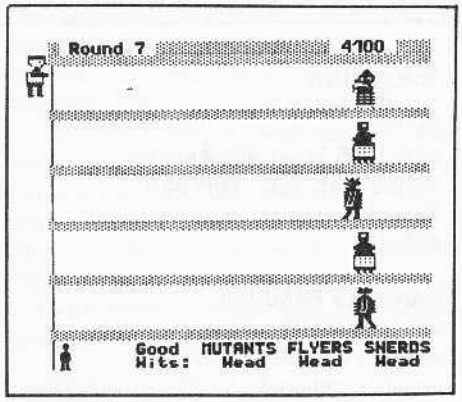
The object of the game is to evolve into a higher life form. You begin at the low end of the evolutionary ladder and try to evolve through tadpole, rodent, beaver, gorilla, and finally human stages. To evolve to the next higher life form you must succeed in your ecological niche by accomplishing various tasks. For instance, in the amoeba stage you must engulf DNA molecules while avoiding microbes, spores, and antibodies. To succeed at the beaver state, you must gather sticks to build a dam and avoid the beaver-loving alligators.

If you can survive through the human stage by killing ten genetic mutants, your reward is to witness the end of the human race. Since survival through the highest levels of the game is not a trivial accomplishment, I have not yet experienced this pleasure.

The graphics and sound in Evolution are quite nice at all levels, and the game is playable from the keyboard or with a joystick. My only criticism is that I think the game could have been made more true-to-life and educational with a little more effort. For instance, I have never heard of any rodent which was able to kill snakes by dropping piles of dung on them.

All-in-all though, Evolution is an excellent first offering from this Canadian-based company.

Graphic Quality: 8
Originality: 9
Difficulty: 6
Interest Level: 8
Playability: 9
Overall Rating: 8



Grapple

Insoft Inc.
10175 S.W. Barbur Blvd., 202B
Portland, OR 97219
$19.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick or paddles optional

Game Type: Arcade
Language: GraForth

Did you ever want to grow up to be a prison warden, or maybe even a prison guard? If you did, Grapple may be just the game for you.

In Grapple you are not guarding just any old prisoners -- these are genetic mutants on a remote penal planet that have loveable names like Deviloids, Robotseques, and Horrible Hoppers.

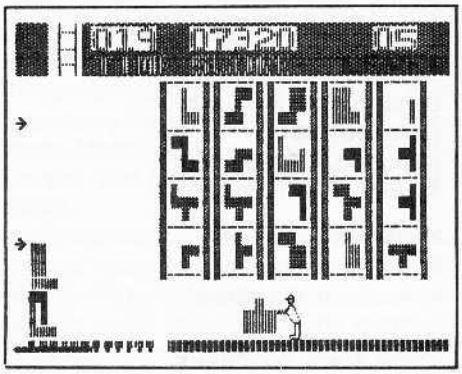
As warden of these outcasts, your problem is to stop their escape; for they have broken out of their cells and are heading (along with their pets, the Sneaky Snerds and Flippant Flyers) toward the prison exits. Luckily, you are in control of three android guards (four if you reach the bonus stage) who can fire stun guns at the mutants and knock them off the edge of the various prison levels.

The androids face five mutants at a time. After each group is destroyed, the power of the stun guns is reduced and a new cast of mutants appears. If any of the mutants make it past the android, the guard is destroyed by the low atmospheric pressure of the planet.

The concept of this game is fairly original, but the game becomes tiring because the screen displayed at each level is exactly the same. Also, because of the reduced effectiveness of the stun guns, it becomes nearly impossible ever to destroy all the mutants.

Grapple was written in the GraFORTH language and, although the shapes are quite detailed, the animation is somewhat jerky.

Graphic Quality: 4
Originality: 9
Difficulty: 8
Interest Level: 3
Playability: 5
Overall Rating: 4



Highrise

Microlab Inc.
Skokie Valley Road
Highland Park, IL 60035
$30.00

Hardware Required:
48K Apple-compatible
At least one disk drive

Game Type: Educational/Strategy
Language: Machine

Highrise is an interesting game that is both entertaining and educational. This is one game that can be truly labeled: "fun for all ages."

The object of Highrise is to build a stable structure out of various-shaped blocks available to Barnaby, the construction worker under your control. Barnaby can choose blocks from one of five overhead chutes. The chosen blocks are moved to a spring-loaded platform which catapults them onto the structure in progress.

Since the blocks vary in size and shape, if they are not positioned properly before being catapulted the structure will be toppled and must be restarted. For each block properly placed upon the structure, points are added to the total score.

If Barnaby succeeds in building a structure of sufficient height, he can scale it to reach the next level. With each level the shapes of the blocks become more irregular and, of course, more difficult to stack.

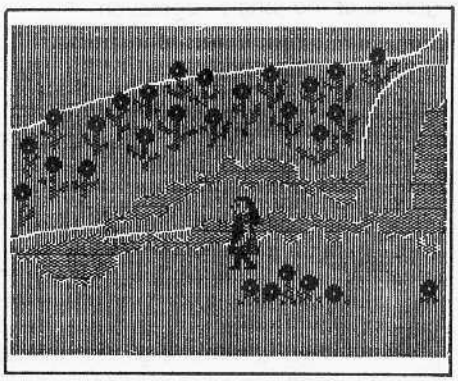
As with most construction projects, Barnaby is working under a time limit, which is depicted by a countdown clock displayed at the top of the screen. Each level of the game has a smaller time limit and the game will end at any point if the clock reaches zero.

The graphics in Highrise are not particularly detailed, but don't need to be because Barnaby is really the only shape requiring detail used in the game.

One feature of Highrise which I think more games should have is an instructional mode so the game can be learned without worrying about scores or time limits.

Highrise provides entertainment for the whole family. I wish more games could successfully combine the educational and entertainment aspects of the computer.

Graphic Quality: 5
Originality: 8
Difficulty: 6
Interest Level: 7
Playability: 7
Overall Rating: 7



Jenny of the Prairie

Rhiannon
3717 Titan Drive
Richmond, VI 23275
$34.95

Continued on page 26

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Continued from page 24

Hardware Required:
48K Apple-compatible
At least one disk drive

Game Type: Adventure
Language: Machine

Jenny of the Prairie is one of a series of illustrated games designed to be played by girls aged 7-12.

The games were developed by a psychologist and a software programmer who decided to do something about the male domination of character roles in video games. Jenny of the Prairie and the other games in the series are meant to attract young females to the keyboard and to prevent them from being shut out from an increasingly computer-oriented society.

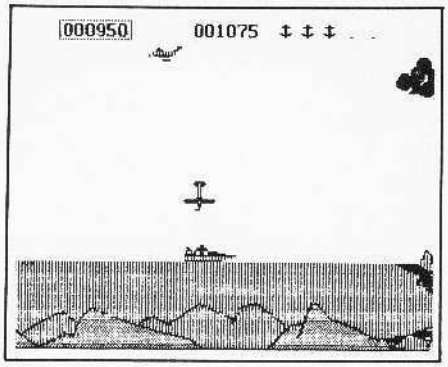
In this game, Jenny has been separated from her wagon train and is faced with the problem of survival on the prairie through the winter. She must prepare herself by collecting food, firewood and rabbit skins. If adequate provisions are not collected by the arrival of winter, Jenny does not survive her adventure. Other dangers Jenny must confront include mountain lions and rattlesnakes.

Because Jenny is faced with a series of dilemmas having real-life applications, Jenny of the Prairie is meant to foster problem-solving skills in young girls, as well as introduce them to the computer. The game comes with three different levels, so that more-advanced players can try different survival strategies.

The graphics, done with the aid of The Graphics Magician, are all quite good, but some of the animation is rough. For instance, if Jenny touches any of the fish in the stream, pieces of them are left behind after they swim away. Also, occasionally when Jenny turns to the left her facial detail disappears.

These criticisms aside, Jenny of the Prairie should provide a very good means of introducing computer and problem-solving skills to young girls.

Graphic Quality: 7
Originality: 9
Difficulty: 7
Interest Level: 6
Playability: 7
Overall Rating: 7



Kamikaze

Hayden Software
600 Suffolk Street
Lowell, MA 01854
$34.95

Hardware Required:
48K Apple II-compatible
At least one disk drive
Joystick or Paddle

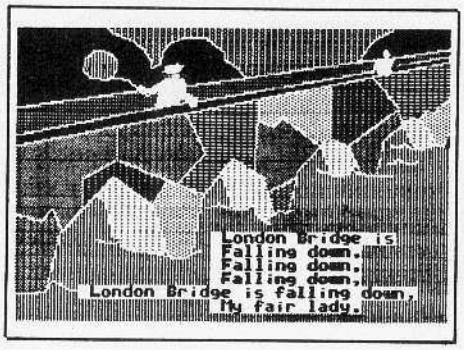
Game Type: Arcade
Language: Machine

Fighting two enemy aircraft that constantly try to blow your boat out of the water, in Kamikaze you must defend yourself with your antiaircraft guns. But you can't forget to beware of floating mines, and a wild kamikaze plane which appears later in the game.

The graphics in the game are good, but the shapes seem too large for the Apple screen. With so many different actions taking place at once, the large shapes make the game exceptionally difficult.

If you're looking for a challenge, you'll find it in Kamikaze.

Graphic Quality: 9
Originality: 8
Difficulty: 8
Interest Level: 5
Playability: 7
Overall Rating: 7



Micro Mother Goose

Software Productions, Inc.
2357 Southway Drive
P.O. Box 213412 Columbus, OH 43221
Phone (614) 486-3563
$39.95

Game Type: Educational/arcade
Language: Applesoft

Hardware Required:
48K Apple-compatible
One disk drive
Paddles or joystick
Small children

Micro Mother Goose contains several programs written for the three-to-nine-year-old age group. There are nine graphical and musical presentations of the most popular Mother Goose rhymes.

A hi-res picture related to the nursery rhyme is presented along with the lyrics. The tune is then played by the computer so the micro-humanoids can sing along.

Micro Mother Goose contains three arcade games for the very young: London Bridge Out, Splat, and Lamb Scramb.

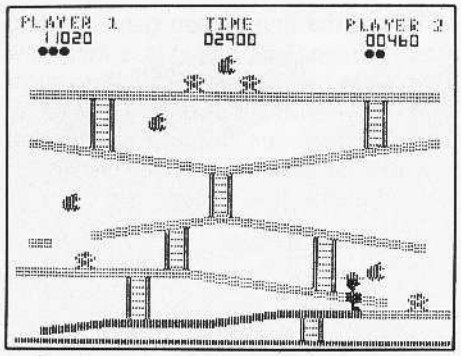
London Bridge Out is a typical Brick Out-type game, except that at its lower levels the ball bounces so slowly the game is playable by practically anyone (small children, the family dog, Ray Charles, etc.). At the higher levels the game plays at a speed more typical of this type of game.

Splat also has levels designed so the youngest child can play. The object of the game is to catch eggs which are falling off a wall into a pan, without the eggs breaking. At its higher levels it is quite challenging.

Lamb Scramb is the most elementary of the three games and probably would interest only those age 6 and below. The object of Lamb Scramb is to guide three lambs through a hole in a fence, where Mary lies waiting on the other side. If all three lambs aren't guided through the fence in sufficient time, a nasty wolf appears to devour all the lambs left outside the fence.

The graphics used for Micro Mother Goose were created with the use of The Graphics Magician, and generally are very good. Most of the hi-res pictures have limited animation incorporated into them.

Graphic Quality: 7
Originality: 6
Interest level: 7 (ages 3-9)
Difficulty: 4
Interest level: 7 (ages 3-9)
Playability: 8
Overall Rating: 7 (ages 3-9)



Miner 2049er

MicroLab Inc.
Skokie Valley Road
Highland Park, IL 60035
$39.95

Hardware Required:
48K Apple-compatible
One disk drive
Joystick

Game Type: Arcade
Language: Machine

Of the many arcade games poured from the Donkey Kong mold, Miner 2049er is, in my opinion, the leader of the pack (do-lang-do-lang-do-lang!).

In Miner 2049er you must guide Bounty Bob as he attempts to reclaim various structures which have been taken over by mutants under the direction of Yukon Yohan. Your goal is to capture this pirate of the North.

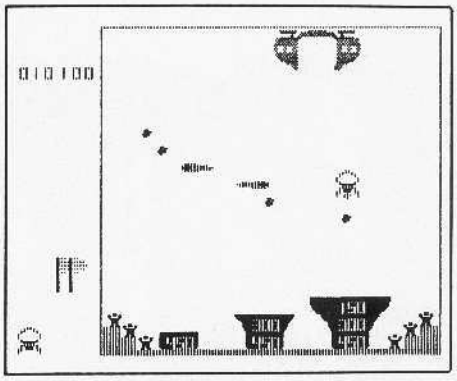
Before he can be captured, Bob must reclaim all the structures (ten in all) by racing over all parts of them. To win the game, Bounty Bob must leap, climb ladders; use elevators, lifts, slides and moving platforms; avoid pools of radioactive liquid; and, finally, on the tenth level, devour TNT and be shot out of a cannon. As if this challenge wasn't enough, the plucky miner must complete each level within an allotted period of time and avoid contact with the mutants.

The numerous mutants, although not aggressive, normally are deadly if touched. Bob's only chance of destroying them is to touch one of the apples found hanging in various places in the game, which causes the creatures to temporarily smile. While the mutants are smiling, they can be destroyed by Bob's touch.

Play is fairly easy through the first three levels of the game, but beyond that things get pretty hairy and the game should challenge even the most agile leapers and climbers. Points are accumulated by reclaiming the structures, destroying mutants, and eating TNT. At 10,000 points an extra Bounty Bob is awarded.

The graphics, animation, and sound in this game all are outstanding. Miner 2049er has set the standard against which all games of this type should be measured.

Graphic Quality: 8
Originality: 8
Difficulty: 7
Interest Level: 9
Playability: 8
Overall Rating: 8



Minit Man

Penguin Software
830 4th Avenue
Geneva, IL 60134
$19.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick

Game Type: Arcade
Language: Machine

A Minit Man is a hyperactive sort who can fly a helicopter, run, jump, duck, and shoot a gun. Under your control, he is trying to protect Minit Man missiles which are enroute to their silos from enemy robots.

The destruction of a bridge which the missiles must cross to reach their silos is the task of the robots. If the robots get to the bridge and destroy part of it, you can rebuild it by going to a stockpile of parts and choosing the piece you need, before returning to the bridge and setting it in place.

A robot can be destroyed if he has an "accident" three times. This includes your shooting him or causing him to walk over a mine (a mine is leftover where a robot has been destroyed). A more suicidal method is crashing into him with your helicopter. However, this will not work for all three accidents as your Minit Man may be reincarnated only twice (you only live thrice), so you must also shoot him or blow him up a complementary number of times to make your combination of three.

Minit Man is probably the best put-together game I have seen, but the author made it much too difficult! After six or seven games I got rather frustrated with it.

Graphic Quality: 9
Originality: 8
Difficulty: 9
Interest Level: 5
Playability: 8
Overall Rating: 6

Mission Escape

Micro Sparc Inc.
10 Lewis Street
Lincoln, MA 01773
$29.95

Hardware Required
48k Apple-compatible
At least one disk drive
Joystick or paddle

Game Type: Arcade
Language: Machine

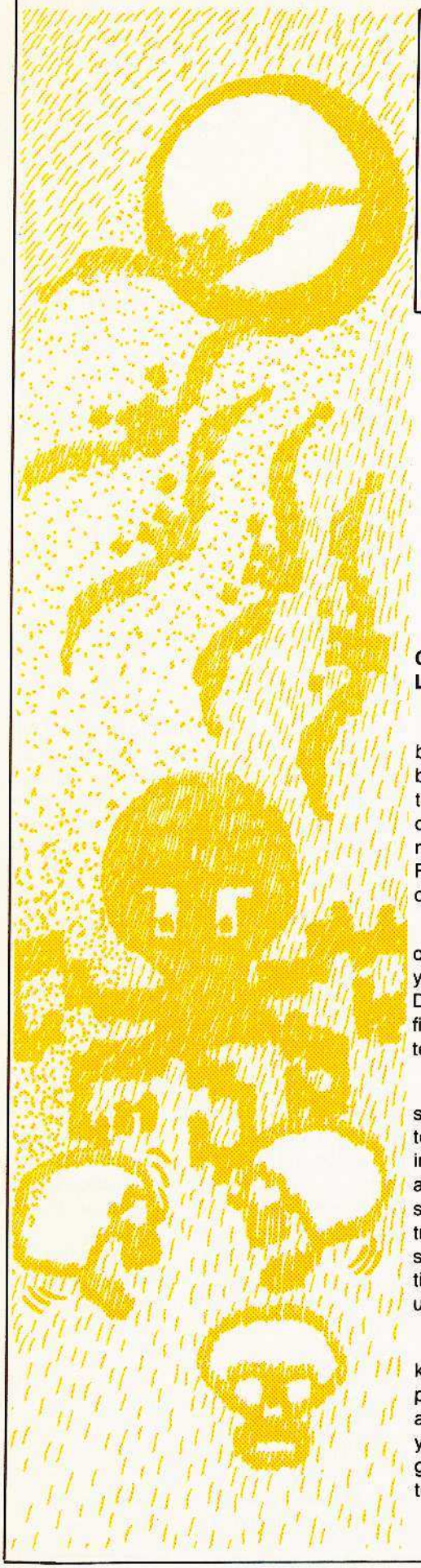
Mission Escape is similar in theme to Choplifter, except that you pilot a spacecraft instead of a helicopter and attempt to rescue tweenies (a lifeform, not a variety of junkfood) instead of men. The tweenies inhabit the 12 planets of the Appel systems, all of which are threatened by volcanic eruptions.

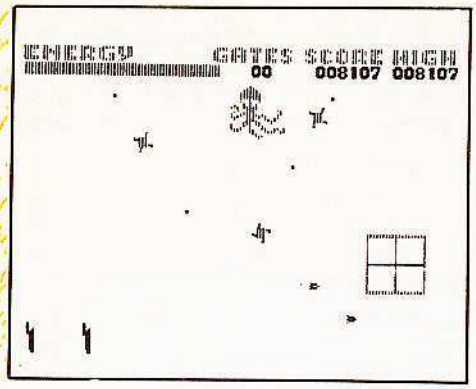
You must pilot your shuttlecraft from the orbiting mothership through asteroids and assorted space junk to set down on various-sized landing platforms where the tweenies will hop aboard. Tweenies apparently are very large and heavy creatures because you can only fit one at a time in your shuttlecraft. Points are scored by returning the said tweenie to the open bay of the mothership.

Once you have rescued all the tweenies on one planet, you move to the next planet or level where rescue becomes more difficult.

Mission Escape is not a game which is particularly addicting, but it is done very well and, as such, is an enjoyable game to play.

Graphic Quality: 6
Originality: 4
Difficulty: 4
Interest Level: 6
Playability: 8
Overall Rating: 7





Pentapus

Turning Point Software
11A Main Street
Watertown, MA 02172
$29.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick optional

Game Type: Arcade
Language: Machine

In Pentapus, a new arcade game written by Jeremy Sagan, you battle billions upon billions of mutant life forms that have travelled across the sea of space and taken control of the habitable universe. These mutant life forms are led by the awesome Pentapus, surely the most tyrannical creature in the cosmos.

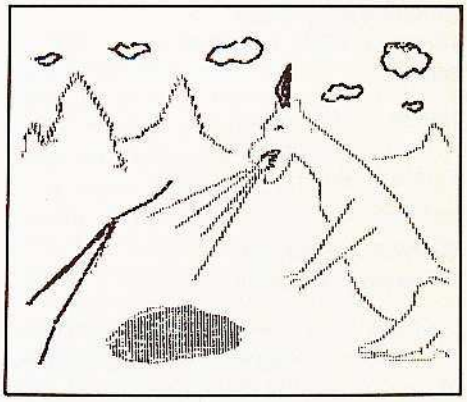
Against a backdrop of the crystal sphere of space and its infinite number of stars, you must vanquish waves of attacking Drangels, C-Aliens, Eagulls, Nagas and, finally, the magnificent Pentapus and its attending Whirrs.

To battle these mutants you control the stargates which channel the flow of matter between alternate universes. By placing one of your five stargates over the aliens and energizing it, the fabric of the space-time continuum is disrupted and trapped mutants are reduced to primordial star-stuff. Dispatch the Pentapus three times and you have regained control of the universe for the human race.

Pentapus has four levels, including a kids' level, so the game theoretically is playable by anyone. It has good graphics and some of the best sound effects I have yet heard on the Apple, but for me the game was just a bit too fast and confusing to be particularly addictive.

This is the first arcade game offering from Turning Point Software, a fairly new company which apparently hopes to make billions and billions of dollars marketing computer software. In case you haven't guessed by now, Jeremy Sagan is the son of astronomer Carl Sagan.

Graphic Quality: 8
Originality: 8
Interest Level: 5
Difficulty: 8
Playability: 7
Overall Rating: 6



Quest for The Holy Grail

Superior Software
P.O. Box 261
Kenner, LA 70063
$24.95

Hardware Required:
48K Apple-compatible
One disk drive

Game Type: Adventure
Language: Applesoft Basic

Quest for the Holy Grail is a text adventure in which the object is, as the name implies, to recover the Holy Grail. You must travel to various monasteries through forests populated with such dangers as killer rabbits and man-eating trees to find the fabled chalice.

Although Quest for the Holy Grail is very interactive with the user, it rapidly becomes boring. I first solved the game in ten minutes. Essentially, it's just another adventure.

Graphic Quality: 3
Originality: 6
Difficulty: 4
Interest Level: 4
Playability: 7
Overall Rating: 5

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( ) #12 The Quest for Trezore
( ) #13 The Caves of Treasure Island
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( ) #17 Merlin's Castle
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( ) #20 The Black Death
( ) #21 The Quest for Marron
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( ) #25 Nuclear Nightmare
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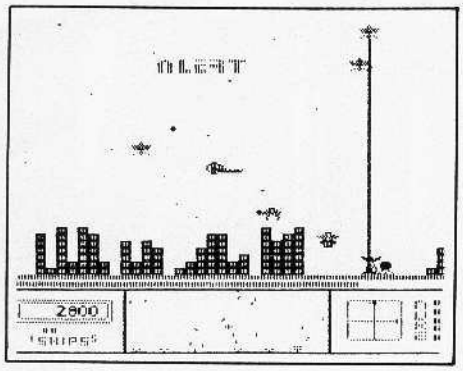


Repton

Sirius Software Inc.
10364 Rockingham Drive
Sacramento, CA 95827
$39.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick optional

Game Type: Arcade
Language: Machine

"On no," you say, "not another clone of Defender!" Well, I guess I would be saying the same thing if I hadn't played Repton. This is one game that is really arcade-quality in both play and graphics.

You are the pilot of the Repton fighter craft as you destroy attacking aliens who are attempting to siphon power from your planet's power grid system. The aliens have arrived in massive numbers on a wide variety of destructive spacecraft and will build a base on the planet if you aren't able to stop them from their mission.

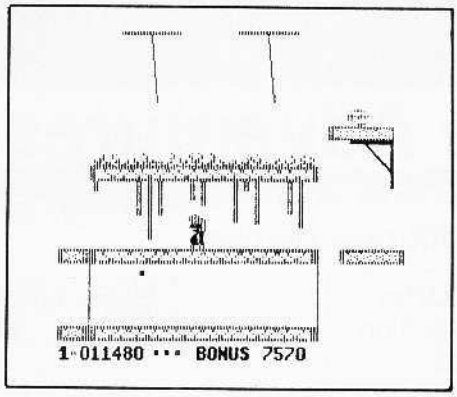
As offensive weaponry, your Repton craft has both guns and nuke bombs. The craft also is equipped with shields and long-range radar.

The attackers use their Dryn ships to siphon energy via electromagnetic beams. Your only hope of preventing this thievery is to fly your Repton craft through the Dryn's beams and return the reclaimed power to the energy tubes of your planet. Your planet's current reserve of power is displayed on screen at all times, giving a gauge of the success rate of the Dryns.

If and when the attackers succeed in building their base or siphoning all of the power from the planet, their Armageddon bomb will wipe out all life on the surface. Your only hope of success if this happens is to carry your battle underground and destroy the alien's subterranean base of operations.

Repton is obviously not a novel concept for an arcade game, but its execution is superb. I might even go so far as to say that this is one game for home computers that is more fun to play that its big brothers in the commercial arcades.

Graphic Quality: 8
Originality: 5
Difficulty: 8
Interest Level: 7
Playability: 8
Overall Rating: 8



Sammy Lightfoot

Sierra On-Line Inc.
Sierra On-Line Building
Coarsegold, CA 93614
$29.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick or paddles optional

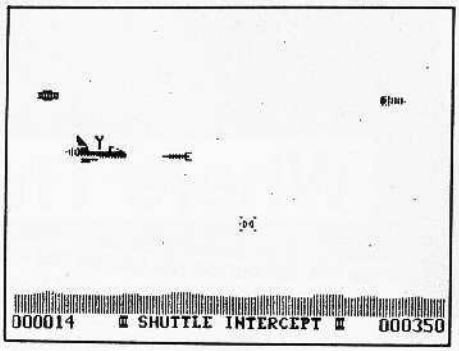
Game Type: Arcade
Language: Machine

Sammy Lightfoot, a young man with a New Wave hairdo, has decided to try out as a circus acrobat. To pass his audition he must leap over large beach balls, jump on trampolines, swing on ropes, and generally prove himself an all-around gymnast in three different scenarios.

Although the concept, as you may already know, is not particularly unusual, the game is enjoyable and challenging to play. The graphics are of the quality we have come to expect from the boys and girls at Sierra On-Line. The sound routines in the game are also first rate.

For me, one of the most enjoyable aspects of this game is watching little Sammy get snuffed; every time he misses a jump his hair will spin around his head several times. I guess it must be battery powered.

Graphic Quality: 8
Originality: 6
Difficulty: 8
Interest Level: 8
Playability: 8
Overall Rating: 8



Shuttle Intercept

Hayden Software
600 Suffolk Street
Lowell, MA 01854
$34.95

Hardware Required:
48K Apple-compatible
At least one disk drive.
Joystick or paddle

Game Type: Arcade

Language: Machine

The object of Shuttle Intercept is to retrieve all the orbiting satellites without hitting space debris or capturing an enemy satellite. Meteors and alien saucers abound, as well as missiles at the higher levels of play.

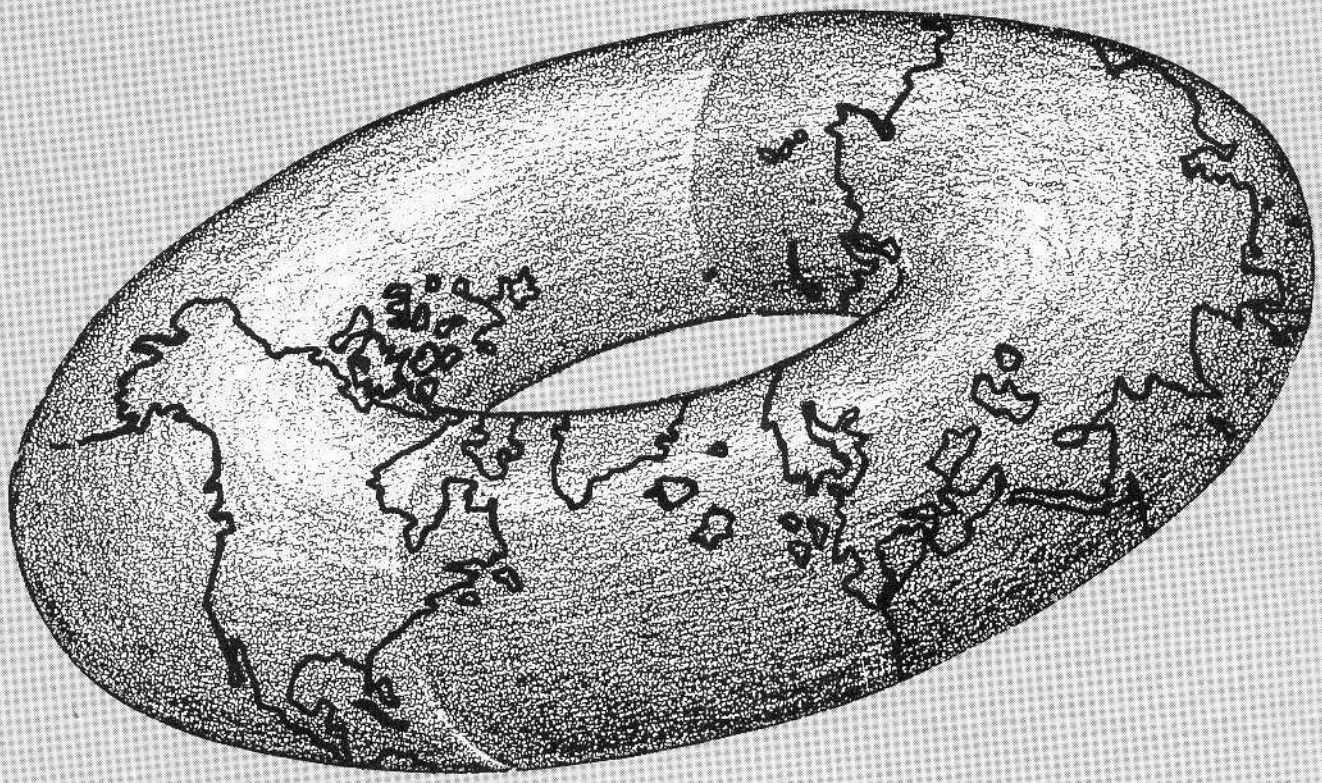
Your ship can withstand one collision with its lone shield, but a second collision causes the ship to blow up. When that happens, some of the most confusing things I have ever seen in game explosions occur. You are thrust into hyperspace, where asteroids and missiles fly at you and a single collision means death. Hyperspace is also your destination if you pass ten satellites, whether you catch them or not.

These "hyperspace transitons" are the most confusing part of the game. Play would be a lot more understandable if it were easier to tell what was going to happen next.

Shuttle Intercept has a very simple format: there is only one screen and, although the number of hazards increases slightly, the play is basically the same throughout the game (paddle # 1 is used to control movement).

Continued on page 55

DESTRUCTIVE



FORCES

By Ray Darrah

The scene of ultimate desolation in "Destructive Forces" takes place in the impending future. There had been a union of the super-powers. For a while, the world was at peace.

Then it happened!

Aliens from the planet Palinsky, indistinguishable from human beings, invaded Earth. Their first action was the reformation of the planet, the startling result of which is illustrated above.

In addition to this tyranny, the brotherhood of man was severed into two entirely distinct and violently-opposed races. Some aliens chose to fight with one race, some with the other. Both alien groups made many contributions to their respective side's defensive and offensive military stockpiles (for example, force-field shields and gigantic laser bases).

The net outcome was two countries with armies of virtual military balance locked together in intense battle.

Destructive Forces

This saga makes for a thrilling two-player game of strategy. The object is simply to destroy your opponent.

Destructive Forces is a simulation of two countries fighting a computerized war. Each player represents the commander of a country, over which he has absolute rule.

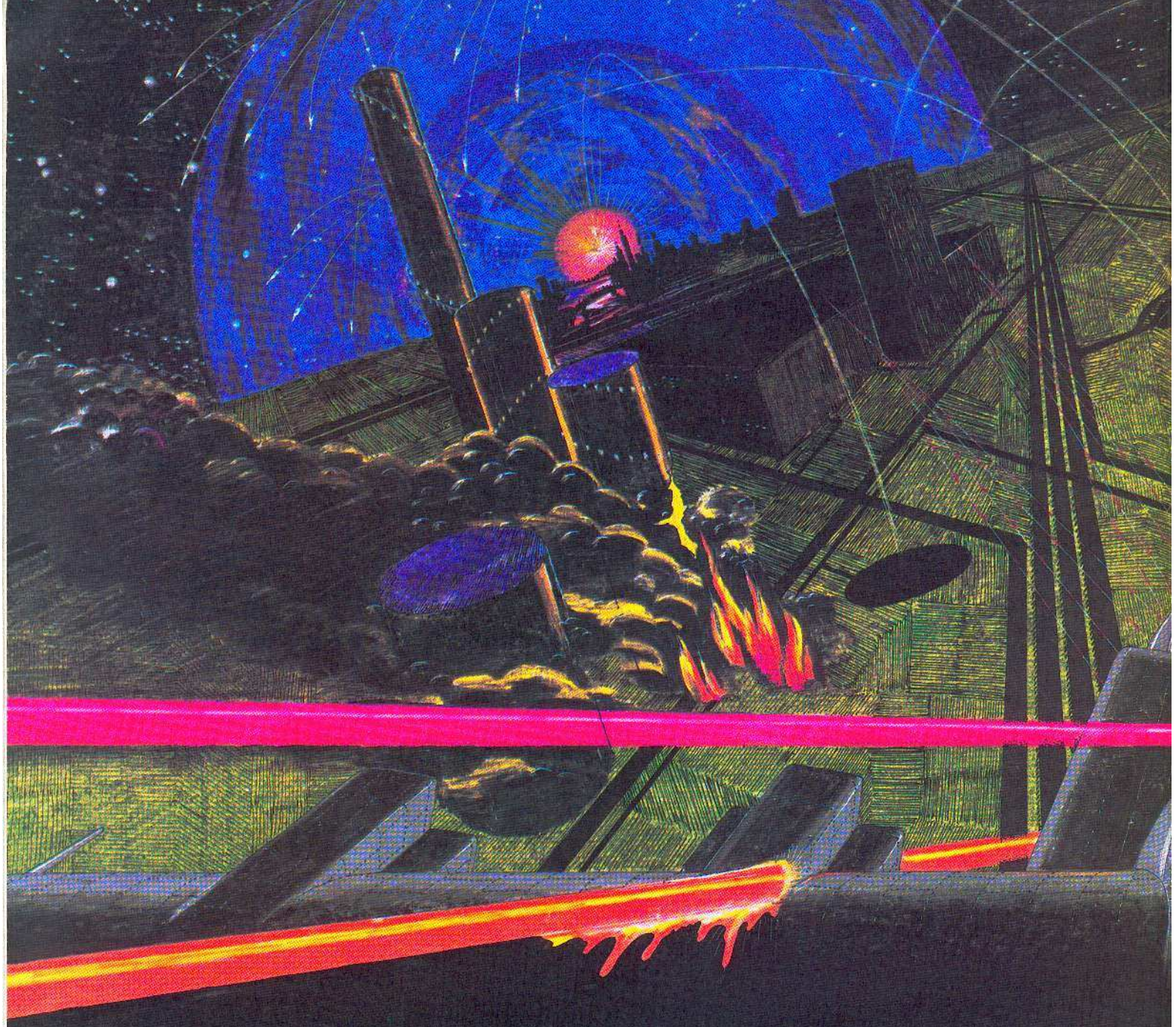
At the beginning of the game, both commanders have few possessions. As the game progresses, they expand their territories until, if they last long enough, they become super-powers. Commanders must protect their cities, industrial complexes, and farms if they want their territories to continue growing. At the same time, they must try to annihilate the enemy to win.

Your Territory

As an absolute ruler, you start the game holding a territory which measures 40x21 sectors, exactly one half of the newly-shaped world. Each sector represents one character position on the text screen. It is up to you to determine the best way to develop your land (i.e., what to build). In addition, you possess a map on which everything you learn about your enemy will be charted.

The physical structures and weapons you build during the game are either offensive, defensive or production-oriented. Here is a list of all items at your disposal:

1) Production-oriented
   A. Farm
   B. City
   C. Industrial complex
2) Offensive
   A. Aerospace bomber
   B. Bomber hangar
   C. Intercontinental ballistic missile (ICBM)
   D. Stealth spy plane
3) Defensive
   A. Laser base



B. Anti-ballistic missile (ABM)
C. Force-field shield
D. Radar establishments

The following explanations of the structures and weapons in each category will show how they interact with each other and how each can be used in game strategy.

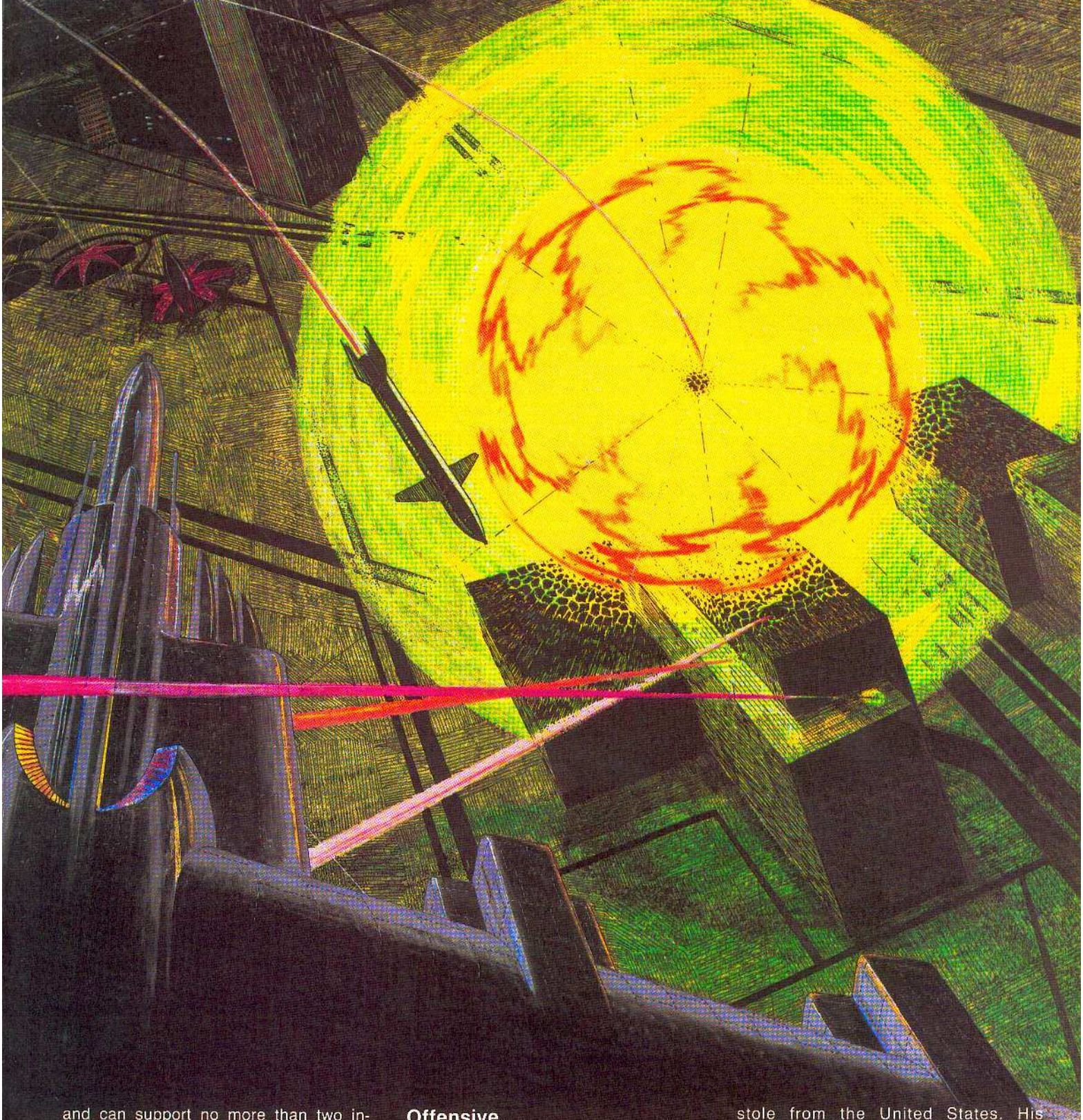
Production-Oriented

Farms, cities, and industrial complexes contribute to the overall production of your territory, because money acquired from them can be used for further territorial expansion. This aspect makes production-oriented structures the most important in winning the game. These locations are the prime targets of the enemy, so be careful.

The **farm** is the basic building block for civilization. Consequently, when your number of farms is depleted, you have lost the game. These super-efficient farms (represented by the letter "F") have come a long way from those of the present. Each requires only one caretaker, usually an unpleasant person named Wilbur.

Because a farm is quite large and computerized, it can support two entire cities. At the completion of each turn, every farm still in your possession produces 60 monetary units. If a farm gets wiped out, the cities it supported are also lost. The maximum number of farms you may build during a game is five (by decree of ancient gods).

Every **city** is linked to a farm. Because of this, any city you build must be placed within a 5x5 area of the supporting farm. Each city is denoted by the letter "C". Cities produce 70 monetary units per turn



and can support no more than two industrial complexes. If a city is destroyed, the industrial complexes it supports are also annihilated.

Industrial complexes (which appear as the symbol "@") produce the most money of the structures in the production-oriented category. Each city can support two industrial complexes, and each complex must be situated within a 9x9 area of the city. Every turn, industrial complexes produce 80 monetary units.

Offensive

The aerospace bomber, intercontinental ballistic missile (ICBM), and stealth spy plane are used for the attempted annihilation of your enemy and to keep tabs on his actions. They are not necessary for the survival of a country, but they certainly are needed to win.

Plans for the **aerospace bomber** used in this game were stolen from a Russian scientist named Barry Husechikoff, who merely was enhancing the plans his spies stole from the United States. His enhancements make this plane the slowest flying-craft in the game, but it can travel five times faster than its predecessor, the B-52.

Unfortunately, the new model can hold a payload of only five one-megaton hydrogen fusion bombs. Also, to allow for greater speed, the landing gear has been removed. Russian technology has replaced the need for a crew with computers. Therefore, upon the order to drop the last bomb, the bomber plunges itself at the target in an attempt to maximize the

destruction.

When bombers are in flight they appear as the letter "B" and may be programmed to move and drop one bomb per turn. When not in use, they reside in a hangar and are invisible.

Aerospace bombers are stored and launched from **bomber hangars**, which appear as the letter "H". Since there is a single runway, only one bomber may be launched from each hangar per turn. Up to seven bombers may be stored in one hangar. A hangar is assumed to be unwanted if it contains no bombers at the end of a turn and, therefore, is demolished by your construction team. This applies to all other silos in the game!

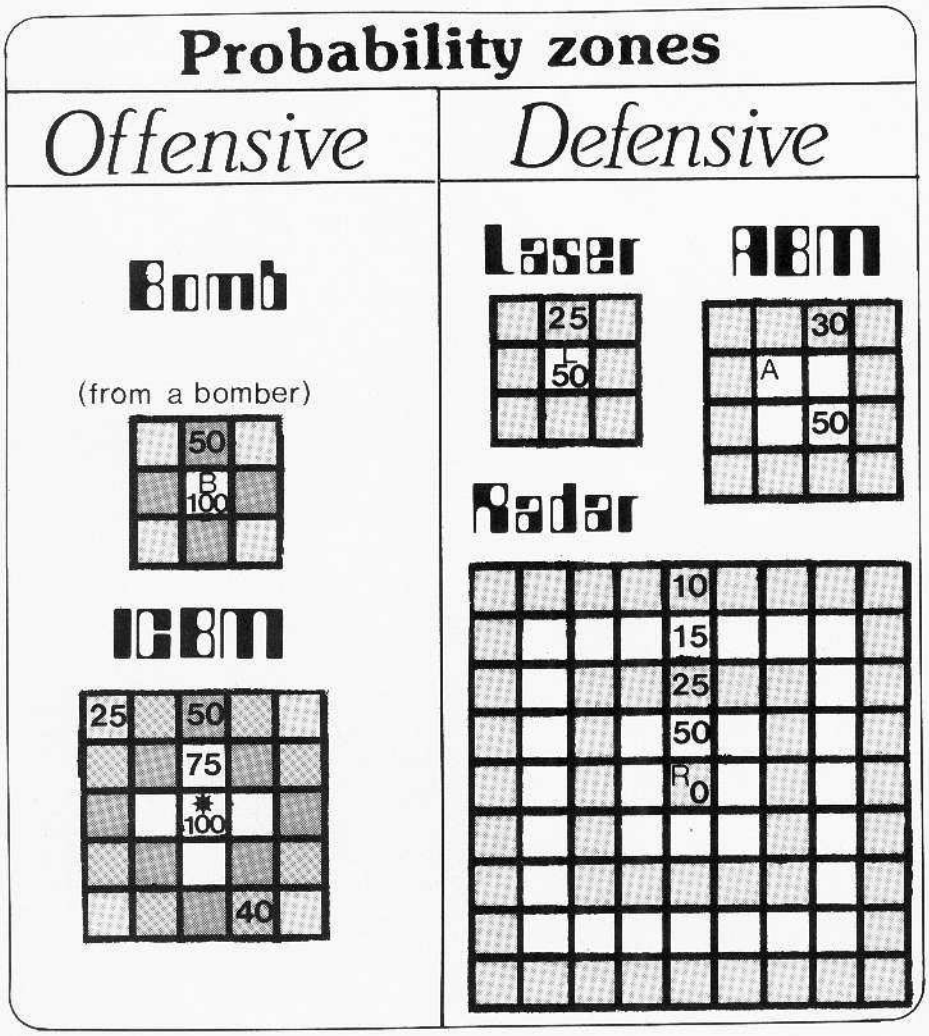
The **intercontinental ballistic missiles (ICBM's)** are a second means of destruction. They can travel extremely fast and cause wide-spread desolation. Basically, the ICBM's in Destructive Forces are much like the ones of today, just faster. When not in use, they are stored in an ICBM silo (denoted by "I") and are harmless. Up to seven ICBM's may be stored in one silo. While in flight, they appear as an asterisk ("*"). ICBM's can be programmed only to move in a turn, or to move and detonate on a sector.

The ICBM's and aerospace bombers are both effective tools of destruction, but also important to a good offence is a reliable means of gathering intelligence.

You can possess one **stealth spy plane**, which is your only tool for keeping tabs on your foe. The spy plane is displayed as a greater-than sign (">") and, like the bombers and ICBM's, can be programmed to move in a new direction each turn. Although not as fast as an ICBM, it is a lot faster than an aerospace bomber. As it flies over enemy territory, it reveals information about the enemy fortress, which is extremely helpful for determining where to drop bombs or detonate ICBM's. The spy plane can tell you what is on every sector within a 3x3 surrounding area. However, it may not see through a force-field shield. The stealth can register that sector only as being shielded.

As the plane silently maneuvers over enemy ground, it is a constant target of lasers and ABM's. Luckily, each spy plane is equipped with an evasion mechanism. A new stealth has an evasiveness of 100%, which means that nothing can hit it. When a spy plane gets too close to radar establishments, its evasion mechanism becomes weaker. But while flying over friendly ground, the evasiveness is repaired 10% per turn. An updated readout of your spy plane's evasiveness is provided every time it is programmed.

TABLE 1
Probability zones



Defensive

Defensive resources are designed for the preservation of a commander's precious farms, cities, and industrial complexes.

The **laser bases** are extremely large and powerful ruby-rod pulse lasers. Every laser establishment is programmed to fire automatically at any foreign aircraft. The laser base has a certain probability of destruction, which is listed in table 1. Nothing can avoid the laser beam except the spy plane. A laser is denoted by "L".

Anti-ballistic missiles (ABM's) are programmed similar to the lasers; except they have a greater range of destruction. While not in use, up to seven may be stored in an ABM silo, which appears as an "A" on screen.

All aircraft in the game are capable of avoiding an ABM that is considered on target. A bomber has a 25% chance and an ICBM has a 15% chance of outmaneuvering the ABM. A spy plane has its evasion mechanism percentage.

Alien wonders, the **force-field shields**, are the latest in electronic deception devices. They not only conceal a 5x5 area from enemy spy planes, but provide protection from bombs and ICBM's. The shield establishment is denoted by an "S".

Once a shield establishment is built, the area encompassed by the shield becomes energized (turns inverse). The energized sectors will stay shielded until a bomb or ICBM attempts to destroy the structure under the shield (even if the shield establishment has been destroyed).

Instead of the structure being annihilated, that sector merely de-energizes, exposing previously-shielded structures to the cruel wrath of the enemy. Shields placed too close together will produce overlapped areas with the same protection as a singly-shielded sector.

TABLE 2
Quick Reference Table

Name:	1	2	3	4	5	6
Radar	R	800	0	9x9		0
Laser base	L	450	0	3x3		0
Shield	S	600	0	5x5		0
Hanger	H	75	0			0
ABM silo	A	150	0	4x4		0
ABM Missile		150	0			
Bomber	B	200	0		5	7
Bomb (from bomber)			0	3x3	35	
ICBM silo	I	150	0			0
ICBM Missile	*	275	0	5x5	5	15
Spy Plane	>	1000	0	3x3	1	12
Farm	F	300	60	5x5	15	0
City	C	300	70	9x9	30	0
Industrial Complex	@	300	80		60	0

Meaning of columns:

1) Symbol

For each object listed in the table, a special symbol will appear on screen in the appropriate location. If no symbol is listed for a particular item, it never is visible on screen.

2) Price

This is the construction price for that particular item. Notice the difference between the silos and missiles.

3) Monetary Production

The number found here is the monetary units produced by the item for every turn.

4) Area Covered

These dimensions are the apparent size of the item. For production-oriented structures, this is the area in which all structures it supports must be placed. For the offensive items, including the spy plane, this is the area of possible detection and destruction.

5) Maximum Possessions

This is the maximum number of each item you may possess at any one time. It is impossible to tell the exact number of some items you possess.

6) Linear Distance Covered

This is the number of squares which can be covered per turn in one of the eight directions.

Radar establishments appear as the letter "R". Their main function is to increase the accuracy of defensive weapons within a 9x9 area. They simply add the percentage of accuracy listed for the relative sectors in table 1. Any combination resulting in an amount greater than 100% is counted as 100%. Remember that even if a defensive weapon (such as an ABM) has a sector totalling 100%, its missiles still can be avoided. The 100% just means that every shot it takes will be on target.

Playing the Game

Type in the Applesoft program on page 38 and

SAVE DESTRUCTIVE FORCES.

Next, enter the hex dump on page 62 and

BSAVE DEST.OBJ,A$8A00,L$1EE.

To run the game, simply type

RUN DESTRUCTIVE FORCES.

At the beginning of the game, the program asks each player's name and code word. Since the game takes place on a single computer, code words help prevent cheating. The code can be as small as one word or as long as several sentences, with the limit being 255 characters. Henceforth, before each new maneuver the computer will address you and ask for your password. You will not be able to see the word as you type it, but it is being accepted by the computer. If you should type the wrong password, just retype it until you get it right.

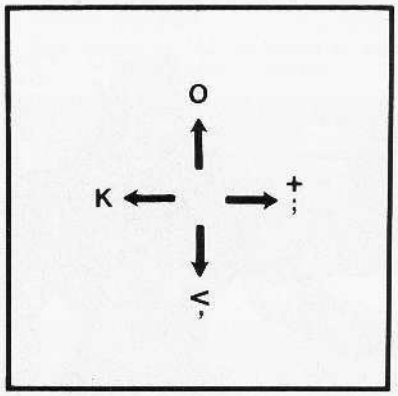
Immediately following the correct code word, the main menu is displayed. The commander has five options:

I Build new items
II Program next move of spy plane
III Program next move of ICBMs
IV Program next move of bombers
V Done

I Build New Items

Upon selection of "Build New Items," the computer displays to each commander the extent of his territory and lists some of the symbols used to represent various subjects (a complete list of symbols is given in table 2). The commander may move his cursor in four directions by typing the following keys:

TABLE 3
Cursor Control Keys



When he has reached a sector on which he has decided to build, he types the symbol for the desired structure. As long as the sector is unoccupied, the structure will appear. Otherwise, the computer will beep and do nothing.

However, there are two exceptions:

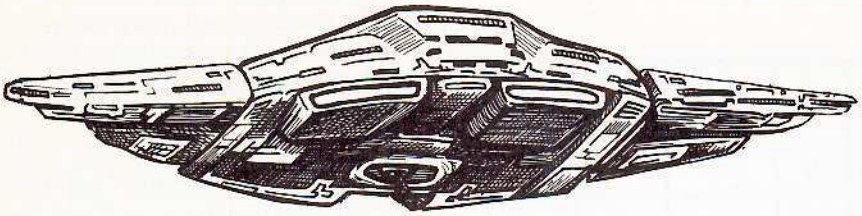
1) You may not build bombers on empty (blank) ground. Instead, position the cursor over the hangar in which you wish to place the bomber and type "B". A hangar may hold a maximum of seven bombers.

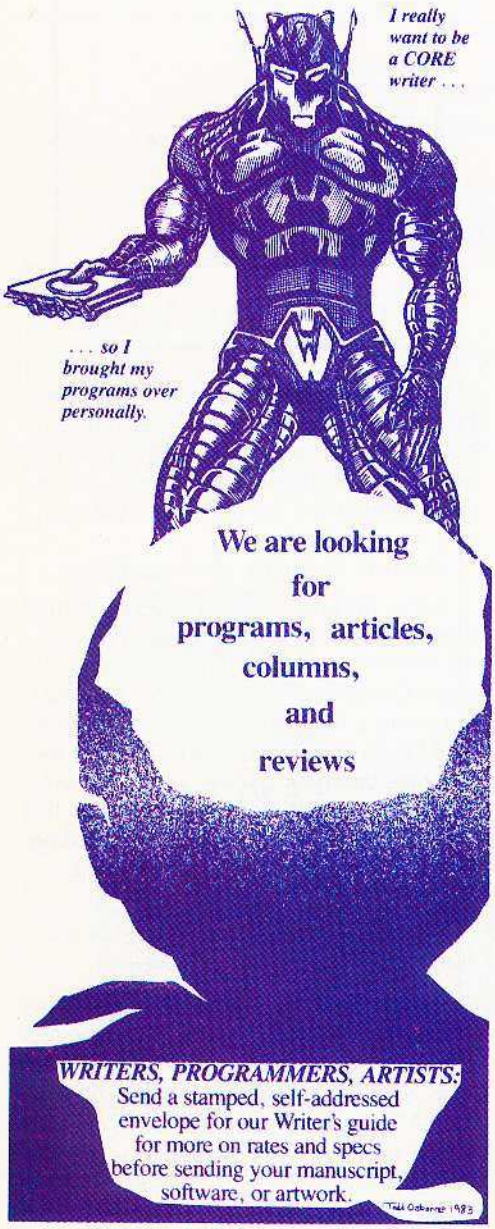
2) When building ABM's or ICBM's, the first time you type "A" or "I" the silo only will be purchased. Successive "A's or "I's will fill the silo with the corresponding missiles, one at a time (up to seven).

Four other keys also perform valuable functions:

T: Toggle between number and symbols.

There are two possible ways of displaying a commander's fortress. For example, the computer can show an ABM either as an "A" or as the number of ABM's contained in that silo. This is also true for the hangars and ICBM silos. Typing "T" switches between these two options.





M: Display monetary units

The "M" key erases the symbol table at the bottom of the screen and replaces it with your current number of monetary units. The monetary display remains until "Z" or ESC is typed.

Z: Display symbol table

"Z" changes the display from monetary units back to the symbol table. The symbol table will be displayed until "M" or ESC is pressed.

ESC: Return to main menu

With ESC, the "Build Items" option can be exited and you will return to the main menu.

When a city or industrial complex is built, a special situation occurs. The computer will display the prompt:

SUPPORTED BY?

You then must place the cursor on the support unit desired for the structure just built ("farm" if a city was just built and "city" if an industrial complex was just built) and press return. In the event that you build an item in an area where nothing can support it, just press ESC and the program will forget that you bought that item.

II Program Next Move of Spy Plane

At the beginning of the second mode, the cursor is placed on your spy plane. At the bottom of the screen is the message:

SPY PLANE TO ?
EVASIVENESS =>XXX

XXX is the current evasiveness of the spy plane (0-100).

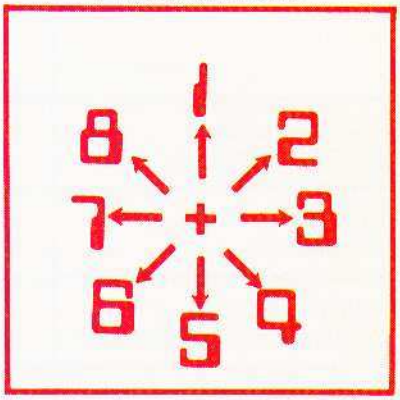
The spy plane, and all other flying craft in the game, travels in one of eight directions (north, south, east, west, northeast, northwest, southeast, southwest) and flies only in a straight line. During one turn, the spy plane may hover or fly (up to twelve sectors per turn).

To program the spy plane, there are two possible methods:

1) Cursor Control Method. Simply move the cursor, using the cursor control keys, to the destination sector and press return. If the plane can travel to the sector specified, you will find yourself at the main menu. If the sector you chose either was too far away or wasn't in a straight line of travel, the computer will beep and return to the prompt, as if you had just pressed "2" while in the main menu.

2) Manual Input Method. To activate the manual input method, type "M". The computer then will ask you for the direction (a number) and the duration (how many sectors, 1-12, to travel in the chosen direction). The direction is a single digit from 1-8, and should be typed as such (don't press return). These are the valid directions:

TABLE 4
Direction Table



The manual input method is designed to allow a jump from friendly territory to enemy territory and back again in one turn, which is impossible with the cursor control method.

Once the spy plane has been given instructions, it will continue in the new course and at the new speed until reprogramming occurs. To escape from this selection, press ESC.

III Program Next Move of ICBM's

When programming the movement of the ICBM's, the "T" and ESC keys perform the same functions as in the "Build New Items" mode. In addition, the "W" key toggles between friendly territory and the map of your enemy. The movement of the ICBM's is programmed just like the movement of the spy plane. However, there are four exceptions:

1) An ICBM can travel 15 sectors per turn.

2) First, you must place the cursor on the ICBM in flight (represented by "*") or ICBM silo from which you wish to launch an ICBM (represented by "I"), then press return. An ICBM silo can launch only one ICBM per turn.

3) After a correct move has been registered, the computer will prompt you with:

DETONATE? N

If you type "Y', the ICBM will travel to the designated sector and (assuming it doesn't get annihilated on the way) attempt to destroy all enemy territory within a surrounding 5x5 area. All other keys will be assumed as a "NO" response.

4) If you should decide not to reprogram the ICBM you've selected, pressing ESC will abort only the programming of that particular ICBM. Pressing ESC once more will return you to the main menu.

IV Program Next Move of Bombers

This mode is identical to the "Program Next Move of ICBM's," with these exceptions:

1) Bombers can travel 7 sectors per turn.

2) If you wish a bomber to drop a bomb before travelling its programmed course, simply place the cursor on the correct bomber and press return twice.

Note: To alter the course and drop a bomb in the same turn, always program the course change first. Otherwise, the order to drop a bomb will be ignored due to the reprogramming of the bomber.

3) The detonate prompt won't appear.

V Done

This option should only be chosen when you have completely finished all battle plans. It merely allows the other player to plan his strategy.

At the beginning of every turn, you and your opponent must spend 10% of your current holdings for the necessities of life (food, clothing, orgies). This can result in the decrementing of your wealth if your farms, cities, and industrial complexes produce less then the amount spent for necessities.

Game Modifications

The main program was written in BASIC, which means that it can be modified easily. Some modifications to enhance the game would be:

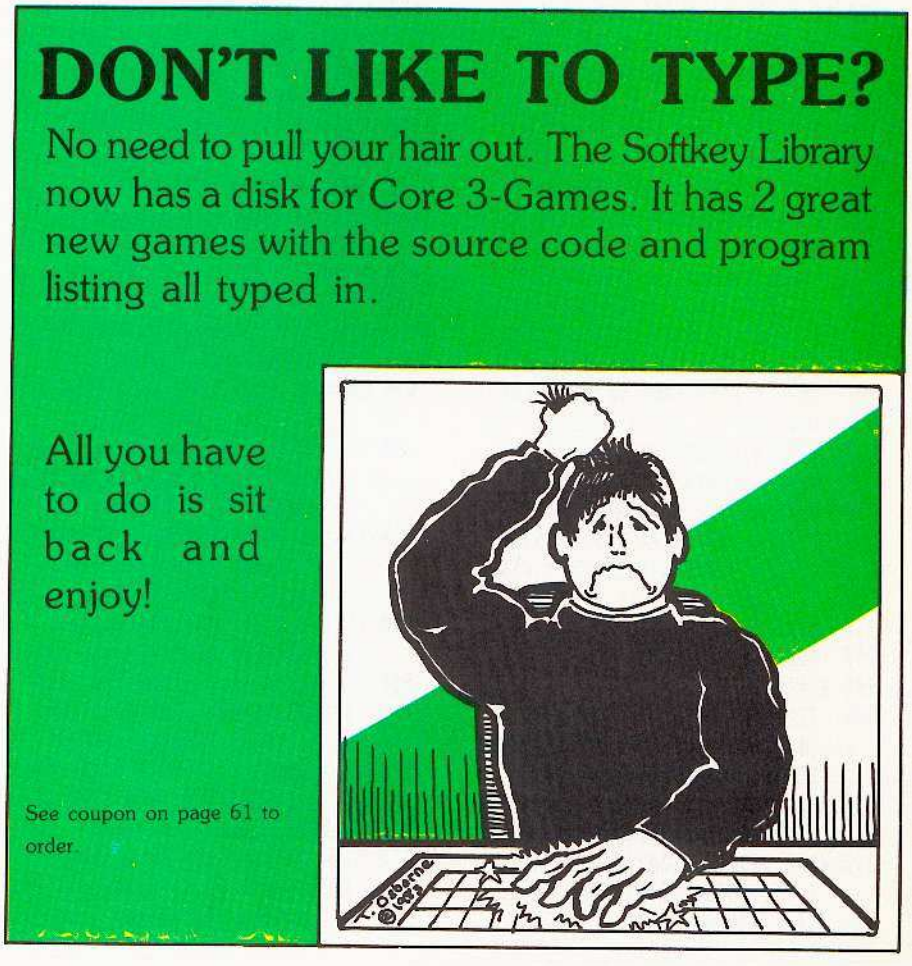
1) Link the program to a hi-res character generator, thus making the symbols look like what they represent.

2) Compile the program for maximum speed during the "ONE MOMENT PLEASE" phase.

3) Make the players face a time schedule while planning moves.

4) Modify the program so the players each have their own computer.

Meanwhile, here is Destructive Forces, a challenging match of wits and warcraft. Prepare your strategy and find a worthy opposing commander, for your work is cut out for you.



DESTRUCTIVE FORCES

Program

```
10  REM ************************
20  REM **                      **
30  REM ** DESTRUCTIVE FORCES **
40  REM **                      **
50  REM **      CREATED BY      **
60  REM **                      **
70  REM **      RAY DARRAH      **
80  REM **                      **
90  REM ************************

100  HIMEM: 32766: GOTO 960
110  REM UPDATE EVERYTHING
120  REM CLEAR OUT ALL UNWANTED S
     ILOS
130 BA = PL: GOSUB 3270: CALL 357
     81
140  REM DROP BOMBS
150  IF BS%(PL,Z,Z) = Z THEN 440:
      REM "NO BOMBERS IN AIR
160  FOR A = 01 TO 9: IF BS%(PL,A
     ,4) <  > Z OR BS%(PL,A,2) =
     Z THEN  NEXT : GOTO 250: REM
     "SEARCH FOR BOMBERS THAT WAN
     T TO DROP A BOMB
170  IF BS%(PL,A,Z) THEN 240: REM
      "DON'T DROP BOMBS ON FRIEND
     LY GROUND
180 VT = BS%(PL,A,3):HT = BS%(PL,
     A,2):BA = 2: GOSUB 3290: POKE
     AD,BS%(PL,A,01)
190 BA = (PL <  > 01):BS%(PL,A,4)
      = BS%(PL,A,6):BS%(PL,A,7) =
     BS%(PL,A,7) - 01:V1 = BS%(PL
     ,A,3) - 01:V2 = V1 + 2:H1 =
     BS%(PL,A,2) - 01:H2 = H1 + 2
     : GOSUB 2890
200  FOR VT = V1 TO V2: FOR HT =
     H1 TO H2: GOSUB 3290: IF  PEEK
     (AD) = 11 OR  PEEK (AD) = 6 OR
      PEEK (AD) = 13 THEN 230
210  IF  PEEK (AD) > 127 THEN  POKE
     AD,128 * ( FN RN(BP%(HT - H1
     ,VT - V1))) +  PEEK (AD) - 1
     28 * ( PEEK (AD) > 127): GOTO
     230
220  IF  FN RN(BP%(HT - H1,VT - V
     1)) = Z THEN  GOSUB 2990
230  NEXT HT,VT: IF BS%(PL,A,7) =
     Z THEN BS%(PL,A,2) = Z:BS%(P
     L,A,3) = Z:BS%(PL,Z,Z) = BS%
     (PL,Z,Z) - 01
240  NEXT A
250  REM   MOVE BOMBERS
260 A = 01
270  IF BS%(PL,A,4) = Z OR BS%(PL
     ,A,2) = Z THEN 420: REM  "WH
     ICH BOMBERS WANT TO MOVE
280 MD = BS%(PL,A,5):BA = 2: IF B
     S%(PL,A,Z) THEN BA = PL
290 VT = BS%(PL,A,3):HT = BS%(PL,
     A,2): GOSUB 3290: POKE AD,BS
     %(PL,A,01)
300 VT = BS%(PL,A,3) + YS(BS%(PL,
     A,4)):HT = BS%(PL,A,2) + XS(
     BS%(PL,A,4)):FG = BS%(PL,A,Z
     )
310  GOSUB 3360:BS%(PL,A,2) = HT:
     BS%(PL,A,3) = VT:BS%(PL,A,Z)
      = FG
320  IF BS%(PL,A,Z) THEN 400: REM
      "NOTHING CAN FIRE AT IT WHI
     LE IT IS ON FRIENDLY GROUND
330 BA = (PL = Z): GOSUB 3220: IF
     AZ = Z THEN 370: REM  "NO AB
     M WANTS TO FIRE AT IT.
340 HT = QX:VT = QY: GOSUB 3290: GOSUB
     3170: POKE AD,( FN MN(AD) -
     01) * 16 +  FN LN(AD)
350  GOSUB 3130:AZ = AZ + RZ: IF
     AZ > 100 THEN AZ = 100
360 BS%(PL,A,2) = BS%(PL,A,2) *  FN
     RN((AZ / 100) * 75): IF BS%(
     PL,A,2) = Z THEN BS%(PL,A,3)
      = Z:BS%(PL,Z,Z) = BS%(PL,Z,
     Z) - 01: GOTO 420
370  GOSUB 3180: IF LZ = Z THEN 4
     00: REM  "NO LASERS WANT TO
     FIRE AT IT
380  GOSUB 3130:LZ = LZ + RZ: IF
     LZ > 100 THEN LZ = 100
390 BS%(PL,A,2) = BS%(PL,A,2) *  FN
     RN(LZ): IF BS%(PL,A,2) = Z THEN
     BS%(PL,A,3) = Z:BS%(PL,Z,Z) =
     BS%(PL,Z,Z) - 01: GOTO 420
400 BS%(PL,A,5) = BS%(PL,A,5) - 0
     1: IF BS%(PL,A,5) > Z THEN 3
     00
410 BS%(PL,A,5) = MD
420 A = A + 01: IF A < 10 THEN 27
     0
430  REM  MOVE ICBM'S
440  IF IS%(PL,Z,Z) = Z THEN 710:
      REM  "NO ICBMS IN AIR
450 A = 01
460  IF IS%(PL,A,6) = Z OR IS%(PL
     ,A,2) = Z THEN 610: REM  "WH
     ICH ICBMS WANT TO MOVE
470 BA = 2: IF IS%(PL,A,Z) THEN B
     A = PL
480 VT = IS%(PL,A,3):HT = IS%(PL,
     A,2): GOSUB 3290: POKE AD,IS
     %(PL,A,01):MD = IS%(PL,A,5)
490 VT = VT + YS(IS%(PL,A,6)):HT =
     HT + XS(IS%(PL,A,6)):FG = IS
     %(PL,A,Z): GOSUB 3360
500 IS%(PL,A,2) = HT:IS%(PL,A,3) =
     VT:IS%(PL,A,Z) = FG
510  IF IS%(PL,A,Z) THEN 590: REM
      "NOTHING CAN FIRE AT IT WHI
     LE IT IS ON FRIENDLY GROUND
520 BA = (PL = Z): GOSUB 3220: IF
     AZ = Z THEN 560: REM  "NO AB
     M WANTS TO FIRE AT IT.
530 HT = QX:VT = QY: GOSUB 3290: GOSUB
     3170: POKE AD,( FN MN(AD) -
     01) * 16 +  FN LN(AD)
540  GOSUB 3130:AZ = AZ + RZ: IF
     AZ > 100 THEN AZ = 100
550 IS%(PL,A,2) = IS%(PL,A,2) *  FN
     RN((AZ / 100) * 85): IF IS%(
     PL,A,2) = Z THEN IS%(PL,A,3)
      = Z:IS%(PL,Z,Z) = IS%(PL,Z,
     Z) - 01: GOTO 610
560  GOSUB 3180: IF LZ = Z THEN 5
     90: REM  "NO LASERS WANT TO
     FIRE AT IT
570  GOSUB 3130:LZ = LZ + RZ: IF
     LZ > 100 THEN LZ = 100
580 IS%(PL,A,2) = IS%(PL,A,2) *  FN
     RN(LZ): IF IS%(PL,A,2) = Z THEN
     IS%(PL,A,3) = Z:IS%(PL,Z,Z) =
     IS%(PL,Z,Z) - 01: GOTO 610
590 IS%(PL,A,5) = IS%(PL,A,5) - 0
     1: IF IS%(PL,A,5) > Z THEN 4
     90
600 IS%(PL,A,5) = MD
610 A = A + 01: IF A < 10 THEN 46
     0
620  REM  ALLOW ICBMS TO HIT TARG
     ET
630  FOR A = 01 TO 9: IF IS%(PL,A
     ,4) <  > Z OR IS%(PL,A,2) =
     Z OR IS%(PL,A,Z) = 01 THEN  NEXT
     : GOTO 710: REM  "SEARCH FO
     R ICBMS THAT ARE TO DETONATE
      NOT ON FRIENDLY GROUND
640 BA = (PL <  > 01):V1 = IS%(PL
     ,A,3) - 2:V2 = V1 + 4:H1 = I
     S%(PL,A,2) - 2:H2 = H1 + 4: GOSUB
     2890
650  FOR VT = V1 TO V2: FOR HT =
     H1 TO H2: GOSUB 3290: IF  PEEK
     (AD) = 11 OR  PEEK (AD) = 6 OR
      PEEK (AD) = 13 THEN 690: REM
     DOES NOTHING TO EMPTY GROUND

660  IF  PEEK (AD) > 127 THEN  POKE
     AD,128 *  FN RN(IP%(HT - H1,
     VT - V1)) +  PEEK (AD) - 128
      * ( PEEK (AD) > 127): GOTO
     690
670  IF  FN RN(IP%(HT - H1,VT - V
     1)) THEN 690: REM "PROBABILI
     TY WASN'T GREAT ENOUGH
680  GOSUB 2990
690  NEXT HT,VT:IS%(PL,A,2) = Z:I
     S%(PL,A,3) = Z:IS%(PL,Z,Z) =
     IS%(PL,Z,Z) - 01
700  NEXT A
710  REM  "MOVE SPY PLANE
720 MD = Z: IF PS(PL,4) = Z THEN
     930: REM  "SPY PLANE IN AIR?

730  IF SS%(PL,4) = Z THEN SS%(PL
     ,5) = 01
740 BA = 2: IF SS%(PL,Z) THEN BA =
     PL
750 HT = SS%(PL,2):VT = SS%(PL,3)
     : GOSUB 3290: POKE AD,SS%(PL
     ,01)
```

```
760  FOR A = 01 TO SS%(PL,5)
770 VT = VT + YS(SS%(PL,4)):HT =
    HT + XS(SS%(PL,4))
780 FG = SS%(PL,Z): GOSUB 3360:SS
    %(PL,2) = HT:SS%(PL,3) = VT:
    SS%(PL,Z) = FG
790  IF FG = 01 AND MD = Z THEN S
    S%(PL,6) = SS%(PL,6) + 10:MD
     = 01
800  IF FG THEN 920: REM "IF WE A
    RE ON FRIENDLY GROUND, DO US
    UAL STUFF
810 V1 = VT - 01:V2 = VT + 01:H1 =
    HT - 01:H2 = HT + 01: GOSUB
    2890: FOR VT = V1 TO V2: FOR
    HT = H1 TO H2:BA = (PL = Z):
     GOSUB 3290:B1 =  FN LN(AD):
     IF B1 = 11 OR B1 = 6 OR B1 =
    10 OR B1 = 13 THEN B1 = 14: REM
      "CHANGE EMPTY GROUND TO ".
    "
820  IF  PEEK (AD) > 127 THEN B1 =
    12: REM "CHANGE SHIELDED GRO
    UND TO AN INVERSE SPACE
830 BA = 2: GOSUB 3290: IF PL THEN
     POKE AD,B1 * 16 +  FN LN(AD
    ): GOTO 850
840  POKE AD, FN MN(AD) * 16 + B1

850  NEXT HT,VT:HT = SS%(PL,2):VT
     = SS%(PL,3):BA = (PL = Z): GOSUB
    3130:SS%(PL,6) = SS%(PL,6) -
    RZ / 10: IF SS%(PL,6) < Z THEN
    SS%(PL,6) = Z
860  GOSUB 3220: IF AZ = Z THEN 8
    90: REM  "NO ABMS WANT TO FI
    RE AT IT
870 AZ = AZ + RZ: IF AZ > 100 THEN
    AZ = 100
880 SS%(PL,2) = SS%(PL,2) *  FN R
    N((AZ / 100) * (100 - SS%(PL
    ,6))): IF SS%(PL,2) = Z THEN
    SS%(PL,3) = Z:PS(PL,4) = Z: GOTO
890
    890  GOSUB 3180: IF LZ = Z THEN 9
    20: REM  "NO ICBM'S WANT TO
    FIRE AT IT
900 LZ = LZ + RZ: IF LZ > 100 THEN
    LZ = 100
910 SS%(PL,2) = SS%(PL,2) *  FN R
    N((RZ / 100) * (100 - SS%(PL
    ,6))): IF SS%(PL,2) = Z THEN
    SS%(PL,3) = Z:PS(PL,4) = Z: GOTO
    890
920  NEXT A: IF SS%(PL,6) > 100 THEN
    SS%(PL,6) = 100
930  REM  UPDATE MONETARY FLOW
940 PS(PL,Z) =  INT (PS(PL,Z) * .
    9) + PS(PL,01) * 60 + 70 * P
    S(PL,2) + 80 * PS(PL,3): RETURN

950  REM  INITIALIZE VARIABLES
960 STTUS = 255:CLRSCREEN = 35558
    :NSHIELD = 35448:PRNTSCREEN =
    35328:Z = 0:01 = 1
970  IF  PEEK (35328) +  PEEK (35
    329) *  PEEK (35330) <  > 16
    9 THEN  PRINT  CHR$ (4)"BLOA
    D DEST.OBJ,A$8A00"
980 ITEM$ = "IAHFC@BRSL> ": DIM P
    S(01,5),PRICE(13),FX%(01,4),
    FY%(01,4),CX%(01,9),CY%(01,9
    ),IX%(01,19),IY%(01,19),XS(8
    ),YS(8): FOR A = Z TO 13: READ
    PR(A): NEXT :PS(Z,Z) = 5000:
    PS(01,Z) = 5000
990  DEF  FN MN(A) =  INT ( PEEK
    (A) / 16): DEF  FN LN(A) =  PEEK
    (A) -  INT ( PEEK (A) / 16) *
    16:G$ =  CHR$ (7)
1000  IF EC <  > 01 THEN EC = 01:
     CALL CLRSCREENS: GOSUB 1360


1010  DIM SS%(01,6),IS%(01,9,6),B
    S%(01,9,7),BP%(2,2),IP%(4,4)
    ,AP%(3,3),LP%(2,2),RP%(8,8):
     FOR A = 01 TO 8: READ XS(A)
    ,YS(A): NEXT :ESC$ =  CHR$ (
    27):RET$ =  CHR$ (13)
1020  FOR A = Z TO 2: FOR B = Z TO
    2:LP%(A,B) = 25:BP%(A,B) = 5
    0: NEXT : NEXT :LP%(01,01) =
    50:BP%(01,01) = 100
1030  FOR A = Z TO 3: FOR B = Z TO
    3:AP%(A,B) = 30: NEXT : NEXT
    : FOR A = 01 TO 2: FOR B = 0
    1 TO 2:AP%(A,B) = 50: NEXT :
     NEXT
1040  FOR A = Z TO 4: FOR B = Z TO
    4: READ C:RP%(A,B) = C:RP%(8
     - A,B) = C:RP%(A,8 - B) = C
    :RP%(8 - A,8 - B) = C: NEXT
    : NEXT
1050  FOR A = Z TO 2: FOR B = Z TO
    2: READ C:IP%(A,B) = C:IP%(4
     - A,B) = C:IP%(A,4 - B) = C
    :IP%(4 - A,4 - B) = C: NEXT
    : NEXT
1060  DEF  FN RN(A) = ( INT ( RND
    (01) * 100) + 01 > A): DEF  FN
    DISTNCE(A) =  SQR ((X - HT) ^
    2 + (Y - VT) ^ 2)
1070  REM  MAIN MENU
1080  POKE ST,Z: TEXT : HOME : PRINT
     TAB( 15 -  LEN (NA$(PL)) /
    2);: INVERSE : PRINT "COMMAN
    DER "NA$(PL): NORMAL
1090  PRINT : PRINT : PRINT " 1)
    BUILD NEW ITEMS."
1100  PRINT : PRINT " 2) PROGRAM
    NEXT MOVE OF SPY PLANE": PRINT
    : PRINT " 3) PROGRAM NEXT MO
    VE OF ICBMS"
1110  PRINT : PRINT " 4) PROGRAM
    NEXT MOVE OF BOMBERS": PRINT
    : PRINT " 5) DONE": PRINT : PRINT
    "WHICH ?" CHR$ (8);
1120  GET A$: IF A$ > "5" OR A$ <
    "1" THEN 1120
1130 Q$ = A$: ON  VAL (A$) GOSUB
    2360,1470,1850,2060,1140: GOTO
    1080
1140 PL = PL + 01: IF PL <  > 2 THEN
    1220
1150  HOME : VTAB 12: PRINT "ONE
    MOMENT PLEASE.":QQ = QQ + 01
    : IF QQ = 2 THEN QQ = Z
1160 PL = QQ: GOSUB 110:PL = PL +
    01: IF PL = 2 THEN PL = Z
1170  GOSUB 110: GOSUB 1250: FOR
    PL = Z TO 01
1180  IF PS(PL,4) THEN FG = SS%(P
    L,Z):HT = SS%(PL,2):VT = SS%
    (PL,3):MD = 10: GOSUB 1420:S
    S%(PL,01) = B1
1190 MD = 13: FOR A = 9 TO 01 STEP
     - 01: IF IS%(PL,A,2) <  > Z
     THEN FG = IS%(PL,A,Z):HT =
    IS%(PL,A,2):VT = IS%(PL,A,3)
    : GOSUB 1420:IS%(PL,A,01) =
    B1
1200  NEXT :MD = 6: FOR A = 9 TO
    01 STEP  - 01: IF BS%(PL,A,2
    ) <  > Z THEN FG = BS%(PL,A,
    Z):HT = BS%(PL,A,2):VT = BS%
    (PL,A,3): GOSUB 1420:BS%(PL,
    A,01) = B1
1210  NEXT : NEXT :PL = Z: PRINT
    G$;
1220  HOME : VTAB 10: PRINT NA$(P
    L)",": PRINT : PRINT "PASSWO
    RD PLEASE": PRINT : PRINT ">
    ";
1230  FOR A = 01 TO  LEN (PW$(PL)
    ): GET A$: IF A$ <  >  MID$
    (PW$(PL),A,01) THEN 1230
1240  NEXT : RETURN
1250  IF PS(Z,01) <  > Z AND PS(0
    1,01) <  > Z THEN  RETURN
1260  HOME : IF PS(Z,01) = Z AND
    PS(01,01) = Z THEN 1330
1270 WN = 01: IF PS(01,01) = Z THEN
    WN = Z
1280  GR :PITCH = 01: POKE 254, PEEK
    (131): POKE 255, PEEK (132):
     PRINT NA$(WN)", THE VICTORI
    OUS": PRINT : PRINT "HAS CON
    QUERED "NA$((WN = Z))
1290  FOR C = Z TO 19: COLOR= C: HLIN
    C,39 - C AT C: COLOR= 19 - C
    : HLIN 19 - C,C + 20 AT C +
    20: NEXT
1300  FOR PI = Z TO 255: CALL 357
    00
1310  CALL 35700: IF  PEEK ( - 16
    384) <  > 155 THEN  NEXT
1320  POKE  - 16368,Z: TEXT : HOME
    : PRINT "THERE IS ALWAYS NEX
    T TIME, "NA$((WN = Z))".": END
1330  HOME : CALL 35757: VTAB 12:
     FLASH : PRINT  TAB( 11)"THE
     WORLD HAS ENDED!": NORMAL :
     FOR A = 01 TO 2000
```

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Creating The Adventure

Most people, even those devoted to the play of adventure games, would pale at the thought of developing their own from scratch, and for good reason. The development of subroutines for command parsing, movement, battle, and other necessities is not a trivial task.

Luckily, for those of us who are adventurous but not necessarily masochistic, Donald Brown has developed the Eamon series of text adventures, available in the public domain for a very modest fee.

There are more than thirty Eamon adventures available. Many take place in the standard adventure environment of caves, castles, and dungeons, but some occur in underground haunts of mole people, death stars in outer space, and sleazy brothels.

Two of the main attractions of the Eamon series are the absence of copy-protection and the use of a documented base program written in Applesoft, which varies little from adventure to adventure. Because of the Eamon standard base program, anyone who wants to write his own EAMON adventure does not have to worry about writing a whole new program, but generally has only to design the layout of the dungeon (the rooms in which the adventure takes place) and describe the creatures and items in the adventure. If extraordinary effects are desired for the adventure, special routines have to be added to the base program.

Designer Disks

To aid in the development of your own Eamon adventures, the Eamon Dungeon Designer and Eamon Designer 5 disks are available. They contain a set of programs which create the text files needed for your adventure.

The Dungeon Designer disk also has two text files of special interest to players and designers of Eamon adventures. PLAYER MANUAL.TEXT contains instructions on how to play the Eamon adventures and describes the attributes of Eamon characters. The file DDD MANUAL.TEXT gives the particulars of designing an Eamon adventure, along with an explanation of some of the main routines and variables used in the Eamon base program.

The Story of the Plot

The main effort in creating a new Eamon adventure goes into the development of the environment and the plot. It is very much like writing your own short story.

Before you use the Dungeon Designer disk, plan your dungeon (or other environment) by deciding what rooms it will have and exactly how they will be connected. You also must come up with a full description of how each room will be displayed when the adventurer enters.

The adventure also should contain artifacts (treasures, useful items, etc.) and monsters (both friendly and antagonistic). Give them names and full descriptions, and decide on their initial placement in the game. Assign a value to each artifact and decide how powerful each monster will be.

Needless to say, a good imagination is the best tool when laying out a dungeon of your own. It also helps to have a good knowlege of how Eamon is played and what the various attributes of the monsters and artifacts mean.

Initializing

When you finish designing your plot, use the Dungeon Designer disk to begin putting together your adventure.

The first step is to initialize a blank disk with the name of the new adventure. The program DUNGEON INIT does this for you by initializing the disk with a HELLO program which prints a display containing the name of the adventure and its creator (some dungeon designers prefer to remain anonymous). DUNGEON INIT also creates the five main text files needed for each adventure. They are listed here with a description of their purposes.

1) EAMON.DESC contains the complete description of each room, artifact, monster, and effect (more about effects later).

2) EAMON.ARTIFACTS stores the names, initial placement, and value of each artifact.

3) EAMON.MONSTERS is for the names, initial placement, and characteristics of each monster.

4) EAMON.ROOMS stores information on how all the rooms are connected.

5) EAMON.ROOM NAMES contains the name of each room.

The DUNGEON INIT program will ask if your dungeon is to have six- or 10-direction movement, but there seems to be a problem with developing adventures with the latter, so it's best to stick with the standard six directions (N,S,E,W,U,D) unless you enjoy tracking down bugs in other people's programs.

Adding and Editing

After the new adventure disk has been initialized, you can put the plot information into the appropriate text files by using the program DUNGEON EDIT.

DUNGEON EDIT allows you to add and edit the four main ingredients of the adventure: rooms, artifacts, monsters, and effects. Up to 100 of each of the four ingredients can be added to the adventure.

Although the DUNGEON EDIT program allows you to add and edit the rooms, artifacts, monsters, and effects in any order, it is probably best to add all the rooms first. The first piece of data to enter for each room is the name, which can be up to 36 characters in length. When the adventure is played, the room name is preceeded by "YOU ARE" (some adventures have changed this to "YOU ARE STANDING IN" or "YOU ARE IN"), so the room name should start with "IN THE" or "AT THE."

Each room also must have a complete description. This is displayed the first time the room is entered or when the LOOK or EXAMINE command is given. The room description can be up to 250 characters in length and should be as detailed as you think necessary. Include the placement of all the exits (unless of course you don't want to reveal where the exits are). You also must indicate connections to other rooms. Each room can have connections in up to six different directions (north,

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Where the adventure never ends.

south, east, west, up and down). If the room has an exit in a particular direction, you must give the room number (remember each room has a number), which is entered by moving in that direction. If you give a code of 0, there is no connection in that direction.

If you wish some sort of special movement to take place (teletransportation or movement to a random room, for instance), indicate this with a negative code number. When negative numbers are used to indicate special movement, the EAMON base program for your adventure will have to be modified. One exception is the use of -99 to indicate "home," meaning that the adventure will end whenever that direction is taken.

Because of the way room connections are laid out in Eamon, you can play tricks in your adventure by setting up illogical connections. For instance, just because "The Pharmacy" connects to "The Mental Ward" by moving north does not mean "The Mental Ward" has to connect to "The Pharmacy" by moving south. Of course, only the totally deranged would want to set-up (or play) an adventure with completely random room connections.

Monsters, Artifacts, Effects

Once you have laid out your dungeon, you can begin adding monsters, artifacts, and effects. First covered will be the addition of the monsters.

The word **'monsters'** is a bit deceiving since it can include creatures who you want to be friendly or helpful to the adventurer. The monster category includes all living creatures in the adventure except the adventurer.

It takes 14 pieces of data to describe each monster. This data is displayed in table 1. The hardiness (HD) and agility (AG) factors have the same meaning as those which are carried by Eamon adventurers.

To keep your adventure interesting, the monsters should have a wide range of personalities (hardiness, friendliness, etc.). You might even want to modify the Eamon base program so certain creatures have unusual characteristics such as speech or invisibility.

Artifacts are treasures, weapons, the dead bodies of monsters, and any inanimate objects in your adventure. Sometimes artifacts are not immediately visible; they may start out being carried by one of the monsters or the adventurer. The dead bodies of the monsters are included in the artifact category so they can be seen after they've been killed in battle. Depending on whether an artifact is a treasure or a weapon, it is described by six or 10 pieces of data. The extra data for weapons is needed to describe their type and complexity, and to help determine the shape and roll of the dice. The data needed to describe the artifacts in your adventure is displayed in table 1.

It is not necessary to manually add a description for each of the dead bodies in the adventure. You can have the DUNGEON EDIT program do this for you. By choosing option 6 from the main menu, you can have the program generate the dead body artifacts for each of the monsters. When done in this manner, however, the description will only say "THE DEAD BODY OF" <monster>. You can always edit the dead body descriptions to be more detailed.

After using DUNGEON EDIT to add the necessary information to the text files, you might want to double check the room connections, artifacts, monster placement, and so forth. The program DUNGEON LIST on the Dungeon Designer disk will help you do this by printing out a complete list of all the data in the files you have established. If you find any errors, use DUNGEON EDIT to go back and make the corrections.

The introduction of **effects** into your adventure is quite different from adding monsters and artifacts. Although DUNGEON EDIT may be used for modifying your adventure to include effects, when an effect is added, the Eamon base program also must be modified.

Effects are events which occur whenever certain conditions are met. Effects are stored in the file EAMON.DESCRIPTION and can be up to 250 characters in length. Since EAMON.DESC is a random access file, the effects can be read rapidly into the adventure, when desired. In most Eamon adventures, effects are used when a certain command is given, with one of the monsters or artifacts being the object of that command.

As an example, if an adventurer in the Beginner's Cave has the Trollsfire sword when the command "SAY TROLLSFIRE" is given, the desired effect is printed on the screen. The "OPEN" command can also call up special effects in the Beginner's Cave. The portions of the Eamon base program which handle the "SAY" and "OPEN" commands had to be modified in order for these effects to work.

You may not want to use effects in the creation of your first adventure, but keep in mind that they are available and can be used to add variety to the standard Eamon format. Remember that the base program must be modified to check for the conditions under which the effects will be invoked.

Saving Base

After you have used DUNGEON EDIT to add all the data of your adventure to the text files, that information must be coupled with the Eamon base program.

If you have not used special effects and do not wish to have the adventure do anything else out of the ordinary, you simply can load one of the Eamon base programs (BASE PROGRAM 2.0 or BASE PROGRAM TEN) from the Eamon Designer disk, and save the base program to your initialized disk using the title of your adventure as the file name.

If you need to tailor the Eamon base program to meet special needs of your adventure, you are pretty much on your own in doing so. Before modifying the base program, take a look at the Dungeon Designer manual on the Eamon Designer disk. This text file has a list of some of the variables and major subroutines used by the Eamon base program. Tearing into other Eamon

adventures is an excellent method of learning how to adapt the base program to your needs. Virtually every Eamon adventure available uses a base program which has been modified to one extent or another.

Bombing for Bugs

After you have linked the Eamon base program to your text files, your new Eamon adventure will be ready to play. To make sure there are no bugs in the program you should test the game to its limits, visiting all of the rooms in the dungeon (since you already have a map of the dungeon) to make sure all the artifacts and monsters do what they should.

When you are satisified that everything is hunky-dory, grab anyone you can (neighbors, the mailman, Aunt Sadie, etc.) and let them try to bomb out your adventure. Even if they can't find any bugs, they might be able to make suggestions on how to make the adventure more enjoyable.

If you think you have come up with a unique Eamon adventure, you might want to consider donating it to the library of Eamon adventures so that the whole world can join in on the fun.

You may not get rich by doing so, but you will have learned a lot about adventure games along the way.

EAMON ATTRIBUTE TABLE 1

ROOMS

Name - Room's name. Preceded by "YOU ARE" when printed by EAMON base program.Stored in EAMON.ROOM NAMES file.

Description - Complete description of room. Printed when room is first entered or upon LOOK or EXAMINE command. Stored in EAMON.DESCRIPTION file.

Directions - Up to six rooms can be connected to a room: from north, south, east, west, up or down. Connections are indicated by codes. A code of 0 means adventurer cannot go in that direction. Negative codes mean a special movement which must be handled by modifying EAMON base program. Code of -99 means game will end when adventurer moves in that direction. Stored in EAMON.ROOMS file.

MONSTERS

Name - When printed by base program, the monster's name is followed by "IS HERE". Stored in EAMON.MONSTERS file.

Description - Complete description of monster. Printed when it is first encountered or upon LOOK or EXAMINE command. Stored in EAMON.DESC file.

Hardiness - A number describing monster's hardiness (how difficult it will be to kill or how many damage points it can absorb before expiring.) The higher the hardiness, the harder to kill. Stored in EAMON.MONSTERS file.

Agility - Number indicating how difficult it will be to hit monster with weapon. Stored in EAMON.MONSTERS file.

Friendliness - A percentage indicating the chance of monster being friendly with adventurer with charisma of 10. Stored in EAMON.MONSTERS file.

Courage - A percentage. Monster will flee battle when its hardiness is reduced to this percentage of its original value by taking hits in battle. Stored in EAMON.MONSTERS file.

Room - Room where monster will first be met. Stored in EAMON.MONSTERS file.

Weight - Weight of monster in gronds. Stored in EAMON.MONSTERS file.

Defensive Odds - Shows monster's special defensive odds. Usually set at 0% to indicate none. Stored in EAMON.MONSTERS file.

Armour - Indicates how many hit points are deflected per blow struck in battle. Stored in EAMON.MONSTERS file.

Weapon # - A weapon # of 0 indicates monster has only natural weapons (hands, teeth, etc.); weapon # of -1 indicates monster has no offensive weapons. Stored in EAMON.MONSTERS file.

Offensive Odds - A percentage indicating monster's chance to strike a sucessful blow with its weapon. Stored in EAMON.MONSTERS file.

Weapon Dice - Number of die tossed to determine how much damage monster's weapon will cause adventurer. Stored in EAMON.MONSTERS file.

Sides per Weapon Die - Number of sides, per die, for the weapon die. Stored in EAMON.MONSTERS file.

ARTIFACTS

Name - Artifact's name. Stored in EAMON.ARTIFACTS file.

Description - Complete description of artifact. Stored in EAMON.DESC file.

Value - Artifact's value in gold pieces. Stored in EAMON.ARTIFACTS file.

Type - There are four different types of artifact. Type 0 are "set treasures" because their value will not vary with adventurer's charisma. Value of type 1 will vary with charisma. Type 2 is a weapon which can be bought at the weapon shop in the Main Hall, whereas type 3 are unusual (odd) weapons which cannot be purchased at the weapon shop. Stored in EAMON.ARTIFACTS file.

Weight - Weight of artifact in gronds. Stored in EAMON.ARTIFACTS file.

Room - Room number in which artifact will be encountered. If, at start, monster carries artifact or it is not immediately visible (dead bodies, etc.), then room number should be set at 00. A Room # -1 means adventurer is carrying artifact.Stored in EAMON.ARTIFACTS file.

Weapon Complexity - A value describing difficulty of using weapon. Stored in EAMON.ARTIFACTS file.

Weapon Type - A value of 1-5 indicating weapon type: 1 = axe, 2 = bow (this includes any weapon thrown or shot), 3 = club, 4 = spear, 5 = sword. Stored in EAMON.ARTIFACTS file.

Weapon Dice - Number of die thrown when this weapon is used. Stored in EAMON.ARTIFACTS file.

Sides per Weapon Die - Number of sides per weapon die. Stored in EAMON.ARTIFACTS file.

In addition to the number of Eamon adventure games which are available in the public domain, there are also approximately 50 complementary utility programs.

Eamon utilities accomplish a variety of tasks, such as generating super characters, aiding in the development of your own Eamon adventures, and resurrecting characters who have died during the course of an adventure. Since these programs are collected on disks generally sold only as Eamon Utilities 1 and Eamon Utilities 2, many people who play Eamon may not be familiar with their functions.

Eamon Utilities 001

Artifact Maintenance -- Enables the user to list, change, add or delete artifacts to and from any Eamon adventure.

Basefix -- Creates an EXEC text file which can be appended onto the standard Eamon base program. It modifies the base program to give faster input/output, better text format, and DOS error checking. This program will work with most, but not all, of the standard adventures (it does not work with The Beginner's Cave or The Temple of Ngurct).

Change Eamon Name -- Changes the name of an Eamon adventure to any name that is desired.

Character Builder 1 -- A character generator for Eamon adventures which allows the user to build characters with any attributes desired.

Character Builder 2 -- Much the same as Character Builder 1, except that the main portion of the program is written in assembly language and includes generation of weapon and armour expertise.

Character Change/Display -- Creates and displays Eamon characters, but has some bugs in it.

Character Clone -- Allows you to clone or create a new Eamon character from an existing character. The clone (new character) should have a different name from the clonee (old character).

Character Creator -- This is another program for generating Eamon characters. The Character Builder 1 & 2 programs are much better.

Character Display -- Prints out the attributes of characters in the CHARACTERS file on the Eamon master disk.

Character Edit -- Allows you to delete any unwanted characters from CHARACTERS on the master disk.

Character Erase -- Deletes all characters from the CHARACTERS file on the master disk.

Character File Condense -- Removes from the master CHARACTERS file any adventurers who have died or never returned from an adventure.

Character Mover -- A program which will move a character from one adventure disk to another by changing the name of the adventurer in the FRESH MEAT file.

Character Resurrect -- Works in conjunction with the Character Rebirth program to bring dead adventurers back to life. Character Rebirth revives dead characters from the FRESH MEAT file on adventure disks.

Character Rebirth -- Writes the revived character back to the CHARACTERS file on the Eamon master.

Create Text Save Base, Create Text Save Game, & Create Text Save Orig -- All three of these programs create an EXEC text file which can be appended onto the Eamon base program to allow saving and restarting of Eamon adventures.

Dungeon Aid -- Prints the room, monster and artifact data from any adventure.

Eamon Utilities 002

Setup For 32K -- Creates the base adventure program for The Beginner's Cave which will run on 32K machines.

Eamon Adventure Logs -- Edits and prints out a list of all the Eamon adventures and their authors, and can print labels for Eamon disks.

Eamon Check -- Checks the EAMON.DESCRIPTION file on any Eamon disk for errors.

Fix Tendir Name -- Gives an example of how to change the name of an Eamon adventure.

Flex Dungeon List -- Another program to list or display the data from any Eamon adventure, including rooms, artifacts, monsters, and effects.

Label Maker -- A general purpose label-printing program.

Leadin Program -- A short program which prints out a good luck message to the adventurer before running the main adventure program.

List Cave of Mind, List Minotaur's Lair, & List Treasure Island -- Three programs which are designed to map particular Eamon adventures.

Quicky Room Print -- Prints out the name and the legal movement directions for each room in an adventure.

Remove Dummy Artifacts -- This is a program to remove undescribed artifacts, which exist in some adventures.

Room Analysis -- Prints out what artifacts and monsters are in each room of an adventure.

Setup Monster/Artifact -- Creates the monster and artifact data files for The Beginner's Cave.

Setup Room Names -- Creates the EAMON.ROOM NAMES file for The Beginner's Cave.

Setup Rooms -- Creates the EAMON.ROOM file for The Beginner's Cave.

Snappy Maint 1 -- Allows you to add and replace phrases which are muttered by the man in the main hall who looks for adventurers' names. These phrases are contained in the file SNAPPY on the Eamon master disk.

Snappy Maint 2 -- Serves the same function as Snappy Maint 1.

Test Bench -- This is a program which creates a FRESH MEAT file on an adventure, so adventures can be tested without first booting the Eamon master disk.

View Rooms 1 -- Prints out the data in the EAMON.ROOMS and EAMON.ROOM NAMES files, displaying the numbers which are connected to each room.

View Rooms 2 -- Much the same as View Rooms 1, except that roomexits are shown as directions and not room numbers.

Eamon Utilities 003

List Monster Master -- Prints out the data contained in the MONSTER.MASTER file. MONSTER.MASTER contains data about most of the monsters who have appeared in the published Eamon adventures.

Monster Battle -- An interesting program which will let the user pick monsters by name or number from the MONSTER MASTER file and to pit these monsters against one another in a free-for-all monster bash.

Monster Inventory -- Prints out the attributes of each monster on the MONSTER MASTER file.

Bibliography

Plamondon, Robert, *Anatomy of An EAMON Adventure,* CALL A.P.P.L.E. March 1973, p. 21.

Brown, Donald, *A Manual for EAMON Adventure Designers,* EAMON Designer Disk.

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1340  POKE  - 16336,Z: IF  PEEK (
      - 16384) <  > 155 THEN  NEXT
1350  HOME : POKE  - 16368,Z: END

1360  PRINT  CHR$ (4)"NOMONCIO": TEXT
      : NORMAL : SPEED= 255: NOTRACE
      : POKE 216,Z: REM   GET NAME
      S AND PASSWORDS
1370  HOME : PRINT  TAB( 11);: FLASH
      : PRINT "DESTRUCTIVE FORCES"
      : NORMAL : PRINT : PRINT
1380  PRINT  TAB( 9)"CREATED BY R
      AY DARRAH!": PRINT : PRINT :
       PRINT
1390  POKE 34,7: HOME : FOR A = Z
      TO 01: PRINT "PLAYER "A + 0
      1"'S NAME =>";: INPUT "";NA$
      (A): PRINT :NA$(Z) =  LEFT$
      (NA$(Z),20): NEXT
1400  FOR A = Z TO 01: HOME : PRINT
      NA$(A)",": PRINT : PRINT "WH
      AT IS YOUR EYES ONLY PASSWOR
      D?": PRINT
1410  INPUT "=>";PW$(A): NEXT : TEXT
      : HOME : RETURN
1420  REM  PUT ITEM AT IT'S POSIT
      ION
1430 BA = 2: IF FG THEN BA = PL
1440  GOSUB 3290:B1 =  PEEK (AD):
       IF BA <  > 2 THEN  POKE AD,
      MD: RETURN
1450  IF PL THEN  POKE AD,MD * 16
       +  FN LN(AD): RETURN
1460  POKE AD,MD +  FN MN(AD) * 1
      6: RETURN
1470  REM  GET NEXT SPY PLANE DIR
      ECTION
1480 B1 = 12: IF PS(PL,4) <  > 01
       THEN  HOME : VTAB 12: PRINT
      "YOU HAVE NO SPY PLANE!"G$: FOR
      A = 01 TO 3000: NEXT : RETURN

1490 MD = Z: HOME : IF SS%(PL,Z) THEN
      BA = PL: GOTO 1510
1500 BA = 2: POKE ST,128 + PL * 6
      4
1510 VT = SS%(PL,3):HT = SS%(PL,2
      ):V1 = VT:H1 = HT
1520  GOSUB 3270: CALL PR: POKE 3
      4,21: HOME : PRINT "SPY PLAN
      E TO ?": PRINT : PRINT "EVAS
      IVENESS =>"SS%(PL,6);: TEXT
1530  VTAB VT: HTAB HT: GOSUB 226
      0: IF A$ <  > RET$ AND A$ <
       > ESC$ AND A$ <  > "M" AND
      A$ <  > "C" THEN  PRINT G$;:
       GOTO 1520
1540  IF A$ = "M" THEN MD = 01: POKE
      34,21: HOME : GOSUB 1640: TEXT
      : IF Q THEN  PRINT G$;: GOTO
      1480
1550  IF MD THEN 1590
1560  IF A$ = "C" THEN BA = 2: GOSUB
      3270: POKE ST,PL * 64: CALL
      35611: GOTO 1470
1570  IF A$ = ESC$ THEN  RETURN
1580  GOSUB 1600: IF Q THEN  PRINT
      G$;: GOTO 1520
1590 SS%(PL,4) = A:SS%(PL,5) = B:
       RETURN
1600  REM  CALCULATE DIRECTION/DI
      STANCE
1610 Q = Z: IF  ABS (HT - H1) > B
      1 OR  ABS (VT - V1) > B1 THEN
      Q = 01: RETURN
1620  FOR B = 01 TO B1: FOR A = Z
       TO 8: IF (HT - H1) / B <  >
      XS(A) OR (VT - V1) / B <  >
      YS(A) THEN  NEXT : NEXT :Q =
      01:VT = V1:HT = H1: RETURN
1630  RETURN
1640  REM  MANUAL INPUT OF DIRECT
      ION AND DURATION

1650 Q = Z: HTAB 01: VTAB 22: PRINT
      "DIRECTION =>";
1660  GET A$: IF A$ < "1" OR A$ >
      "8" THEN Q = 01: RETURN
1670  PRINT A$:A =  VAL (A$): PRINT
      : INPUT "DURATION =>";B: IF
      B > B1 OR B < 01 THEN Q = 01
      : RETURN
1680 B =  INT (B): RETURN
1690  REM  GET BEGGINING COORDINA
      TES

1700  GOSUB 3270: CALL PR
1710  VTAB VT: HTAB HT: GOSUB 226
      0: IF A$ <  > "T" AND A$ <  >
      RET$ AND A$ <  > ESC$ AND A$
       <  > "W" THEN 1710
1720  IF A$ = "T" AND BA < 2 THEN
       POKE ST,64 * ( PEEK (ST) <
       > 64): GOTO 1700
1730  IF A$ = "T" THEN  PRINT G$;
      : GOTO 1710
1740  IF A$ = ESC$ THEN  POP : RETURN


1750  IF A$ = RET$ THEN  RETURN
1760 FG = (BA = 2): IF BA = 2 THEN
      BA = PL: POKE STTUS,Z: GOTO
      1700
1770 BA = 2: POKE ST,128 + PL * 6
      4: GOTO 1700
1780  REM  GET ENDING COORDINATES

1790 Q = Z:V1 = VT:H1 = HT
1800  VTAB VT: HTAB HT: GOSUB 226
      0: IF A$ <  > RET$ AND A$ <
       > ESC$ AND A$ <  > "M" THEN
      1800
1810  IF A$ = ESC$ THEN Q = 2: RETURN

1820  IF A$ = RET$ THEN  RETURN
1830  POKE 34,21: HOME : GOSUB 16
      40: TEXT : IF Q THEN  POKE 3
      4,21: HOME : PRINT G$: PRINT
      "TO ?";: TEXT : GOTO 1790
1840 Q = 01: RETURN
1850  REM  GET ICBM FLIGHT PATTER
      N
1860 FG = 01: HOME :BA = PL:VT =
      12:HT = 20
1870  GOSUB 3270: CALL PR: POKE 3
      4,21: HOME : PRINT : PRINT "
      ICBM FROM ?": TEXT
1880  GOSUB 1690: GOSUB 3290: IF
      ( FN LN(AD) = 13 OR  FN LN(A
      D) = Z) AND BA = PL THEN 200
      0
1890  IF BA = PL THEN  PRINT G$;:
       GOTO 1880
1900  IF PL THEN 1930
1910  IF  FN LN(AD) <  > 13 THEN
       PRINT G$;: GOTO 1880
1920  GOTO 1940
1930  IF  FN MN(AD) <  > 13 THEN
       PRINT G$;: GOTO 1880
1940  FOR A = 01 TO 9: IF IS%(PL,
      A,2) <  > (HT) OR IS%(PL,A,3
      ) <  > (VT) OR IS%(PL,A,Z) <
       > FG THEN  NEXT : STOP
1950 B1 = 15:C = A: POKE 34,21: HOME
      : PRINT : PRINT "TO ?": TEXT
      : GOSUB 1780: IF Q = Z THEN
       GOSUB 1600: IF Q = 01 THEN
       PRINT G$;:A = C: GOTO 1950
1960  IF Q = 2 THEN 1870
1970  IF A = Z THEN 1950
1980 IS%(PL,C,4) = A:IS%(PL,C,5) =
      B:IS%(PL,C,6) = A: POKE 34,2
      1: HOME : PRINT : PRINT "DET
      ONATE? N" CHR$ (8);: GET A$:
       IF A$ = "Y" THEN IS%(PL,C,4
      ) = Z
1990  GOTO 1870
2000  IF  FN LN(AD) = 13 THEN 194
      0
2010  IF IS%(PL,Z,Z) = 9 THEN  POKE
      34,21: HOME : PRINT : PRINT
      "ALREADY NINE IN FLIGHT!"G$G
      $: FOR A = 01 TO 1500: NEXT
      : TEXT : GOTO 1870
2020  IF  FN MN(AD) - 8 * ( FN MN
      (AD) > 7) = Z THEN  PRINT G$
      ;: GOTO 1860
2030  POKE AD,( FN MN(AD) - 01) *
      16 +  FN LN(AD):IS%(PL,Z,Z) =
      IS%(PL,Z,Z) + 01: FOR A = 01
       TO 9: IF IS%(PL,A,2) <  > Z
       THEN  NEXT : STOP
2040 IS%(PL,A,2) = HT:IS%(PL,A,3)
       = VT:IS%(PL,A,Z) = 01:IS%(P
      L,A,01) =  PEEK (AD): POKE A
      D,13
2050  GOSUB 3270: CALL PR:IS%(PL,
      A,4) = Z: GOTO 1940
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2060  REM  GET BOMBERS FLIGHT PAT
     TERN
2070 FG = 01:BA = PL:VT = 12:HT =
     20
2080  GOSUB 3270: CALL PR: POKE 3
     4,21: HOME : PRINT : PRINT "
     BOMBER FROM ?": TEXT
2090  GOSUB 1690: GOSUB 3290: IF
     ( FN LN(AD) = 6 OR  FN LN(AD
     ) = 2) AND BA = PL THEN 2200
2100  IF BA = PL THEN  PRINT G$;:
      GOTO 2090
2110  IF PL THEN 2140
2120  IF  FN LN(AD) <  > 6 THEN  PRINT
     G$;: GOTO 2090
2130  GOTO 2150
2140  IF  FN MN(AD) <  > 6 THEN  PRINT
     G$;: GOTO 2090
2150  FOR A = 01 TO 9: IF BS%(PL,
     A,2) <  > (HT) OR BS%(PL,A,3
     ) <  > (VT) OR BS%(PL,A,Z) <
      > FG THEN  NEXT : STOP
2160 B1 = 7:C = A: POKE 34,21: HOME
     : PRINT : PRINT "BOMBS LEFT
     =>"BS%(PL,A,7): PRINT : PRINT
     "BOMBER TO ?";: TEXT : GOSUB
     1780: IF Q = Z THEN  GOSUB 1
     600: IF Q = 01 THEN  PRINT G
     $;:A = C: GOTO 2160
2170  IF Q = 2 THEN 2080
2180  IF A <  > Z THEN BS%(PL,C,5
     ) = B:BS%(PL,C,4) = A: GOTO
     2080
2190 BS%(PL,C,6) = BS%(PL,C,4):BS
     %(PL,C,4) = Z: GOTO 2080
2200  IF  FN LN(AD) = 6 THEN 2150
2210  IF BS%(PL,Z,Z) = 9 THEN  POKE
     34,21: HOME : PRINT : PRINT
     "ALREADY NINE IN FLIGHT!"G$G
     $: FOR A = 01 TO 1500: NEXT
     : TEXT : GOTO 2070
2220  IF  FN MN(AD) - 8 * ( FN MN
     (AD) > 7) = Z THEN  PRINT G$
     ;: GOTO 2080
2230  POKE AD,( FN MN(AD) - 01) *
     16 +  FN LN(AD):BS%(PL,Z,Z) =
     BS%(PL,Z,Z) + 01: FOR A = 01
      TO 9: IF BS%(PL,A,2) <  > Z
      THEN  NEXT : STOP
2240 BS%(PL,A,2) = HT:BS%(PL,A,3)
      = VT:BS%(PL,A,Z) = 01:BS%(P
     L,A,01) =  PEEK (AD): POKE A
     D,6
2250 BS%(PL,A,7) = 5: GOSUB 3270:
      CALL PR:BS%(PL,A,4) = Z: GOTO
     2150
2260  REM  MOVE CURSOR
2270 VT =  PEEK (37) + 01:HT =  PEEK
     (36) + 01
2280  VTAB VT: HTAB HT: GET A$: IF
     A$ <  > "0" AND A$ <  > ";" AND
     A$ <  > "K" AND A$ <  > "," THEN
      RETURN
2290  IF A$ = "0" THEN VT = VT -
     01: IF VT = Z THEN VT = 21
2300  IF A$ = "K" THEN HT = HT -
     01: IF HT = Z THEN HT = 40
2310  IF A$ = "," THEN VT = VT +
     01: IF VT = 22 THEN VT = 01
2320  IF A$ = ";" THEN HT = HT +
     01: IF HT = 41 THEN HT = 01
2330  GOTO 2280
2340  REM  CALCULATE BANK AND POK
     E IN ITEM.
2350  GOSUB 3290: POKE AD,128 * (
      PEEK (AD) > 127) + NI * 16 +
     IT: RETURN
2360  REM  BUILD SOMETHING!
2370  HOME :BANK = PLAYER
2380 VT = 12:HT = 20
2390 MD = Z: GOSUB 3310
2400  GOSUB 3270: CALL PRNTSCREEN
2410  IF MD THEN  POKE 34,21: HOME
     : PRINT : PRINT "MONETARY UN
     ITS =>"PS(PL,Z): TEXT
2420  VTAB VT: HTAB HT: GOSUB 226
     0
2430  IF A$ = ESC$ THEN  POKE ST,
     Z: RETURN : REM   ESC=EXIT
2440  IF A$ = "T" THEN  POKE ST,6
     4 * ( PEEK (ST) <  > 64): GOTO
     2400
2450  IF A$ = "Z" THEN 2390
2460  IF A$ = "M" THEN MD = 01: GOTO
     2400
2470  FOR A = 01 TO 11: IF A$ <  >
      MID$ (IT$,A,01) THEN  NEXT
     : GOTO 2880
2480  IF A$ = "A" OR A$ = "B" OR
     A$ = "I" THEN 2500
2490  GOSUB 3290: IF  PEEK (AD) -
     128 * ( PEEK (AD) > 127) <  >
     11 THEN 2880
2500  IF PS(PL,Z) < PR(A - 01) THEN
     2880
2510 PS(PL,Z) = PS(PL,Z) - PR(A -
     01): ON A GOTO 2530,2530,261
     0,2640,2750,2810,2580,2610,2
     520,2610,2620
2520 IT = 8: GOSUB 2340: CALL NS:
      GOTO 2400: REM  BOUGHT SHIE
     LD
2530  REM  BOUGHT ICBM,ABM,HANGER
2540  GOSUB 3290: IF ( FN LN(AD) <
      > A - 01 OR  FN MN(AD) - 8 *
     ( FN MN(AD) > 7) = 7) AND  FN
     LN(AD) <  > 11 THEN 2870
2550  IF  FN LN(AD) = 11 THEN IT =
     A - 01:NI = Z: GOSUB 2340: GOTO
     2400
2560  IF PS(PL,Z) - PR(A + 10) <
     Z THEN 2870
2570 PS(PL,Z) = PS(PL,Z) - PR(A +
     10): POKE AD,( FN MN(AD) + 0
     1) * 16 +  FN LN(AD): GOTO 2
     400
2580  REM  BOUGHT A BOMBER
2590  GOSUB 3290: IF  FN LN(AD) <
      > 2 THEN 2870
2600 A = 3: GOTO 2530
2610 IT = A - 01: GOSUB 2340: GOTO
     2400
2620  IF PS(PL,4) THEN 2870
2630 PS(PL,4) = 01:SS%(PL,Z) = 01
     : GOSUB 3290:SS%(PL,01) =  PEEK
     (AD):SS%(PL,2) = HT:SS%(PL,3
     ) = VT:SS%(PL,6) = 100: GOTO
     2610
2640  IF PS(PL,5) = 5 THEN 2870
2650 FX%(PL,PS(PL,5)) = HT:FY%(PL
     ,PS(PL,5)) = VT:PS(PL,01) =
     PS(PL,01) + 01:PS(PL,5) = PS
     (PL,5) + 01: GOTO 2610
2660  REM  SUPPORTED BY ROUTINE
2670  IF PS(PL,A) / 2 = PS(PL,A -
     01) THEN  POP :A = A + 3: GOTO
     2870
2680 V1 = VT:H1 = HT
2690 PS(PL,A) = PS(PL,A) + 01:IT =
     A + 2: GOSUB 2340: CALL PR: POKE
     34,21: HOME : PRINT : PRINT
     "SUPPORTED BY?": TEXT
2700  GOSUB 2280: IF A$ <  > RET$
      AND A$ <  > ESC$ THEN  PRINT
     G$;: GOTO 2700
2710  IF A$ <  > ESC$ THEN 2730
2720  POP :PS(PL,A) = PS(PL,A) -
     01:PS(PL,Z) = PS(PL,Z) + PR(
     A + 2):VT = V1:HT = H1:IT =
     11: GOSUB 2340: GOTO 2390
2730  GOSUB 3290: IF  FN LN(AD) <
      > A + 01 OR  ABS (H1 - HT) >
     MX THEN  PRINT G$;: GOTO 270
     0
2740  RETURN
2750 A = 2:MX = 4: GOSUB 2660
2760  FOR A = Z TO 9: IF FX%(PL,A
     ) <  > (HT) OR FY%(PL,A) <  >
     VT THEN  NEXT : STOP
2770  FOR B = Z TO 01
2780  IF CX%(PL,A * 2 + B) <  > Z
      THEN  NEXT : POKE 34,21: HOME
     : PRINT "ALREADY SUPPORTS TW
     O CITIES!"G$G$;: TEXT : FOR
     A = 01 TO 3000: NEXT :VT = V
     1:HT = H1:PS(PL,2) = PS(PL,2
     ) - 01: GOTO 2750
2790 CX%(PL,A * 2 + B) = H1:CY%(P
     L,A * 2 + B) = V1:HT = H1:VT
      = V1: IF MD THEN 2400
2800  GOTO 2390
2810 A = 3:MX = 2: GOSUB 2660
2820  FOR A = Z TO 19: IF CX%(PL,
     A) <  > (HT) OR CY%(PL,A) <
      > VT THEN  NEXT : STOP
2830  FOR B = Z TO 01
2840  IF IX%(PL,A * 2 + B) <  > Z
      THEN  NEXT : POKE 34,21: HOME
     : PRINT "ALREADY SUPPORTS TW
     O COMPLEXES!"G$G$;: TEXT : FOR
     A = 01 TO 3000: NEXT :VT = V
     1:HT = H1:PS(PL,3) = PS(PL,3
     ) - 01: GOTO 2810
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2850 IX%(PL,A * 2 + B) = H1:IY%(P
     L,A * 2 + B) = V1:HT = H1:VT
      = V1: IF MD THEN 2400
2860  GOTO 2390
2870 PS(PL,Z) = PS(PL,Z) + PR(A -
     01)
2880  PRINT G$;: GOTO 2400
2890  REM  MAKE V1,V2,H1,H2 FIT O
     N SCREEN
2900  IF V1 < 01 THEN V1 = 01: GOTO
     2920
2910  IF V1 > 21 THEN V1 = 21
2920  IF H1 < 01 THEN H1 = 01: GOTO
     2940
2930  IF H1 > 40 THEN H1 = 40
2940  IF V2 < 01 THEN V2 = 01: GOTO
     2960
2950  IF V2 > 21 THEN V2 = 21
2960  IF H2 < 01 THEN H2 = 01: RETURN

2970  IF H2 > 40 THEN H2 = 40: RETURN

2980  RETURN
2990  REM  CALCULATE EFFECT OF BL
     OWING UPCOORDINATE AT LOCATI
     ON AD
3000 C =  FN LN(AD): POKE AD,11: IF
     C < 3 OR (C > 5 AND C < 10) THEN
      RETURN : REM "ICBM,ABM,HANG
     ER,RADAR,SHIELD,LASER REQUIR
     E NO EFFECT
3010 PL = BA: ON C + 01 GOTO 10,1
     0,10,3020,3060,3090,10,10,10
     ,10,3120

3020  FOR B = Z TO 4: IF FX%(PL,B
     ) < > (HT) OR FY%(PL,B) < >
     VT THEN  NEXT : STOP
3030 FX%(PL,B) = Z:FY%(PL,B) = Z:
     PS(PL,01) = PS(PL,01) - 01: FOR
     C = B * 2 TO B * 2 + 01: IF
     CX%(PL,C) = Z THEN  NEXT : GOTO
     3110

3040 PS(PL,2) = PS(PL,2) - 01:HT =
     CX%(PL,C):VT = CY%(PL,C): GOSUB
     3290: POKE AD,11:CX%(PL,C) =
     Z:CY%(PL,C) = Z: FOR D = C *
     2 TO C * 2 + 01: IF IX%(PL,D
     ) = Z THEN  NEXT : NEXT : GOTO
     3110
3050 PS(PL,3) = PS(PL,3) - 01:HT =
     IX%(PL,D):VT = IY%(PL,D): GOSUB
     3290: POKE AD,11:IX%(PL,D) =
     Z:IY%(PL,D) = Z: NEXT : NEXT
     : GOTO 3110
3060  FOR B = Z TO 9: IF CX%(PL,B
     ) < > (HT) OR CY%(PL,B) < >
     VT THEN  NEXT : STOP
3070 PS(PL,2) = PS(PL,2) - 01:CX%
     (PL,B) = Z:CY%(PL,B) = Z: FOR
     C = B * 2 TO B * 2 + 01: IF
     IX%(PL,C) = Z THEN  NEXT : GOTO
     3110
3080 PS(PL,3) = PS(PL,3) - 01:HT =
     IX%(PL,C):VT = IX%(PL,C): GOSUB
     3290: POKE AD,11:IX%(PL,C) =
     Z:IY%(PL,C) = Z: NEXT : GOTO
     3110
3090  FOR B = Z TO 19: IF IX%(PL,
     B) < > (HT) OR IY%(PL,B) <
      > VT THEN  NEXT : STOP
3100 IX%(PL,B) = Z:IY%(PL,B) = Z:
     PS(PL,3) = PS(PL,3) - 01
3110 PL = (PL < > 01): RETURN
3120  POKE AD,SS%(PL,01):PS(PL,4)
     = Z: GOTO 3110
3130  REM  CALCULATE RADAR ZONE O
     F CURRENT COORDINATE (HT,VT)

3140 DS = 20:RZ = Z:V1 = VT - 4:V
     2 = VT + 4:H1 = HT - 4:H2 =
     HT + 4:X = HT:Y = VT: GOSUB
     2890: FOR VT = V1 TO V2: FOR
     HT = H1 TO H2: GOSUB 3290: IF
      FN LN(AD) < > 7 THEN  NEXT
     : NEXT : GOTO 3170
3150  IF  FN DI(Z) < DS THEN DS =
      FN DI(Z):RZ = RP%(4 + HT -
     X,4 + VT - Y)
3160  NEXT : NEXT
3170 HT = X:VT = Y: RETURN : REM
     "COMMON EXIT FOR RESTORING V
     T AND HT
3180  REM  CALCULATE LASER ZONE F
     OR NEAREST LASER
3190 DS = 20:LZ = Z:V1 = VT - 01:
     V2 = VT + 01:H1 = HT - 01:H2
      = HT + 01:X = HT:Y = VT: GOSUB
     2890: FOR VT = V1 TO V2: FOR
     HT = H1 TO H2: GOSUB 3290: IF
      FN LN(AD) < > 9 THEN  NEXT
     : NEXT : GOTO 3170
3200  IF  FN DI(Z) < DS THEN DS =
      FN DI(Z):LZ = LP%(01 + HT -
     X,01 + VT - Y)
3210  NEXT : NEXT : GOTO 3170
3220  REM  CALCULATE ABM ZONE CLO
     SEST ABM
3230 DS = 20:AZ = Z:V1 = VT - 01:
     V2 = VT + 2:H1 = HT - 01:H2 =
     HT + 2:X = HT:Y = VT: GOSUB
     2890: FOR VT = V1 TO V2: FOR
     HT = H1 TO H2: GOSUB 3290: IF
      FN LN(AD) < > 01 THEN  NEXT
     : NEXT : GOTO 3170
3240  IF  FN MN(AD) = Z OR  FN MN
     (AD) = 8 THEN  NEXT : NEXT :
      GOTO 3170
3250  IF  FN DI(Z) < DS THEN DS =
      FN DI(Z):AZ = AP%(01 + HT -
     X,01 + VT - Y):QX = HT:QY =
     VT
3260  NEXT : NEXT : GOTO 3170
3270  REM  POKE IN CORRECT BANK
3280 ADDRESS = 32768 + BANK * 840
     : POKE 38,AD -  INT (AD / 25
     6) * 256: POKE 39,AD / 256: RETURN
3290  REM  CALCULATE EXACT CURSOR
      TRANSLATED ADDRESS
3300  GOSUB 3280:AD = AD + (VT -
     01) * 40 + HT - 01: RETURN
3310  REM  PRINT SYMBOLS
3320  POKE 34,21: HOME : PRINT "I
     ^ICBM" TAB( 10)"A^ABM" TAB(
     20)"H^HANGER" TAB( 30)"F^FAR
     M"
3330  PRINT "C^CITY" TAB( 10)"@^C
     OMPLEX" TAB( 20)"B^BOMBER" TAB(
     30)"R^RADAR"
3340  PRINT "S^SHIELD" TAB( 10)"L
     ^LASER" TAB( 20)">^SPY PLANE
     ";
3350  TEXT : RETURN
3360  REM  DONUT WRAP AROUND
3370  IF VT > 21 THEN VT = 01
3380  IF VT < 01 THEN VT = 21
3390  IF HT > 40 THEN HT = 01:FG =
     (FG = Z):BA = 2: IF FG THEN
     BA = PL: RETURN
3400  IF HT < 01 THEN HT = 40:FG =
     (FG = Z):BA = 2: IF FG THEN
     BA = PL: RETURN
3410  RETURN
3420  DATA  150,150,75,300,300,30
     0,200,800,600,250,1000,125,0
     ,125: REM     "PRICE INFORMA
     TION
3430  DATA 0,-1,1,-1,1,0,1,1,0,1,
     -1,1,-1,0,-1,-1: REM  "DIREC
     TION INFORMATION
3440  DATA 10,10,10,10,10,10,15,1
     5,15,15,10,15,25,25,25,10,15
     ,25,50,50,10,15,25,50,0: REM
        "RADAR PROBABILITY ZONES
3450  DATA 25,40,50,40,50,75,50,7
     5,100: REM  "ICBM PROBABILIT
     Y ZONES
```

```
1000 *--------------------------------
1010 * DRAW PLAYERS SCREEN
1020 *--------------------------------
1030
1040 VTABZ    .EQ $FC24    MOVES CURSOR
TO LINE SPECIFIED IN ACCUMULATOR
1050 UP       .EQ $FC1A    ROUTINE TO MO
VE CURSOR UP ONE LINE
1060 BS       .EQ $FC10    BACKSPACES CU
RSOR
1070 COUT1    .EQ $FDF0    PRINTS CHARAC
TER IN (A)
1080 CH       .EQ $24      CURSOR HORIZO
NTAL
1090 CV       .EQ $25      CURSOR VERTIC
AL
1100 GBASL    .EQ $26      POINTER
1110 STATUS   .EQ $FF      CONFIGURATION
 BYTE
1120 TEMP     .EQ $01      TEMPORARY USA
GE
```

```
1130 TEMP1    .EQ $00      ANOTHER TEMPO
RARY STORAGE BYTE
1140 FIRSTCOL .EQ $00
1150 LASTCOL  .EQ $01
1160 LASTROW  .EQ $24
1170 GBASH    .EQ $27
1180 BASL     .EQ $28      BASE ADDR POI
NTER
1190 BASH     .EQ $29      HIGH BYTE OF
 BASE ADDRESS
1200          .OR $8A00    START THIS AF
TER THE PLAYERS DATA BLOCKS
1210          .TF DEST.OBJ
1220 START1   LDA #0       Set the Curso
r to the origin of the TEXT screen.
1230          STA CH
1240          STA CV
1250          JSR VTABZ
1260          LDX #0       INITALIZE THE
 PAGE COUNTER.
1270 DO1      LDA (GBASL),Y GBASL HOLDS
POINTER TO FIRST BYTE.
1280          STA TEMP1    SAVE MS BIT S
TATUS FOR SHIELDED TEST
1290          BIT STATUS   ENEMY SCREEN?
1300          BMI ENEMY    YES, DO ENEMY
 STUFF
1310          BVS TOPS     IF V=1 THEN D
ISPLAY NUMBERS INSTEAD OF LETTERS.
1320 DO2      AND #$0F     STRIP OFF AMO
UNT (OR DUPLICATE LETTER)
1330          JSR TRANSLATE PRINT A BYTE
1340          JMP DO1      DO ANOTHER
1350 TOPS     PHA          SAVE IT IN CA
SE IT IS ONE WITH AN ASSOCIATED QUANTITY
1360          AND #$0F     STRIP OFF UPP
ER
1370          CMP #3       DOES IT HAVE
A QUANTITY
1380          PLA
1390          BCS DO2      NO,PRINT THE
REGULAR SYMBOL
1400          LSR          YES, PRINT TH
E NUMBER (HIGH NIBBLE)
1410          LSR
1420          LSR
1430          LSR
1440          AND #$07     ONLY DIGITS 0
-7 WILL WORK
1450          STY TEMP
1460          ORA #$B0     MAKE IT INTO
AN ASCII NUMBER
1470          JSR COUTER   PRINT IT WITH
OUT DECODING.
1480          JMP DO1      GET ANOTHER
1490 TRANSLATE STY TEMP
1500          TAY
1510          LDA ITEMS,Y
1520 COUTER   BIT TEMP1    RETRIEVE MS B
IT
1530          BPL NOT.SHIELDED
1540          AND #$3F
1550 NOT.SHIELDED JSR COUT1
1560          LDY TEMP
1570          CPX #3       ON LAST PAGE?
1580          BEQ LAST1    YES, GO TO LA
ST PAGE ROUTINE
1590          INY
1600          BNE RTS1     RETURN AFTER
PRINTING THE TRANSLATED VERSION
1610          INC $27
1620          INX          NEXT PAGE!
1630          BNE RTS1     ...ALWAYS
1640 LAST1    INY
1650          CPY #72      LAST BYTE?
1660          BNE RTS1     NO KEEP GOING
1670          PLA          YES, POP OFF
JSR AND RETURN
1680          PLA
1690 RTS1     RTS
1700 ITEMS    .AS -"IAHFC@BRSL> "
1710          .HS 20AAAE
1720
1730 ENEMY    BVC .1       IF V=0 THEN P
RINT LSN
1740          LSR          PRINT THE MS
NYBBLE
1750          LSR
1760          LSR
1770          LSR
1780 .2       STA TEMP1    ENEMY DATA IS
 ALWAYS UNSHIELDED
1790          JMP DO2      PRINT THE NIB
BLE TRANSLATED
1800 .1       AND #$7F     MAKE THE MS B
IT 0
1810          BPL .2       ...ALWAYS
1820 *--------------------------------
1830 *   NEW SHIELD HAS BEEN ADDED
1840 *--------------------------------
1850
1860 NEWSHLD  LDY CH
1870          INY          CALCULATE LAS
T ROW (=CH+3)
1880          INY
1890          INY
1900          CPY #41      OFF SCREEN
1910          BCC .1       NO, USE THIS
CALCULATION
1920          LDY #40      YES, USE END
OF SCREEN AS CALCULATION
1930 .1       STY LASTCOL
1940          LDY CH       CALCULATE FIR
ST ROW (=CH-2)
1950          BEQ .2       IF ALREADY ZE
RO THEN CANNOT SUBTRACT FROM IT
1960          DEY          -1
1970          BEQ .2
1980          DEY          -2
1990 .2       STY FIRSTCOL
2000          LDA CV       CALCULATE LAS
T ROW (=CV+3)
2010          CLC
2020          ADC #$03
2030          CMP #22      OFF BOTTOM?
2040          BCC .4       NO, USE THIS
CALCULATION
2050          LDA #21
2060 .4       STA LASTROW
2070          LDX CV       CALCULATE FIR
ST ROW (=CV-2)
2080          BEQ .5       IF ALREADY ZE
RO THEN CAN'T SUBTRACT
2090          DEX
2100          BEQ .5
2110          DEX
2120 .5       STX CV
2130 .7       JSR MULT40   MULTIPLY CV B
Y 40
2140          LDA GBASL    GBASL & GBASH
 HOLD THE FIRST BYTE
2150          ADC BASL     ADD IT TO THE
 MULT40 ANSWER
2160          STA BASL
2170          LDA GBASH
2180          ADC BASH
2190          STA BASH
2200 .6       LDA (BASL),Y MAKE THE MS B
IT SET FOR SHIELDED
2210          ORA #$80
2220          STA (BASL),Y
2230          INY
2240          CPY LASTCOL  DONE WITH ROW
?
2250          BNE .6       NO, DO ANOTHE
R COLOUMN
2260          LDY FIRSTCOL
2270          INC CV
2280          LDA CV
2290          CMP LASTROW  DONE?
2300          BNE .7       NO, DO NEXT R
OW
2310          RTS
2320 *--------------------------------
2330 * MULTIPLY CURSOR VERTICAL BY 40
2340 *--------------------------------
2350
2360 MULT40   LDA CV
2370          ASL
2380          ASL
2390          ASL
2400          STA BASL
2410          ASL
2420          ROL BASH
2430          ASL
2440          ROL BASH
2450          CLC
2460          ADC BASL
2470          STA BASL
2480          LDA BASH
2490          AND #$03
2500          ADC #$00
2510          STA BASH
2520          RTS
2530 *--------------------------------
2540 *   CLEAR BOTH PLAYERS SCREENS
2550 *--------------------------------
2560
2570 CLRSCRN  LDA #$80     STARTING PAGE
```

```
 =$80
2580          STA BASH
2590          LDA #0
2600          STA BASL
2610          TAY
2620          TAX           INITIALIZE PA
GE COUNTER
2630          LDA #$0B      BLANK GROUND
WITHOUT SHIELD
2640 .1       STA (BASL),Y CLEAR ONE BYT
E
2650          CPX #6        LAST PAGE OF
REGULAR SCREEN?
2660          BEQ .2        YES, SEE IF D
ONE
2670          INY           OTHERWISE GET
 NEXT BYTE POINTER
2680          BNE .1        IF NOT DONE W
ITH PAGE
2690          INX
2700          INC BASH
2710          BNE .1        ...ALWAYS
2720 .2       INY
2730          CPY #$90      LAST BYTE OF
REGULAR SCREEN
2740          BNE .1        NO, KEEP GOIN
G
2750          LDA #$BB      START ENEMY S
CREEN CLEARING
2760 .4       STA (BASL),Y
2770          CPX #9        FINAL BYTE?
2780          BEQ .3        YES, SEE IF D
ONE TOTALLY
2790          INY
2800          BNE .4
2810          INX
2820          INC BASH
2830          BNE .4
2840 .3       INY
2850          CPY #$D8      VERY LAST BYT
E?
2860          BNE .4        NO
2870          RTS           YES!
2880
2890 *-------------------------------
2900 * CLEAR THE SPY PLANE TRAIL
2910 *-------------------------------
2920
2930          LDY #0        INITIALIZE CO
UNTER
2940          BIT STATUS    ;CLEAR TOP OR
 BOTTOM
2950          BVC CLEAR.BOTTOM
2960          LDA #$F0
2970          STA TEMP
2980          LDA #$E0
2990          STA TEMP1
3000          LDA #$0F
3010          STA BASL
3020          LDA #$B0
3030          STA BASH
3040          BMI CLEAR     ...ALWAYS
3050 CLEAR.BOTTOM
3060          LDA #$0F
3070          STA TEMP
3080          LDA #$0E
3090          STA TEMP1
3100          LDA #$F0
3110          STA BASL
3120          LDA #$0B
3130          STA BASH
3140 CLEAR    LDA (GBASL),Y GBASL SHOULD
 ALREADY POINT TO ENEMY BANK
3150          AND TEMP      ;STRIP OFF UN
ECESSARY BITS
3160          CMP TEMP1     IS IT A TRAIL
 NIBBLE?
3170          BNE NXTBYT    NO TRY NEXT B
YTE
3180          LDA (GBASL),Y YES, CLEAR I
T
3190          AND BASL
3200          ORA BASH
3210          STA (GBASL),Y
3220 NXTBYT   INY
3230          BNE CLEAR
3240          INC GBASH
3250          LDA GBASH
3260          CMP #$89
3270          BCC CLEAR
3280          LDY #72
3290 RAY      LDA (GBASL),Y
3300          AND TEMP
3310          CMP TEMP1
3320          BNE INY1
3330          LDA (GBASL),Y
3340          AND BASL
3350          ORA BASH
3360          STA (GBASL),Y
3370 INY1     DEY
3380          BPL RAY
3390          RTS
3400
3410 *-------------------------------
3420 * SOMEONE HAS WON, MAKE WEIRD
3430 * NOISES AND FLICKER SCREEN
3440 *-------------------------------
3450
3460          LDX #25       ;LENGTH FOR N
OTE
3470 .2       LDY #1
3480          LDA ($FE),Y   ;GET PITCH
3490          TAY           ;MAKE IT EASI
ER TO DEAL WITH
3500 .1       DEY
3510          BNE .1
3520          STA $C030
3530          DEX
3540          BNE .2
3550 FLICKER  LDA #0
3560 .2       STA CV
3570          LDY #39       INITIALIZE OF
FSET AND SET UP POINTER
3580          JSR VTABZ
3590 .1       LDA (BASL),Y
3600          PHA
3610          CLC
3620          ADC #$01
3630          AND #$F
3640          STA (BASL),Y
3650          PLA
3660          AND #$F0
3670          CLC
3680          ADC #$10
3690          ORA (BASL),Y
3700          STA (BASL),Y
3710          DEY
3720          BPL .1
3730          INC CV
3740          LDA CV
3750          CMP #20
3760          BCC .2
3770          RTS
3780 *-------------------------------
3790 * THE WORLD HAS ENDED
3800 *-------------------------------
3810
3820          LDA #4
3830          STA BASH
3840          LDY #0
3850          STY BASL
3860          LDA #$60
3870 FLASH    STA (BASL),Y
3880          INY
3890          BNE FLASH
3900          INC BASH
3910          LDX BASH
3920          CPX #08
3930          BNE FLASH
3940          RTS
3950 *-------------------------------
3960 * CLEAR OUT UNWANTED SILOS
3970 *-------------------------------
3980
3990 CLRSILO  LDX #4        ;PAGE COUNTER
4000          LDY #0
4010 .2       LDA (GBASL),Y
4020          AND #$0F
4030          CMP #3        IS IT A SILO?
4040          BCS .1        NO
4050          LDA (GBASL),Y
4060          AND #$70
4070          BNE .1        DOESN'T HAVE
A ZERO IN MSB
4080          LDA (GBASL),Y
4090          ORA #$0B
4100          STA (GBASL),Y
4110 .1       CPX #$00      ON LAST PAGE?
4120          BEQ .3        YES, SEE IF L
AST BYTE
4130 .4       INY           DONE WITH PAG
E?
4140          BNE .2        NO, DO NEXT O
NE
4150          DEX           NEXT PAGE
4160          INC GBASH
4170          BNE .2        ...ALWAYS
4180 .3       CPY #$47
4190          BNE .4
4200          RTS
```

Continued on page 61

The Graphics Magician

Penguin Software
830 4th Avenue
Geneva, IL 60134
$59.95

The Graphics Magician is a best-selling graphics package from Penguin Software. It is designed to simplify the creation of graphics for both arcade and illustrated adventure games (or other programs which require hi-res graphics).

To date, a number of games have been released that were developed with the aid of Graphics Magician. These include Spy's Demise and Pieman.

There are three basic sections to the Graphics Magician package: the Animation System, the Picture/Object Editor and the Super Shapes Creator.

Animation System

The Animation System comes in handy for creating arcade-type games. It consists of three basic subsystems: the Shape Editor, the Path Editor and the Animation Editor. Using these three subsystems in conjuction with one another allows you to design small shapes and have them move on the screen in a pattern which you specify.

Four different types of animation are supported by the Graphics Magician's Animation System, each with particular advantages and disadvantages.

The Two Block Move method provides the smoothest animation but does not flag collisions between objects. The First Block Move method is able to plot on either hi-res page one or two while the Second Block method uses page two as a background for the animation.

The other two animation methods, Block with Background Save and XDRAW, are not quite as smooth but do flag collisions between objects and also support an animation background. The different animation methods require varying amounts of memory, from eight to 16 or more kilobytes.

Shape Editor

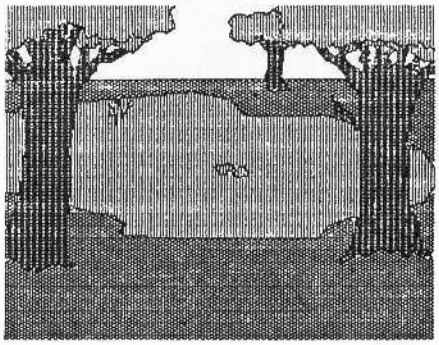
The first step in creating an animated image for a game is to create your mutant creature, spaceship, or whatever, using the Shape Editor. With this subsystem you compose the shape you desire, pixel by pixel, specifying a series of plotting commands from the keyboard.

The Shape Editor creates the shape you want in the form of seven pre-shifted images. This means that seven separate shapes are stored in memory, each shifted over one or two pixels from the previous shape.

GraFORTH, like the LOGO and Apple Pascal languages has turtlegraphics capabilities.

UTILITIES

GAME DEVELOPMENT TOOLS



This technique allows you to create animation figures which will move in a horizontal direction very smoothly. Because seven separate images are actually stored in memory, the Shape Editor allows you to edit each successive image slightly to create such effects as flapping wings on a bird or blinking lights on a spaceship. Once the desired shape is created it is compiled to the proper bytes in memory and can be stored to disk.

Path Editor

The Animation System's Path Editor is, next, used to define the screen movements which are desired for a shape. A path can be as elaborate as desired, but in order to conserve memory it is best to plan a path that is simple and repeats itself.

Like the Shape Editor, animation paths are determined from the key by choosing a combination of movements in the eight allowed directions. In order to preserve the color of your shapes it is best to create a path that jumps in steps of two pixels. Once the desired path has been created it too can be stored to disk.

Animation Editor

The Animation Editor allows you to combine the shapes and paths you have created into an animation file that you can interface with your Applesoft or assembly language program.

When a shape is combined with a path or paths (up to three), it is called an "object." Each animation file can contain up to 32 individual "objects," which means that you can have quite a number of separately-animated objects moving on the screen at one time.

Each time this animation file is invoked with a call 36928 (Applesoft) or JSR $9040 (assembly), each object in the file is updated one move along its current path. Of course, your host program must determine what will happen to the shapes if they are hit by laser fire, or whatever.

Picture/Object Editor

The Graphics Magician's Picture/Object Editor is an excellent development tool for any type of software which makes heavy use of detailed hi-res pictures.

This editor permits you to use the Apple as a sort of advanced color etch-a-sketch pad. It allows you to draw lines in the standard Apple hi-res colors and to fill in areas in your choice of 108 colors.

Of course, The Graphics Magician does not give the Apple's true 108 color capability. Instead, the program combines the standard hi-res colors to create its own palette. These colors can be applied by filling the area within enclosed lines or with the use of the program's eight different sized "paintbrushes."

One of the best features of the Picture/Object Editor is its ability to store hi-res pictures in a very compact format. Depending upon the detail in the scene, a hi-res picture will consume from two to five sectors on disk instead of the customary 34 sectors. This is important if you want to store a large number of hi-res pictures on a disk along with your programs.

A special program supplied with the Graphics Magician, named PICDRAW, must be used to load pictures created with the Picture/Object Editor. This machine language routine fills in the hi-res screen much faster than standard techniques.

Super Shapes Creator

The Super Shapes portion of the Graphics Magician provides an extension to the standard Applesoft shape routines by allowing more compact shape storage and internal control of scale and color. Not only does it create shapes but it provides the means for editing and storing the shapes it creates. In my opinion, this is the least used subsystem in the whole package. To be perfectly honest, I have yet to put the Super Shapes subsystem to good use.

Documentation

Penguin Software truly live up to their billing as the "Graphics People." Unfortunately, though, it would be equally valid to call them the "Graphics (Not the Documentation) People." Although, I suppose, the Graphics Magician's documentation is not a lot worse than that of other application programs, it is a pity the documentation is not of the same standard as the programs.

Equally, although it can't be said that the manual is lacking in information, you must read it very closely in order to be able to use the Graphics Magician in conjunction with your own programs. (Note: a tutorial-type update to the original manual has somewhat remedied this situation).

Hurray for Mark!

Mark Pelczarski, Penguin Software's founder, and a co-author of the Graphics Magician, deserves a round of applause from all Apple users for his practice of marketing non-copy protected application software. Penguin Software was one of the first software houses to take this bold step and, judging from the sales chart, this doesn't seem to have hurt his company's revenues.

GraFORTH

Insoft
10175 SW Barbur Blvd Suite 202-B
Portland OR 97219 $75.00

GraFORTH is not just a graphics ultility but a complete programming language for the Apple. It was developed by Paul Lutus, of Applewriter fame, and is a variation on the FORTH language which has been optimized for graphic imaging on the Apple. As such, it offers an excellent game and educational development tool for those willing to learn a new computer language.

GraFORTH Language

Like BASIC, GraFORTH is a high-level language, but it has an advantage over BASIC in that it is compiled, not interpreted.

This gives GraFORTH a distinct speed advantage over BASIC and affords one the ability to create professional quality graphics without going through the rigors of learning to program in assembly language.

Unlike most other compiled languages, however, GraFORTH can also be used in immediate execution mode for debugging purposes. It is able to do this because it immediately compiles to machine language all statements as they are typed from the keyboard. It, therefore, offers the flexibility of both compiled and interpreted languages.

One of the attractions of the standard FORTH language, which has also been implemented in GraFORTH, is the ability to add new commands to the language. In fact, every program you have written in GraFORTH can be added to the GraFORTH language as a new command.

All GraFORTH's commands are contained in its dictionary or word library. New commands are appended to this word library. Commands can also be deleted from the word library if not needed so that valuable memory can be conserved when necessary. This ability allows you to tailor a FORTH-like language to meet your particular needs.

GraFORTH's Quirks

Some people find FORTH-like languages difficult to learn because these languages use reverse Polish notation for algebraic formulae. This form of notation, which is also used by Hewlett-Packard calculators, makes extensive use of a stack for data storage.

Reverse Polish notation is unusual because when doing arithmetic the number to be operated upon preceeds the operation to be performed. For instance, to multiply 4 times 5 using reverse Polish notation the notation is:

```
4 5 *
```

the reverse notation applies to all GraFORTH commands. For instance, in GraFORTH to count from one to 100 the following statement would be necessary (note: in GraFORTH the loop limit is not included in the count):

```
101 1 DO LOOP
```

It is just this sort of thing that makes GraFORTH and other FORTH-like languages hard to get used to for those familiar with programming in other languages. However, it is reverse Polish notation's efficient use of the stack which tends to make FORTH-like languages execute faster than other compiled high-level languages.

The GraFORTH language provides several different methods of drawing on the Apple's hi-res screen: standard line and point graphics, turtle graphics, character graphics and three-dimensional imaging. All of these methods offer a substantial improvement over the standard Applesoft graphic commands.

Line Drawing

Line drawing in GraFORTH is accomplished much the same as in standard Applesoft, using the commands PLOT and LINE. GraFORTH also has the ability to display solid rectangles by specifiying opposite corner coordinates of the rectangle.

Turtlegraphics

GraFORTH, like the LOGO and Apple Pascal languages, also has turtlegraphics capabilities. With turtlegraphics, hi-res plotting is done by directing the movement of an imaginary turtle with a pen attached to its tail. The GraFORTH commands MOVE, TURN, MOVETO and TURNTO are used to specify the turtle's movement. The commands PENUP, PENDOWN and UNPEN control the drawing and erasing of lines by the turtle's pen.

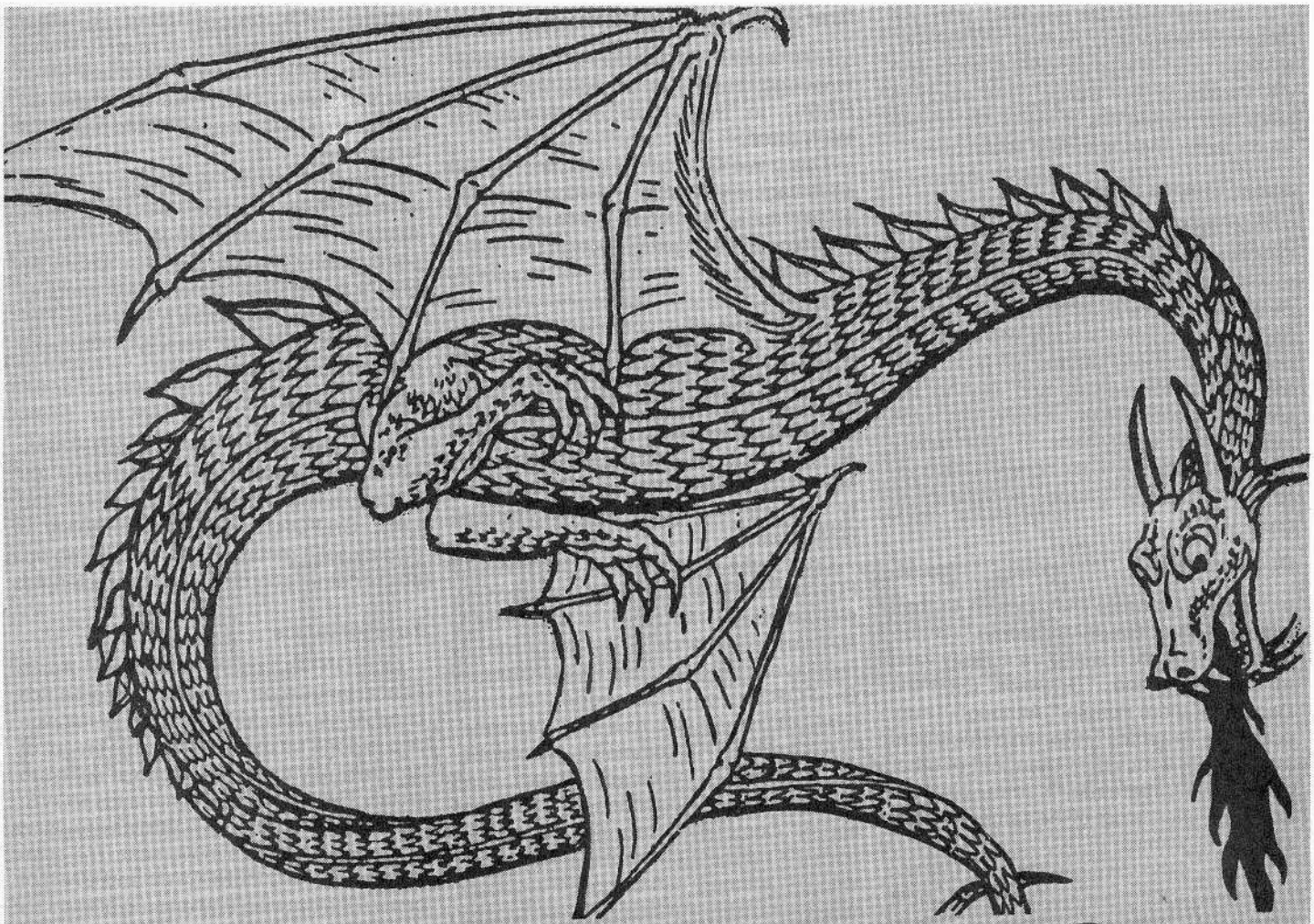
Turtlegraphics are much more powerful than standard Apple line drawing commands because, unlike BASIC, absolute screen coordinates do not have to be continually re-specified each time a line needs to be plotted. Shapes drawn by programs using turtlegraphics can, of course, be added to the GraFORTH language as new command words.

Hi-res Character Generator

Character manipulation in GraFORTH is done by using a hi-res character generator much like the one that is provided with the DOS tool kit and other packages. With a hi-res character generator and editor you can define your own special character sets (lower case, foreign languages, mutant images, etc.) and then position and plot these characters on the hi-res screen using HTAB and VTAB and PUTBLK (put a character block).

Although GraFORTH displays all characters on the hi-res screen the HTAB and VTAB commands can be utilized because the text screen is used as a template for the hi-res screen. The command UNBLK is used to erase character blocks from the screen. The size of the

Continued on page 64



DRAGON DUNGEON

By Ray Darrah

Presented on the next few pages is an excellent example of what a computer owner can do with a working knowledge of BASIC and a little machine language.

I'm talking about Dragon Dungeon, a graphic and sound action/strategy game. You may find it hard to believe that a large part of it was written in BASIC (even if it is in lo-res).

During a game, the player assumes the role of a wizard on his first adventure. Hired by King Arthur, Yobtralite (the wizard) has to retrieve treasure stolen by ferocious dragons. Because of Yobtralite's inexperience, the only advantage at his disposal (besides his quick-footedness) is a mere bag of maze eaters.

What is a maze eater?

Maze eaters are furry little creatures whose diet consists almost entirely of stone. These rare magical animals consider dungeon walls a delicacy and, when given the opportunity, will eat until they burst. This makes maze eaters particularly handy for removing walls that trap Yobtralite in a dragon's path.

Upon entry into the first level of the dungeon, the gods observe Yobtralite's braveness and grant him two reincarnations. Should he gather all the gold from one level of the dungeon, the gods will favor him and grant an additional reincarnation.

Once Yobtralite has retrieved as much treasure as he dares, he is free to leave the dungeon (through any opening to the outside). At that point, his apprentice, Elgowac, will relieve him of the treasure he has gathered, give him another bag of maze eaters, and teleport him to the next level of the dungeon. As Yobtralite ventures deeper into the dungeon, the dragons steadily become more angry and, therefore, pursue him more frantically.

Exploring the Game

Type in the Applesoft program listing on page 53 and
SAVE DRAGON DUNGEON.
Next, enter the hex dump on page 60 and
BSAVE DRAGON.MOVER,A$4000,L$1B7.
Finally, type in a second hex dump found on page 60 and
BSAVE DRAGON.MAZER,A$300,L$B7.
When you are ready to play simply type **RUN DRAGON DUNGEON**.

Movement Keys:

A	up
Z	down
<-	left
->	right
SPACE	stop

Pressing return lets a maze eater out of the bag. Also, ESC stops the game until another key is pressed.

What About the Prompts?

When Dragon Dungeon is played for the first time, a series of prompts will appear. They are meant to configure the game to the player and machine. Most of them are self-explanatory, but there follows a brief word on each of them.

NUMBER OF DRAGONS = >

The number entered after this prompt is the starting number of dragons in each level of the dungeon. Every treasure retrieved summons another dragon, so if Yobtralite recovers all the gold on a level, he will be running from twice as many dragons (at the beginning of the level, there is one dragon per treasure).

PLAYER'S SPEED = >

This number decides how quickly Yobtralite moves. He will remain at this speed, even if the dragons move faster.

DRAGON'S SPEED = >

How frantically the dragons pursue Yobtralite at the beginning of the game depends on this number. Remember, as the game passes from level to level, the dragons move progressively faster.

NUMBER OF MAZE EATERS PER MAZE = >

Simply, this is how many maze eaters Yobtralite can use to make the walls surrounding him vanish in any one level of the dungeon.

STANDARD COLORS?

If the answer is "yes," the computer will make the dragons dark green, Yobtralite dark blue, the treasures yellow, and the maze magenta.

When a "no" response is typed, the computer will display color bars and the player will be asked for the color of each playing piece. Note: The color is the only characteristic that allows identification of the various playing pieces. Therefore, if you are without a color monitor, it is best to choose your own colors.

Tips

Try to lure the dragons away from their treasure before trying to grab it (by moving Yobtralite on top of the treasure).

Sometimes it may be easier to avoid the dragon sentinels by locating a passage behind the treasure and letting the maze eaters devour the wall in between. Before grabbing the treasure, however, make sure a dragon is not lurking behind.

While the computer is ringing up the points acquired for the treasure, plan your next move and press the appropriate key. Every treasure retrieved summons another dragon, so be ready for them.

Fair thee well great wizard, and may fortune keep with ye, for these be all the tips ye shall receive.

DRAGON DUNGEON
Program

```
10  REM ************************
20  REM **** DRAGON DUNGEON *****
30  REM * CREATED BY RAY DARRAH *
40  REM ************************
50  GOTO 430
60  VTAB 21: HTAB 0: PRINT "SCORE
    =>"SC TAB( 26)"MAZE EATERS=>
    "ME;
70  GOSUB 880:M1 = MN: IF M1 > 3 THEN
    M1 = 3
80 M1 = MN: IF M1 > 3 THEN M1 = 3

90 UM = Z: IF MN > 3 THEN UM = MC

100  COLOR= MC: FOR A = 17 TO 17 +
    (M1 - 0) * 2 STEP 2: PLOT A,
    38: NEXT :A = A - 2
110  FOR C = 1 TO 50: COLOR= C: PLOT
    A,38:B =  PEEK (QS): NEXT
120  FOR C = 38 TO Y STEP  - 0: COLOR=
    UM: PLOT A,C:B =  PEEK (QS):
     COLOR= MC: PLOT A,C
130 B =  PEEK (QS): COLOR= UM: PLOT
    A,C:UM =  SCRN( A,C - 0): NEXT
    :UM = Z
140  FOR C = A TO X STEP  SGN (X -
    A): COLOR= UM: PLOT C,Y:B =
     PEEK (QS): COLOR= MC: PLOT
    C,Y
150 B =  PEEK (QS): COLOR= UM: PLOT
    C,Y:UM =  SCRN( C +  SGN (X -
    A),Y): NEXT :UM = Z
160  COLOR= MC: PLOT  PEEK (254),
     PEEK (255): CALL 16384:WH =
     PEEK (0)
170  ON WH / 32 GOTO 230,180,290,
    350
180 CM = CM + 0: IF CM < GC THEN
    210
190  VTAB 24: HTAB 0: HTAB 14: FLASH
    : PRINT "FINDING MAZES!";
200  NORMAL : FOR A = 16896 TO 17
    151: POKE A, RND (0) * 4: NEXT
    : HTAB 14: PRINT  SPC( 25);:
    CM = Z
210 CS = CS - 0: IF CS < 2 THEN C
    S = 2
220  GOTO 60
230 Y =  PEEK (255) - 0: FOR X =
     PEEK (254) - 0 TO  PEEK (25
    4) + 0: GOSUB 280: NEXT :X =
    X - 0
240  FOR Y =  PEEK (255) TO  PEEK
    (255) + 0: GOSUB 280: NEXT :
    Y = Y - 0
250  FOR X = X TO  PEEK (254) - 0
     STEP  - 0: GOSUB 280: NEXT
    :X = X + 0
260  FOR Y = Y TO  PEEK (255) - 0
     STEP  - 0: GOSUB 280: NEXT
270  VTAB 21: HTAB 39: PRINT  PEEK
    (3)" ";: GOTO 160
280 A =  PEEK (QS): COLOR= 15:A =
     PEEK (QS): PLOT X,Y:A =  PEEK
    (QS): COLOR= Z:A =  PEEK (QS
    ): PLOT X,Y:A =  PEEK (QS): RETU-
RN
290  FOR A =  RND (0) * 128 + 128
     TO  RND (0) * 128 STEP  - 0
    : POKE 940,A:SC = SC + 0: VTAB
    21: HTAB 0
300  PRINT "SCORE=>"SC;: CALL 937
    : NEXT
310  COLOR= MC: PLOT  PEEK (254),
     PEEK (255): POKE 17152 +  PEEK
    (246),( RND (0) * GX + 0) *
    2
320  POKE 17280 +  PEEK (246),( RND
    (0) * GX + 0) * 2: POKE 246,
     PEEK (246) + 0:TG = TG + 0
330  IF TG = NM THEN  FOR A = 1 TO
    20: POKE 940, RND (1) * 256:
     CALL 937: NEXT :MN = MN + 0
    : IF MN <  = 4 THEN  COLOR=
    MC: PLOT (MN - 2) * 2 + 17,3
    8
340  GOTO 160
350 MN = MN - 0:X = 19:Y = 19:C =
    Z
360  FOR C = 1 TO 63: COLOR= C: POKE
    940,C * 4: PLOT  PEEK (254),
     PEEK (255)
370  CALL 937: NEXT : COLOR= BC: PLOT
     PEEK (254), PEEK (255)
380  IF MN = Z THEN 750
390  IF  SCRN( X,Y) <  > Z THEN X
     = X - 0:Y = Y - 0: GOTO 390

400  POKE 254,X: POKE 255,Y
410  POKE SR,Z: GOTO 80
420  END
430  IF  PEEK (768) <  > 169 OR  PEEK
    (769) <  > 0 THEN  PRINT  CHR$
    (4)"BLOAD DRAGON.MAZER,A$300
    ": PRINT  CHR$ (4)"BLOAD DRA
    GON.MOVER,A$4000"
440  HOME : PR# 0: IN# 0: HIMEM:
    16383:0 = 1:GX = 15:Z = 0:GC
     = 16:SC = 0:SC = Z
450 SC = Z:NM = 3:CS = 25:CL = 0:
    ME = 4:RS = 8:CM = Z:TC = 13
    :MC = 2:BC = 4:MN = 3
460 TG = Z:SR =  - 16368: FOR A =
    16896 TO 17151: POKE A, RND
    (0) * 4: NEXT
470 NM = 3:CS = 25:CL = 0:ME = 4:
    RS = 8:CM = Z:TC = 13:MC = 2
    :BC = 4:MN = 3:TG = Z
480 SR =  - 16368:QS =  - 16336: FOR
    A = 16896 TO 17151: POKE A, RND
    (0) * 4: NEXT
490  TEXT : HOME : SPEED= 255: NORMAL
    :MN = 3
```

```
500  VTAB 0: HTAB 14: PRINT "DRAG
     ON DUNGEON": PRINT
510  PRINT  SPC( 9)"CREATED BY RA
     Y DARRAH!"
520  VTAB 23: HTAB 10: PRINT "PRE
     SS ANY KEY TO PLAY";: VTAB 1
     2: HTAB 0: PRINT "SCORE=>";
530  PRINT SC TAB( 40 -  LEN ( STR$
     (HS)) - 9)"HI-SCORE=>"HS;
540  WAIT  - 16384,128: GET A$
550  IF JS = Z THEN JS = 0: GOTO
     590
560  HOME : VTAB 12: HTAB 10: PRINT
     "SAME SET UP?" SPC( 5)"(Y/N)
     ";: HTAB 21
570  GET A$: IF A$ <  > "Y" AND A
     $ <  > "N" THEN 570
580  IF A$ = "Y" THEN SC = Z:CS =
     QQ: GOTO 60
590  HOME : PRINT "NUMBER OF DRAG
     ONS=>" SPC( 12)"(1-64)";: HTAB
     20:LN = 1:GN = 64: GOSUB 780
     :NM =  VAL (K$): PRINT  SPC(
     18);
600  PRINT : PRINT : PRINT "PLAYE
     RS SPEED=>" SPC( 7)"(0=SLOW
     - 9=FAST)";: HTAB 16:LN = 0:
     GN = 9: GOSUB 780: PRINT  SPC(
     24);: PRINT
610 RS = 21 -  VAL (K$) * 2: PRINT
     "DRAGONS SPEED=>" SPC( 7)"(0
     =SLOW-9=FAST)";: HTAB 16: GOSUB
     780: PRINT  SPC( 25);: PRINT
     :CS = (10 -  VAL (K$)) * 4
620 QQ = CS: PRINT "NUMBER OF MAZ
     E EATERS PER MAZE=>  (0-7)";
     : HTAB 33:LN = 0:GN = 7: GOSUB
     780:ME =  VAL (K$): PRINT  SPC(
     7);: PRINT
630  PRINT "STANDARD COLORS?    (
     Y/N)";: HTAB 16
640  GET K$: IF K$ <  > "Y" AND K
     $ <  > "N" THEN 640
650 SC = Z: IF K$ = "Y" THEN TC =
     13:MC = 2:BC = 4:CL = 0: GOTO
     60
660  GR : HOME : PRINT " 0  1  2
      3  4  5  6  7  8  9  A  B
     C ";: POKE 34,21: REM "ONE S
     PACE AT EITHER END AND TWO S
     PACES BETWEEN EACH DIGIT
670  FOR X = 0 TO 38: COLOR= (X +
     3) / 3: VLIN 0,39 AT X: NEXT
     :A$ =  CHR$ (95) + "01234567
     89ABC" +  CHR$ (95)
680  HOME : VTAB 23: PRINT "DRAGO
     N COLOR=>";: GOSUB 720:BC =
     A
690  HOME : VTAB 23: PRINT "PLAYE
     R COLOR=>";: GOSUB 720:MC =
     A:
700  HOME : VTAB 23: PRINT "TREAS
     URE COLOR=>";: GOSUB 720:TC =
     A
710  HOME : VTAB 23: PRINT "MAZE
     COLOR=>";: GOSUB 720:CL = A:
      HOME : GOTO 60
720  GET K$: FOR A = 0 TO  LEN (A
     $): IF K$ <  > MID$ (A$,A,0
     ) THEN  NEXT : GOTO 720
730 A$ =  LEFT$ (A$,A - 0) +  CHR$
     (95) +  RIGHT$ (A$, LEN (A$)
      - A):A = A - 2: VTAB 21: HTAB
     2 + A * 3
740  PRINT " ";: COLOR= Z: FOR X =
     A * 3 TO A * 3 + 2: VLIN 0,3
     9 AT X: NEXT :A = A + 0: RETURN

750  POKE SR,Z: IF SC <  = HS THEN
     490
760 HS = SC: VTAB 24: HTAB 13:K$ =
     "NEW HI-SCORE!!!": FOR A = 1
      TO  LEN (K$): POKE 940, RND
     (1) * 256
770  CALL 937: PRINT  MID$ (K$,A,
     0);: NEXT : FOR A = 1 TO 200
     0: NEXT : GOTO 490
780 K$ = ""
790  GET A$: IF (A$ < "0" OR A$ >
     "9") AND A$ <  >  CHR$ (13) AND
     A$ <  >  CHR$ (8) THEN 790
800  IF A$ =  CHR$ (8) AND K$ = "
     " THEN 790
810  IF A$ =  CHR$ (8) AND  LEN (
     K$) = 0 THEN K$ = "": PRINT
     A$;: GOTO 790
820  IF A$ =  CHR$ (8) THEN K$ =
      LEFT$ (K$, LEN (K$) - 0): PRINT
     A$;: GOTO 790
830  IF A$ =  CHR$ (13) AND K$ =
     "" THEN 790
840  IF A$ =  CHR$ (13) THEN  IF
      VAL (K$) >  = LN AND  VAL (
     K$) <  = GN THEN  RETURN
850  IF A$ =  CHR$ (13) THEN 790
860 T$ = K$ + A$: IF  VAL (T$) >
     GN OR  VAL (T$) < LN OR ( LEN
     (T$) >  LEN ( STR$ (LN)) AND
      VAL (T$) = LN) THEN 790
870 K$ = T$: PRINT A$;: GOTO 790
880  REM SET UP A MAZE
890 TG = Z: FOR A = 25 TO 28: POKE
     A,2: NEXT : GR
900  COLOR= CL: HLIN 0,38 AT 0: HLIN
     0,38 AT 38: VLIN 0,38 AT 0: VLIN
     0,38 AT 38: CALL 768
910  COLOR= 0: HLIN 0,38 AT 0: HLIN
     0,38 AT 38: VLIN 0,38 AT 0: VLIN
     0,38 AT 38:X = 19:Y = 19
920  IF  SCRN( X,Y) <  > Z THEN X
      = X - 0:Y = Y - 0: GOTO 920

930  POKE 78, RND (1) * 256: FOR
     A = 0 TO NM - 0: VTAB 24: HTAB
     12: FLASH : PRINT "WAKING TH
     E DRAGONS!";: NORMAL
940 MX = 2 *  INT ( RND (0) * 17 +
     1) + 1:MY = 2 *  INT ( RND (
     0) * 17 + 1) + 1
950  POKE 17152 + A,MX: POKE 1728
     0 + A,MY: POKE 17408 + A,MX:
      POKE 17536 + A,MY: NEXT : HTAB
     12: PRINT  SPC( 28);
960  COLOR= BC: FOR A = Z TO NM -
     0: PLOT  PEEK (17152 + A), PEEK
     (17280 + A): NEXT : POKE 254
     ,X: POKE 255,Y
970  POKE 251,CS: POKE 247,CS: POKE
     250,CL: POKE 249,MC: POKE 2,
     BC: POKE 246,NM
980  POKE 4,RS: POKE 5,RS: POKE 2
     24,NM: POKE 28,TC: POKE 3,ME
     : RETURN
```

DRAGON. MAZER

```
1000 *--------------------------------
1010 *MAZE MAKER
1020 *
1030 * Created by Ray Darrah
1040 *--------------------------------
1050
1060 RNDTABLE .EQ $4200    ;TABLE OF RAN
DOM NUMBERS
1070 SCRN     .EQ $F871
1080 PLOT     .EQ $F800
1090 SPEAKER  .EQ $C030
1100 XCOOR    .EQ $19      ;CURRENT XCOO
R OF MAZE CURSOR
1110 YCOOR    .EQ $1A
1120 X1       .EQ $1B      ;CURRENT XCOO
R OF TRACER
1130 Y1       .EQ $1A
1140 RNDPTR   .EQ $4E      ;POINTER TO W
HICH RANDOM NUMBER IS BEING USED
1150 XSPEED   .EQ $1D      ;HOW MUCH TO
MOVE HORIZONTALLY
1160 YSPEED   .EQ $1E
1170 MOVES    .EQ $18
1180          .OR $0300
1190          .TF DRAGON.MAZER
1200
1210 MAKE.MAZE
1220          LDA #0
1230          STA MOVES    ;ZERO THE MOV
E COUNTER
1240          STA XSPEED   ;AND THE X AN
D Y SPEEDS
1250          STA YSPEED
1260          INC RNDPTR
1270          LDY RNDPTR
1280          LDA RNDTABLE,Y ;GET RANDOM
 NUMBER FOR DIRECTION
1290          BNE TRY1
1300          INC XSPEED
1310 TRY1     CMP #1
1320          BNE TRY2
```

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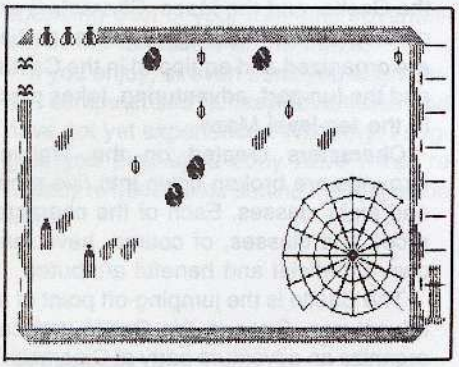
But despite its simple format, Shuttle Intercept is confusing and, therfore, very hard to be good at. I got tired of trying after a while and lost interest.

Graphic Quality: 7
Originality: 7
Difficulty: 8
Interest Level: 4
Playability: 5
Overall Rating: 4



Spider Raid

Insoft Inc.
10175 S.W. Barbur Blvd., 202B
Portland, OR 97219
$29.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick optional

Game Type: Arcade
Language: GraFORTH

Spider Raid, like so many science fiction stories, takes place in the post-atomic holocaust world of the future. Naturally, radiation has created mutant life forms.

You are a Hero Maximus spider whose only prey is the common housefly. Your main opponent is the Spraybius Toxicus beetle which resembles, curiously, a spray can of Raid. (Who gives these things Latin names when there aren't any humans left?)

Hero Maximus must try to find flies and avoid being sprayed by the Toxicus beetles. Other hazards include poisonous acid rain, which will cause the spider's random relocation on the screen. Among the helpful things in the game are boulders for him to hide behind and magic leaves which can transport him near a fly.

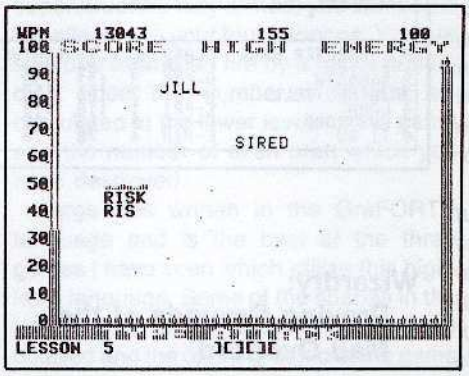
If the spider is sprayed by a beetle, his only hope for survival is to wash himself off immediately in the acid rain (take note you pinko environmentalists, acid rain is sometimes good for you).

Scoring in the game is somewhat complex, depending upon the spider's current strength whenever a fly is caught. Extra spiders are rewarded when a sufficient number of flies have been trapped.

Spider Raid is a fairly novel concept, but the game fails in its execution. The screen gets a bit too crowded with all the different objects moving around. Whenever a beetle is in the vicinity of the spider things get rather frustrating because the spider cannot be moved, and spraying is inevitable. The animation also is slightly jerky.

Spider Raid was written in the GraFORTH language and gives a good example of some of the different things which can be done with this variation of FORTH, but in the end, it is not really a very enjoyable game.

Graphic Quality: 5
Originality: 8
Difficulty: 8
Interest Level: 3
Playability: 4
Overall Rating: 5



Type Attack

Sirius Software, Inc.
10364 Rockingham Drive
Sacramento, CA 95827
$39.95

Hardware Required:
48K Apple-compatible
At least one disk drive

Game Type: Arcade
Language: Machine

Type Attack is a combination arcade/educational game designed to teach and improve typing skills. As the name implies, you are besieged by waves of attacking keyboard characters which can be destroyed by typing in the appropriate keys.

The starting menu of the game allows you to pick a typing speed (1-99) and the number of the lesson (1-99) you wish to begin with. The lessons start with characters from the home row of the keyboard and continue on through the rest of the alphabetic, numeric, and special characters.

Each lesson consists of two different attack waves: the character attack and the word attack.

The character attack consists of the characters from the current lesson edging toward you Space Invaders-style. In order to fend off the attackers, characters in the bottom row are shot by typing the matching key on the keyboard. After one wave of characters has been destroyed, two more must be faced before moving on to the word attack stage.

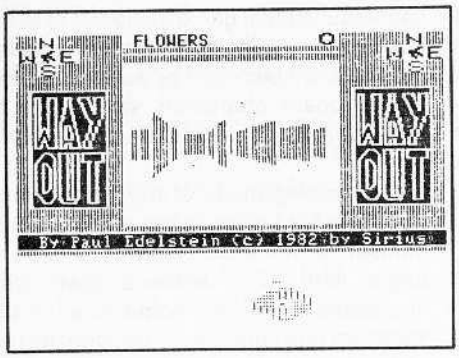
In the word attack, words made from the characters of the current lesson will scroll by horizontally at the top of the screen. They must be destroyed by typing the word while it is still on the screen. If you let any word get by, it will reappear later to give you another chance to blast it. Destroying all the words on their first pass qualifies you for the bonus round where extra points can be accumulated. After the word attack stage, play resumes with the character attack on the next highest level.

Throughout the game, points are accumulated for accurate typing and subtracted for inncorrect or slow typing. The current typing speed in words per minute also is displayed on the screen (as a bar graph).

Type Attack comes with the first 39 lessons predefined, but allows the user to create lessons from 40 to 99 so that weak typing areas can be practiced.

The graphics, animation, and sound in Type Attack are all very good. This game should challenge and entertain even those who have no interest in improving their typing skills.

Graphic Quality: 7
Originality: 5
Difficulty: varies
Interest Level: 8
Playability: 8
Overall Rating: 8



Wayout

Sirius Software Inc.
10364 Rockingham Drive
Sacramento, CA 95827
$39.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick optional

Game Type: Arcade/Stategy
Language: Machine

When I first saw the advertising and packaging for Wayout, with its Ronald McDonald-like clown, I somehow assumed that this would be a game for the kiddies only. After about the first 30 seconds of playing Wayout, I found out how wrong first impressions can be.

Wayout is a real time 3-D graphics maze game in which you attempt to find your way out of a maze in the least amount of moves. To help in finding the exit, you have two tools at your disposal: a compass and a mapmaker. With the compass you can point yourself in any of eight directions. The mapmaker draws a picture of the maze for you as you move through it.

The movement and graphics in Wayout are what sets it apart from other maze games. As you move through the maze there is a realistic three-dimensional perspective, not just an overhead view or a text description. The animation is so smooth that there is absolutely no flicker or delay as you wander down the corridors of the maze.

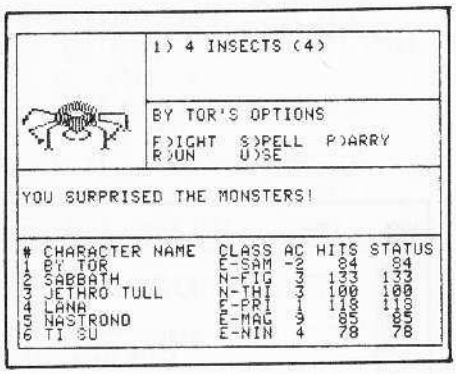
To keep things interesting, your cohabitant in the maze is the cleptomaniac Cleptangle. This creature, which appears as a spinning rectangular form, can steal your mapmaker and/or compass if you let it come too near. Good luck in navigating your way out of the maze if the Cleptangle happens to get both your mapmaker and compass! Of course, you can attempt to get your pilfered items back by blindly chasing the Cleptangle until you run into it.

Another aspect of play in Wayout is the wind. The wind has sort of a good news/bad news twist to it. The good news is that you sometimes can find your way out by observing how the winds blow the small fireflies which are present. The bad news is that the wind can blow so strongly you are prevented from moving in certain directions.

Since the object of Wayout is to escape from the maze in the least amount of moves, the lower your score the better. For every wall in the maze which you pass, one point is added to your score. Once you have finished the introductory maze, 25 additional mazes of varying complexity await your exploration.

Don't pass up Wayout just because you see the clown on the cover. If you enjoyed wandering through the mazes in Zork or the dungeons in Ultima II you should really enjoy this one.

Graphic Quality: 8
Originality: 7
Difficulty: 7
Interest Level: 8
Playability: 8
Overall Rating: 8



Wizardry: Proving Grounds of the Mad Overlord

Sir-Tech Software Inc.
6 Main Street
Ogdenburg, NY 13669
$49.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Some of the game utilities require two disk drives

Game Type: Fantasy/Adventure
Language: Run-Time Pascal

Just in case you have spent the last two years in cryogenic suspension or a monastery in the Himalayas, we are including a review of Wizardry, voted by the readers of Softalk as the most popular program ever (yes, that includes business-type programs such as Visicalc and Applewriter) for the Apple.

Wizardry is the program which comes closest to being a computerized version of the popular game Dungeons and Dragons.

The basic world of Wizardry is broken up into three sections: the Training Grounds, the Castle, and the Maze. Characters are created on the Training Grounds, parties are organized and equipped in the Castle, and the fun part, adventuring, takes place in the ten-level Maze.

Characters created on the Training Grounds are broken down into five races and eight classes. Each of the character races and classes, of course, have their own beneficial and baneful attributes.

The Castle is the jumping-off point of all adventures. Once in the Castle you can organize an adventure party at Gigamesh's Tavern, purchase equipment at Boltac's Trading Post, plead for divine intervention at the Temple of Cant or rest at the Adventurer's Inn.

Once you have organized and equipped your band of adventurers, you probably will want to tackle the Maze.

In the maze your characters will build up experience, power, and riches on their way to discovering where the Overlord has stashed his magical items. The scenario of "The Proving Grounds of the Mad Overlord" will challenge characters who have up to 13th level of experience. After that the character is too powerful to find a true challenge. However, the second and third Wizardry scenarios, "Knight of Diamonds" and "Legacy of Lyllgamyn," are designed to challenge characters having higher levels of experience.

Wizardry does not have the hi-res graphics vituosity of other fantasy adventure games, like the Ultima series. While moving through the mazes in Wizardry you generally see a 3-D perspective line-drawing of the current location or a picture of whatever creatures or object you have encountered. Variety of experience and mood is what makes Wizardry stand apart from other games of its variety.

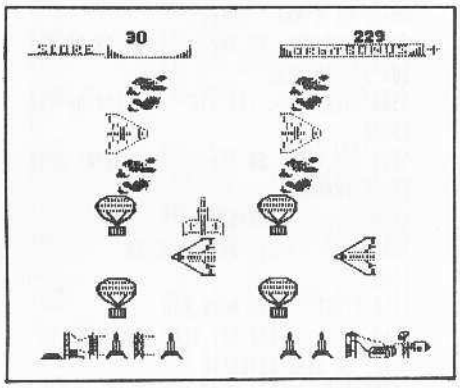
The command input in Wizardry is done via a single-key entry menu which is on screen at all times. This speeds up play vastly over that of most other adventure

games. My only criticism of this type of command entry is that there is no way to enter text commands such as, "Look under the chest."

The Wizardry documentation is well above the standard I have come to expect from game manufacturers. It is both enlightening and humorous, and it never once resorts to the goobledygookish psuedo-Old English which pervades some adventure game documentation. The manual intentionally is vague when it comes to explaining the finer points of how to play Wizardry, on the theory that experience is the best teacher. As a result, don't expect to finish Wizardry without spending a lot of your free time adventuring in the ten levels of the maze.

If you enjoy, or even think you might enjoy, computerized fantasy/adventures and have not yet experienced Wizardry, I suggest you pick up a copy ASAP. You're already two scenarios behind the rest of the world.

Graphic Quality: 8
Originality: 4
Difficulty: 7
Interest Level: 9
Playability: 6
Overall Rating: 8



Zargs

Insoft Inc.
10175 S.W. Barbur Blvd., 202B
Portland, OR 97219
$34.95

Hardware Required:
48K Apple-compatible
At least one disk drive

Game Type: Arcade
Language: GraFORTH

The Zargs scenario is as follows: it has been determined that the Earth will soon be under attack by hostile aliens (what other kind of aliens is there?)

Your duty is to guide four battlecraft through the asteroid belt and dock them at the Zarg supership. When the four craft have reached their destination, the supership is fully armed and can defend the Earth against the invaders.

Zargs might be subtitled, "Space Frogger," because the first two levels appear so similar to that game (hopping spaceships?).

On the first level, you must guide your craft into orbit while avoiding hot-air balloons and other flying debris. The craft is placed successfully in orbit when it reaches the launch window at the top of the screen. Points are scored by quickly placing your craft in orbit.

In level 2, after your craft is in orbit, you must dodge or destroy space junk and incoming aliens. When in orbit, you may score points by blasting anything in your way with the ships' guns.

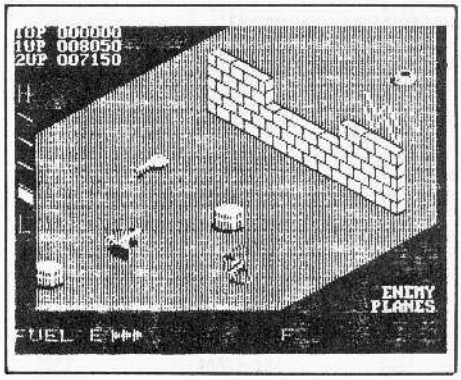
At the third level, you must dock your craft to the Zarg superstructure. Docking is a critical and difficult maneuver and must be performed within a time limit which is determined by the number of points scored on levels 1 and 2. If the docking speed is too rapid or any part of the superstructure is bumped, the spacecraft, but not the superstructure, is destroyed.

The fourth level of Zargs is reached only after four battlecraft have been docked to the superstructure. With the Zarg superstructure fully armed, you can battle the aliens with your four cannons. You are shielded from alien fire by a factor depending upon the number of points accumulated at the lower levels of the game and the number of alien craft which you have destroyed.

Zargs was written in the GraFORTH language and is the best of the three games I have seen which utilize this high-level language. Some of the shapes in the game, such as the balloons, are nicely detailed and the opening demo of the game shows a spacecraft moving in impressive 3-D animation.

Zargs is playable with the computer keyboard only, so there is no extra hardware to acquire.

Graphic Quality: 6
Originality: 7
Difficulty: 7
Interest Level: 8
Playability: 8
Overall Rating: 7



Zaxxon

Datasoft Inc.
16606 Schoenborn Street
Sepulveda, CA 91348
$39.95

Hardware Required:
48K Apple-compatible
At least one disk drive
Joystick

Game Type: Arcade

Language: Machine

Zaxxon is a copy of the coin arcade game, and features fast 3-D graphics like the original. The fortress is not quite as extensive as the arcade game, but very good nonetheless.

However, this version of Zaxxon has what seem to be bugs in it. The game is not as accurate as the original, and as a result the program can't tell if you have actually hit something or if you are just close to it (you hit it, no matter what).

This can prove quite annoying, especially if you are good at the original and can't make a decent score on this.

Graphic Quality: 8
Originality: 1
Difficulty: 8
Interest Level: 6
Playability: 8
Overall Rating: 6

Continued from page 54

```
1330          DEC XSPEED
1340 TRY2     CMP #2
1350          BNE TRY3
1360          INC YSPEED
1370 TRY3     CMP #3
1380          BNE SEE.IF.TRAPPED
1390          DEC YSPEED
1400 SEE.IF.TRAPPED
1410          LDY XCOOR    ;CHECK TWO SP
ACES TO THE LEFT
1420          DEY
1430          DEY
1440          LDA YCOOR
1450          JSR SCRN
1460          BEQ NOT.TRAPPED
1470          LDY XCOOR    ;CHECK TWO SP
ACES TO THE RIGHT
1480          INY
1490          INY
1500          LDA YCOOR
1510          JSR SCRN
1520          BEQ NOT.TRAPPED
1530          LDA YCOOR    ;CHECK TWO SP
ACES UPWARDS
1540          SEC
1550          SBC #2
1560          LDY XCOOR
1570          JSR SCRN
1580          BEQ NOT.TRAPPED
1590          LDA YCOOR    ;CHECK TWO SP
ACES DOWNWARD
1600          CLC          ;(Y) STILL HA
S THE XCOOR
1610          ADC #2
1620          JSR SCRN
1630          BNE TRAPPED
1640 NOT.TRAPPED
1650          LDA XCOOR    ;NOT TRAPPED
SO TRY THE DIRECTION
1660          CLC
1670          ADC XSPEED   ;ADD 2* THE X
SPEED AND 2* THE YSPEED
1680          CLC          ;TO THE MAZE
CURSOR
1690          ADC XSPEED
1700          TAY          ;AND SEE IF T
HAT DOT IS LIT
1710          LDA YCOOR
1720          CLC
1730          ADC YSPEED
1740          CLC
1750          ADC YSPEED
1760          JSR SCRN
1770          BNE MAKE.MAZE ;IF THE DOT
IS LIT, THEN TRY ANOTHER DIRECTION
1780 DRAW.SEG INC MOVES    ;OTHERWISE, D
RAW THE SEGMENT IN THE SPECIFIED DRECTIO
N
1790          LDA XCOOR
1800          CLC
1810          ADC XSPEED
1820          TAY
1830          LDA YCOOR
1840          CLC
1850          ADC YSPEED
1860          STY XCOOR
1870          STA YCOOR
1880          JSR PLOT
1890          LDA MOVES
1900          CMP #2       ;TWO LO-RES B
LOCKS MAKE ONE SEGMENT
1910          BNE DRAW.SEG
1920          JMP MAKE.MAZE ;FIND DIRECT
ION FOR NEXT SEGMENT
1930 TRAPPED  INC Y1       ;THE MAZE CUR
SOR IS TRAPPED
1940          INC Y1       ;SO MOVE TRAC
ER TO A HOPEFULLY NOT TRAPPED POSITION
1950          LDA Y1
1960          CMP #38      ;OFF BOTTOM O
F MAZE?
1970          BNE TRY.TRACER
1980          LDA #2       ;YES, SO RESE
T THE VERTICAL TRACER TO 2 AND
1990          STA Y1
2000          INC X1       ;MOVE THE HOR
IZONTAL ONE
2010          INC X1
2020          LDA X1
2030          CMP #38      ;OFF TRIGHT E
DGE OF MAZE?
2040          BNE TRY.TRACER
2050          RTS          ;YES, SO WE'R
E DONE.
2060 TRY.TRACER
2070          LDA X1       ;MOVE TRACER
TO MAZE CURSOR
2080          STA XCOOR
2090          TAY
2100          LDA Y1
2110          STA YCOOR
2120          JMP SEE.IF.TRAPPED
2130
2140 *-------------------------------
2150 * NOTE ROUTINE
2160 *-------------------------------
2170
2180 MAKENOTE LDX #16      ;DURATION IS
ALWAYS 16
2190 NOT.DONE LDY #128     ;DUMMY PITCH
2200 WAIT1    DEY
2210          BNE WAIT1
2220          STA SPEAKER
2230          DEX
2240          BNE NOT.DONE
2250          RTS
```

DRAGON. MOVER

```
1000 *-------------------------------
1010 * DRAGON UPDATE ROUTINE
1020 *
1030 * Created by Ray Darrah
1040 *-------------------------------
1050
1060 SCRN     .EQ $F871
1070 SETCOL   .EQ $F864
1080 PLOT     .EQ $F800
1090 PREAD    .EQ $FB1E
1100 DRAGON.X .EQ $4300
1110 DRAGON.Y .EQ $4380
1120 TREASR.X .EQ $4400
1130 TREASR.Y .EQ $4480
1140 STROBE   .EQ $C010
1150 KEY      .EQ $C000
1160 PLAYER.X .EQ $FE      ;X-COORIDNATE
 OF PLAYER
1170 PLAYER.Y .EQ $FF
1180 NUM.TREAS .EQ $E0     ;NUMBER OF TR
EASURES CURRENTLY
1190 MOVE.MAN .EQ $04      ;COUNT DOWN U
NTIL TIME TO UPDATE PLAYER
1200 MOVE.MAN1 .EQ $05     ;REPLACEMENT
FOR ABOVE LOCATION
1210 XSPEED   .EQ $FC      ;HOW MUCH TO
MOVE PLAYER HORIZONTALLY
1220 YSPEED   .EQ $FD
1230 MAZE.COL .EQ $FA      ;COLOR OF MAZ
E
1240 MAN.COL  .EQ $F9      ;COLOR OF PLA
YER
1250 EATERS   .EQ $03
1260 MOVE.DRAG .EQ $FB     ;COUNTDOWN UN
TIL TIM TO MOVE DRAGONS
1270 MOVE.DRAG1 .EQ $F7    ;REPLACEMENT
FOR ABOVE LOCATION
1280 TEMP     .EQ $00      ;TEMPORARY ST
ORAGE OF X AND Y SPEEDS
1290 DRAG.COL .EQ $02      ;COLOR OF DRA
GON STORED HERE
1300 TREASR.COL .EQ $1C    ;COLOR OF TRE
ASURE
1310 NUM.DRAG .EQ $F6      ;CURRENT NUMB
ER OF DRAGONS
1320          .OR $4000
1330          .TF DRAGON.MOVER
1340
1350 START    DEC MOVE.MAN
1360          BNE KEY.SCAN ;NOT TIME TO
MOVE, SO SCAN KEYBOARD
1370 MOVE.HIM LDA MOVE.MAN1
1380          STA MOVE.MAN
1390          LDA XSPEED   ;SEE IF HE IS
 TRYING TO MOVE INTO A WALL
1400          CLC
1410          ADC PLAYER.X
1420          TAY
1430          CLC
1440          LDA YSPEED
1450          CLC
1460          ADC PLAYER.Y
1470          TAX          ;SAVE Y-COORI
DNATE
```

```
1480          JSR SCRN
1490          CMP MAZE.COL ;HIT A WALL?
1500          BEQ KEY.SCAN ;YES, SO DON'
T UPDATE HIM
1510          CMP MAN.COL  ;NO MOVEMENT?
1520          BEQ KEY.SCAN
1530          LDA MAN.COL  ;PLOT NEW POS
ITION, THEN ERASE OLD ONE
1540          JSR SETCOL   ;SET THE CORR
ECT COLOR
1550          TXA          ;RESTORE Y-CO
ORDINATE
1560          JSR PLOT
1570          LDA #0
1580          JSR SETCOL   ;TIME TO ERAS
E
1590          LDA PLAYER.Y ;STORE NEW CO
ORDIATES WHILE RESTORING OLD ONES
1600          STX PLAYER.Y
1610          TAX
1620          LDA PLAYER.X
1630          STY PLAYER.X
1640          TAY
1650          TXA
1660          JSR PLOT
1670 KEY.SCAN LDA KEY      ;DO APPROPRIA
TE THING BECAUSE OF KEYBOARD
1680          LDX #0       ;ZERO THE X A
ND Y SPEEDS
1690          LDY #0
1700          CMP #$C1     ;A=UP
1710          BNE TRY.Z    ;NOT UP
1720          LDY #$FF     ;YSPEED=-1
1730 NEW.SPEEDS STX XSPEED ;SAVE THE NEW
 SPEEDS
1740          STY YSPEED
1750          JMP DRAG.TIME ;DONE WITH K
EY SCAN
1760 TRY.Z    CMP #$DA     ;Z=DOWN
1770          BNE .2       ; NOT DOWN
1780          LDY #1
1790          BNE NEW.SPEEDS ;...ALWAYS
1800 .2       CMP #$88     ;<- EQUALS LE
FT
1810          BNE .3       ;NOT LEFT
1820          LDX #$FF     ;XSPEED=-1
1830          BNE NEW.SPEEDS ;...ALWAYS
1840 .3       CMP #$95     ;-> EQUALS RI
GHT
1850          BNE .4       ;NOT RIGHT AR
ROW KEY
1860          LDX #1
1870          BNE NEW.SPEEDS ;...ALWAYS
1880 .4       CMP #$8D     ;MAZE EATER (
CR)?
1890          BNE .5       ;NOPE
1900          LDA EATERS
1910          BEQ .5       ;IF NO MAZE E
ATERS, THEN IGNORE
1920          BIT STROBE   ;CLEAR KEYBPA
RD
1930          DEC EATERS   ;DECREMENT TH
E NUMBER OF MAZE EATERS
1940          LDA #32      ;CODE FOR MAZ
E EATER
1950          JMP RTS1     ;RETURN TO BA
SIC
1960 .5       CMP #$A0     ;SPACE ZEROS
THE X AND Y SPEEDS
1970          BEQ NEW.SPEEDS
1980          CMP #$9B     ;ESCAPE?
1990          BNE DRAG.TIME ;NOPE, SO SE
E IF TIME TO MOVE DRAGONS
2000          BIT STROBE   ;PAUSE UNTIL
A KEY IS PRESSED
2010 .6       BIT KEY
2020          BPL .6
2030          BIT STROBE
2040 DRAG.TIME DEC MOVE.DRAG ;TIME TO UP
DATE DRAGONS?
2050          BEQ UPD.DRAG ;YES, DO IT
2060          JMP SEE.IF.DEAD ;NO, SEE I
F PLAYER HAS HIT A DRAGON
2070 UPD.DRAG LDA MOVE.DRAG1
2080          STA MOVE.DRAG
2090          LDX #0       ;START AT FIR
ST DRAGON
2100 MOVE.X   LDA PLAYER.X
2110          SEC
2120          SBC DRAGON.X,X ;DETERMINE
WHICH WAY DRAGON WANTS TO MOVE
2130          BMI NEG.X
2140          LDA #1
2150          BNE TRY.2.MOVE.X
2160 NEG.X    LDA #$FF
2170 TRY.2.MOVE.X
2180          STA TEMP     ;SAVE CALCULA
TED XSPEED INCASE IT IS GOOD
2190          CLC
2200          ADC DRAGON.X,X
2210          TAY
2220          LDA DRAGON.Y,X
2230          JSR SCRN
2240          CMP MAZE.COL ;IS THERE WAL
L THAT WAY
2250          BEQ DRAG.VERT ;YES, TRY TO
 MOVE VERTICALLY
2260          LDA #0       ;ERASE DRAGON
2270          JSR SETCOL
2280          LDY DRAGON.X,X
2290          LDA DRAGON.Y,X
2300          JSR PLOT
2310          LDA DRAGON.X,X ;CALCULATE
NEW POSITION
2320          CLC
2330          ADC TEMP     ;USING STORED
 XSPEED
2340          TAY
2350          STA DRAGON.X,X
2360          LDA DRAG.COL
2370          JSR SETCOL   ;RE-PLOT NEW
POSITION
2380          LDA DRAGON.Y,X
2390          JSR PLOT
2400 TRY.NEXT.DRAG
2410          INX          ;GET NEXT DRA
GON OFFSET
2420          CPX NUM.DRAG ;DONE WITH TH
EM?
2430          BNE MOVE.X   ;NO, DO ANOTH
ER
2440          JMP OUT.CHECK
2450 DRAG.VERT LDA PLAYER.Y
2460          SEC
2470          SBC DRAGON.Y,X ;CALCULATE
WHICH DIRECTION THE DRAGON WANTS TO MOVE
2480          BMI NEG.Y
2490          LDA #1
2500          BNE MOVE.Y
2510 NEG.Y    LDA #$FF     ;YSPEED EQUAL
S NEGATIVE ONE
2520 MOVE.Y   STA TEMP     ;SAVE YSPEED
2530          CLC
2540          ADC DRAGON.Y,X
2550          LDY DRAGON.X,X
2560          JSR SCRN
2570          CMP MAZE.COL ;IS THERE WAL
L IN THAT DIRECTION?
2580          BEQ TRY.NEXT.DRAG ;YES, DO
N'T LMOVE THE DRAGON
2590          LDA #0
2600          JSR SETCOL
2610          LDA DRAGON.Y,X ;ERASE DRAG
ON IN OLD POSITION
2620          LDY DRAGON.X,X
2630          JSR PLOT
2640          LDA DRAG.COL ;PLOT NEW POS
ITION AFTER CALCULATING NEW PLACE
2650          JSR SETCOL
2660          LDY DRAGON.X,X
2670          LDA DRAGON.Y,X
2680          CLC
2690          ADC TEMP
2700          STA DRAGON.Y,X ;SAVE NEW Y
 POSITION
2710          JSR PLOT
2720          JMP TRY.NEXT.DRAG ;DO IT A
LL OVER FOR THE NEXT DRAGON
2730 SEE.IF.DEAD
2740          LDX #0
2750 EVAL.PLX LDA PLAYER.X
2760          CMP DRAGON.X,X ;COMPARE PL
AYERS XCOOR WITH ALL THE DRAGONS
2770          BEQ FOUND.MATCH
2780 EVAL.NEX.DRAG
2790          INX          ;NOT SAME COO
RDINATES SO TRY NEXT DRAGON
2800          CPX NUM.DRAG ;DONE WITH TH
E DRAGONS
2810          BNE EVAL.PLX ;NO, EVALUATE
 AOTHER ONE
2820          BEQ OUT.CHECK ;YES, SEE IF
 THE PLAYER IS OUT OF THE MAZE
2830 FOUND.MATCH LDA PLAYER.Y
2840          CMP DRAGON.Y,X ;THE XCOORD
INATES MATCHED, TRY THE Y'S
2850          BNE EVAL.NEX.DRAG
2860          LDA #$80     ;CODE FOR DEA
TH
2870          JMP RTS1     ;RETURN TO BA
SIC
2880 OUT.CHECK LDA PLAYER.X ;SEE IF THE
PLAYER HAS REACHED THE OUTER EXTREMITY
2890          CMP #0       ;X=0?
```

```
2900          BEQ MAN.OUT  YES, HE IS OU
T!
2910          CMP #38      ;X=38?
2920          BEQ MAN.OUT  ;ONCE MORE, H
E IS OUT
2930          LDA PLAYER.Y ;TEST THE Y P
OSITION
2940          CMP #0
2950          BEQ MAN.OUT
2960          CMP #38
2970          BEQ MAN.OUT
2980 PLOT.ALL.TREASURES
2990          LDA TREASR.COL
3000          JSR SETCOL
3010          LDX NUM.TREAS
3020          BEQ PAUSE    ;IF NO TREASU
RES THEN IGNORE TREASURE TESTS
3030          DEX
3040 PLOT.T   LDA TREASR.Y,X ;GET COORDI
NATES AND PLOT A TREASURE
3050          LDY TREASR.X,X
3060          JSR PLOT
3070          DEX          ;DONE WITH TH
E TREASURES?
3080          BPL PLOT.T   ;NOPE, PLOT A
NOTHER.ONE
3090          LDX NUM.TREAS ;SEE IF PLAY
ER IS ON ONE OF THE TREASURES
3100          DEX
3110 EVAL.T   LDA PLAYER.X
3120          CMP TREASR.X,X
3130          BEQ MATCH
3140 CMP.TREAS DEX         ;DONE WITH TR
EASURES?
3150          BPL EVAL.T   ;NO, COMPARE
ANOTHER ONE
3160          JMP PAUSE    ;DONE WITH TH
E TREASURES, SO DO EVERTHING AGAIN
3170 MATCH    LDA PLAYER.Y ;XCOORS MATCH
, HOW ABOUT Y'S
3180          CMP TREASR.Y,X ;MATCH?
3190          BNE CMP.TREAS ;NO, DO ANOT
HER ONE
3200 .1       INX          ;PLAYER HAS H
IT A TREASURE THEREFORE, SCROLL THE TREA
SURES BACKWARD
3210          LDA TREASR.X,X
3220          DEX
3230          STA TREASR.X,X
3240          INX
3250          LDA TREASR.Y,X
3260          DEX
3270          STA TREASR.Y,X
3280          INX
3290          CPX NUM.TREAS ;DONE WITH S
CROLL?
3300          BCC .1       ;NOPE
3310          DEC NUM.TREAS ;ONE LESS TR
EASURE
3320          LDA #96      ;CODE TO TELL
 BASIC THAT PLAYER HIT TREASURE
3330          BNE RTS1     ;...ALWAYS
3340 PAUSE    LDX #$10
3350 .1       LDY #$80
3360 .2       DEY
3370          BNE .2
3380          DEX
3390          BNE .1
3400          JMP START
3410 MAN.OUT  LDA #64      ;CODE FOR OUT
 OF MAZE
3420 RTS1     STA $01
3430          LDA #0       ;ZERO THE PLA
YERS X AND YSPEEDS
3440          STA XSPEED
3450          STA YSPEED
3460          RTS
```

DRAGON DUNGEON
Checksums

10	$BADD	360	$09DB	680	$ACE4
20	$9B13	370	$6B7B	690	$965A
30	$4D3B	380	$13B7	700	$9821
40	$AD92	390	$C9B3	710	$B2C0
50	$56E6	400	$D214	720	$40FA
60	$9F63	410	$0A30	730	$4FF4
70	$A7AB	420	$B219	740	$7934
80	$6FDD	430	$39A4	750	$A2CC
90	$DB5E	440	$C38A	760	$9BBF
100	$B766	450	$1D60	770	$4A1F
110	$C68F	460	$8BC3	780	$EE67
120	$47BE	470	$FBE7	790	$8EF0
130	$6C7C	480	$766D	800	$6B40
140	$5B34	490	$C95C	810	$66D8
150	$1586	500	$88D3	820	$52F3
160	$C631	510	$83AB	830	$ACB2
170	$CC30	520	$13DC	840	$3149
180	$BCB2	530	$9F59	850	$5E42
190	$24A7	540	$CB7D	860	$4F17
200	$B7AF	550	$BBBC	870	$D3E7
210	$0E51	560	$0403	880	$9653
220	$2F45	570	$BC33	890	$1C9D
230	$EE4E	580	$3BD6	900	$3C8F
240	$1C65	590	$94C9	910	$C730
250	$EC3B	600	$FE05	920	$758F
260	$1641	610	$8A6D	930	$8B54
270	$2F35	620	$CD47	940	$7815
280	$EF5B	630	$BC0F	950	$837C
290	$7477	640	$8FD4	960	$89AB
300	$6887	650	$8FDB	970	$51A6
310	$E137	660	$9736	980	$D5F7
320	$B537	670	$70A3		
330	$98EE				
340	$C063				
350	$25D6				

DRAGON DUNGEON
Hexdumps

```
4000- C6 04 D0 38 A5 05 85 04  $A804
4008- A5 FC 18 65 FE A8 18 A5  $EDF7
4010- FD 18 65 FF AA 20 71 F8  $2BE5
4018- C5 FA F0 20 C5 F9 F0 1C  $620C
4020- A5 F9 20 64 F8 8A 20 00  $E168
4028- F8 A9 00 20 64 F8 A5 FF  $A1C8
4030- 86 FF AA A5 FE 84 FE A8  $6F05
4038- 8A 20 00 F8 AD 00 C0 A2  $D66D
4040- 00 A0 00 C9 C1 D0 09 A0  $F585
4048- FF 86 FC 84 FD 4C 8D 40  $B2C7
4050- C9 DA D0 04 A0 01 D0 F1  $360B
4058- C9 88 D0 04 A2 FF D0 E9  $8779
4060- C9 95 D0 04 A2 01 D0 E1  $C7E0
4068- C9 8D D0 0E A5 03 F0 0A  $2969
4070- 2C 10 C0 C6 03 A9 20 4C  $EDA3
4078- AE 41 C9 A0 F0 CB C9 9B  $B5AB
4080- D0 08 2C 10 C0 2C 00 C0  $6A06
4088- 10 FB 2C 10 C0 C6 FB F0  $7601
4090- 03 4C 27 41 A5 F7 85 FB  $0F45
4098- A2 00 A5 FE 38 FD 00 43  $6A92
40A0- 30 04 A9 01 D0 02 A9 FF  $4836
40A8- 85 00 18 7D 00 43 A8 BD  $7B60
40B0- 80 43 20 71 F8 C5 FA F0  $CF49
40B8- 2B A9 00 20 64 F8 BC 00  $970E
40C0- 43 BD 80 43 20 00 F8 BD  $D138
40C8- 00 43 18 65 00 A8 9D 00  $79B8
40D0- 43 A5 02 20 64 F8 BD 80  $E62A
40D8- 43 20 00 F8 E8 E4 F6 D0  $BC03
40E0- B9 4C 43 41 A5 FF 38 FD  $B8E9
40E8- 80 43 30 04 A9 01 D0 02  $7606
40F0- A9 FF 85 00 18 7D 80 43  $190E
40F8- BC 00 43 20 71 F8 C5 FA  $2638
```

```
4100- F0 DA A9 00 20 64 F8 BD  $79A4
4108- 80 43 BC 00 43 20 00 F8  $C36A
4110- A5 02 20 64 F8 BC 00 43  $0AD7
4118- BD 80 43 18 65 00 9D 80  $F9B5
4120- 43 20 00 F8 4C DC 40 A2  $8C5F
4128- 00 A5 FE DD 00 43 F0 07  $49CB
4130- E8 E4 F6 D0 F4 F0 0C A5  $BF21
4138- FF DD 80 43 D0 F2 A9 80  $A005
4140- 4C AE 41 A5 FE C9 00 F0  $33E3
4148- 63 C9 26 F0 5F A5 FF C9  $56E4
4150- 00 F0 59 C9 26 F0 55 A5  $AF2A
4158- 1C 20 64 F8 A6 E0 F0 3F  $1335
4160- CA BD 80 44 BC 00 44 20  $4F97
4168- 00 F8 CA 10 F4 A6 E0 CA  $4A93
4170- A5 FE DD 00 44 F0 06 CA  $BB9F
4178- 10 F6 4C 9F 41 A5 FF DD  $8FAF
4180- 80 44 D0 F3 E8 BD 00 44  $05EE
4188- CA 9D 00 44 E8 BD 80 44  $202E
4190- CA 9D 80 44 E8 E4 E0 90  $147A
4198- EB C6 E0 A9 60 D0 0F A2  $77A2
41A0- 10 A0 80 88 D0 FD CA D0  $9B20
41A8- F8 4C 00 40 A9 40 85 01  $1246
41B0- A9 00 85 FC 85 FD 60     $31DF
```

.....

```
0300- A9 00 85 18 85 1D 85 1E  $0D24
0308- E6 4E A4 4E B9 00 42 D0  $5313
0310- 02 E6 1D C9 01 D0 02 C6  $68B9
0318- 1D C9 02 D0 02 E6 1E C9  $2199
0320- 03 D0 02 C6 1E A4 19 88  $3232
0328- 88 A5 1A 20 71 F8 F0 21  $7301
0330- A4 19 C8 C8 A5 1A 20 71  $B777
0338- F8 F0 16 A5 1A 38 E9 02  $1C17
0340- A4 19 20 71 F8 F0 0A A5  $B219
0348- 1A 18 69 02 20 71 F8 D0  $B2A7
0350- 33 A5 19 18 65 1D 18 65  $02EC
0358- 1D A8 A5 1A 18 65 1E 18  $64FB
0360- 65 1E 20 71 F8 D0 99 E6  $D757
0368- 18 A5 19 18 65 1D A8 A5  $0A9D
0370- 1A 18 65 1E 84 19 85 1A  $2415
0378- 20 00 F8 A5 18 C9 02 D0  $B5B3
0380- E6 4C 00 03 E6 1A E6 1A  $D3D2
0388- A5 1A C9 26 D0 0F A9 02  $E0FD
0390- 85 1A E6 1B E6 1B A5 1B  $4FCD
0398- C9 26 D0 01 60 A5 1B 85  $FD76
```

```
03A0- 19 A8 A5 1A 85 1A 4C 25  $DA39
03A8- 03 A2 10 A0 80 88 D0 FD  $56C3
03B0- 8D 30 C0 CA D0 F5 60     $AB21
```

Continued from page 49

DESTRUCTIVE FORCES

Checksums

10	- $BADD	580	- $714A	1150	- $3898	1790	- $052F	1910	- $9EF4	2030	- $2B2E	2150	- $1BC4
20	- $9B13	590	- $2F19	1160	- $83A6	1800	- $BBB6	1920	- $2D7B	2040	- $1FD5	2160	- $C344
30	- $4D3B	600	- $8071	1170	- $96CB	1810	- $1D7A	1930	- $4F6D	2050	- $6817	2170	- $99A1
40	- $AD92	610	- $1B1B	1180	- $A5E2	1820	- $EC24	1940	- $D9EF	2060	- $9D29	2180	- $A7A7
50	- $C899	620	- $A874	1190	- $DE62	1830	- $E438	1950	- $33BA	2070	- $A8E2	2190	- $5A45
60	- $FF65	630	- $728E	1200	- $8472	1840	- $69C1	1960	- $DA59	2080	- $B0EA	2200	- $0F2B
70	- $A3BF	640	- $498C	1210	- $9EA4	1850	- $DAF8	1970	- $5923	2090	- $0F35	2210	- $4605
80	- $A900	650	- $6E8D	1220	- $BA4A	1860	- $1A88	1980	- $D187	2100	- $4AC1	2220	- $6DFE
90	- $924D	660	- $403C	1230	- $B2F3	1870	- $66B7	1990	- $AC50	2110	- $657E	2230	- $A4D2
100	- $185D	670	- $D1E1	1240	- $89E9	1880	- $B372	2000	- $6E4E	2120	- $6DC3	2240	- $2E47
110	- $E3F0	680	- $866A	1250	- $39C3	1890	- $8F93	2010	- $02BD	2130	- $00AC	2250	- $BE3B
120	- $7A9A	690	- $A729	1260	- $7939	1900	- $92FD	2020	- $30F4	2140	- $3A34	2260	- $D123
130	- $4B17	700	- $C9E2	1270	- $9D28								
140	- $91CE	710	- $8D1D	1280	- $2667								
150	- $F251	720	- $C004	1290	- $8CA8								
160	- $A56C	730	- $E872	1300	- $EDF5								
170	- $674C	740	- $C5EA	1310	- $A71E								
180	- $E50E	750	- $DD42	1320	- $6BCC								
190	- $484F	760	- $EE4F	1330	- $359C								
200	- $0C9E	770	- $7385	1340	- $DD0F								
210	- $05CE	780	- $1F5A	1350	- $B1EB								
220	- $F948	790	- $982C	1360	- $17EC								
230	- $DBC1	800	- $0DB7	1370	- $1484								
240	- $137F	810	- $2755	1380	- $7E1C								
250	- $41F1	820	- $4F51	1390	- $E90B								
260	- $04D1	830	- $F91F	1400	- $0B5A								
270	- $9A17	840	- $2ADE	1410	- $3C6A								
280	- $5A27	850	- $58F6	1420	- $A89A								
290	- $68D3	860	- $00A8	1430	- $8C0A								
300	- $9023	870	- $62B7	1440	- $91BF								
310	- $3568	880	- $B23D	1450	- $A8CB								
320	- $2F5D	890	- $2B92	1460	- $401F								
330	- $E573	900	- $66F3	1470	- $2181								
340	- $1B42	910	- $16F8	1480	- $3D5B								
350	- $BF74	920	- $FC1C	1490	- $349A								
360	- $A0F9	930	- $B1FB	1500	- $E935								
370	- $8628	940	- $16AB	1510	- $ECEB								
380	- $3F12	950	- $DAF5	1520	- $526F								
390	- $4FC4	960	- $6E07	1530	- $5AE5								
400	- $A64E	970	- $C234	1540	- $3673								
410	- $6E2A	980	- $FD6C	1550	- $1F5D								
420	- $0D55	990	- $6B42	1560	- $F130								
430	- $6140	1000	- $CB53	1570	- $26F5								
440	- $543A	1010	- $0ABF	1580	- $09D3								
450	- $64AA	1020	- $5394	1590	- $B698								
460	- $1F06	1030	- $1B5F	1600	- $F521								
470	- $F015	1040	- $D880	1610	- $ECBD								
480	- $E477	1050	- $A7C4	1620	- $CD2A								
490	- $A662	1060	- $C92A	1630	- $2C60								
500	- $0306	1070	- $CA2F	1640	- $9D67								
510	- $40EB	1080	- $E4EC	1650	- $1CA6								
520	- $7492	1090	- $FA43	1660	- $DE74								
530	- $571D	1100	- $0371	1670	- $5E05								
540	- $E3A0	1110	- $F779	1680	- $E82D								
550	- $9558	1120	- $EC25	1690	- $0CB4								
560	- $4D00	1130	- $995C	1700	- $B8FC								
570	- $14AD	1140	- $70E5	1780	- $EEE2								

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HARDCORE COMPUTIST #4

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Core games - see page 37

Library Disk #2 ..... $19.95 ☐

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GOTO Label — Dynamic Menu
GOTO Replace — Fast Copy
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Map Maker
Hardcore Computist #4:
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Tacoma, WA 98444

```
2270 - $BB11
2280 - $2178
2290 - $5332
2300 - $5C54
2310 - $04B6
2320 - $74DE
2330 - $3E84
2340 - $5044
2350 - $4B03
2360 - $13DD
2370 - $A3F1
2380 - $7BA3
2390 - $72B2
2400 - $0A81
2410 - $4E3A
2420 - $3D70
2430 - $6B27
2440 - $04B1
2450 - $E13B
2460 - $ECF6
2470 - $02DC
2480 - $6D9B
2490 - $A6EF
2500 - $9EDC
2510 - $4867
2520 - $972A
2530 - $16FA
2540 - $98F5
2550 - $559D
2560 - $3DDB
2570 - $3292
2580 - $B92F
2590 - $E3C6
2600 - $0AA6
2610 - $C563
2620 - $32CE
2630 - $848C
2640 - $E8BA
2650 - $C0A3
2660 - $1CAF
2670 - $39D4
2680 - $83AC
2690 - $0EC0
2700 - $826A
2710 - $4A53
2720 - $3A6C
2730 - $471E
2740 - $2E07
2750 - $15C6
2760 - $992E
2770 - $8FE5
2780 - $18ED
2790 - $B516
2800 - $02D4
2810 - $93F3
2820 - $FB0B
2830 - $A2F8
2840 - $BD77
2850 - $DF65
2860 - $A303
2870 - $A276
2880 - $8D0A
2890 - $C3CE
2900 - $7AF1

2910 - $538C
2920 - $5501
2930 - $A06A
2940 - $BD0B
2950 - $26B6
2960 - $56F2
2970 - $2591
2980 - $CFDA
2990 - $D39E
3000 - $CE4E
3010 - $9CE5
3020 - $DBAA
3030 - $9EAA
3040 - $3F3A
3050 - $FDF1
3060 - $416E
3070 - $018C
3080 - $1A92
3090 - $0722
3100 - $827E
3110 - $5642
3120 - $FA4D
3130 - $ED34
3140 - $6ECF
3150 - $AD49
3160 - $42D3
3170 - $C09F
3180 - $FFC5
3190 - $ACCF
3200 - $2AAF
3210 - $BD8A
3220 - $B6EA
3230 - $6727
3240 - $2E4A
3250 - $FFDE
3260 - $685E
3270 - $D24E
3280 - $41E6
3290 - $B285
3300 - $E59F
3310 - $DF31
3320 - $59B1
3330 - $ECDF
3340 - $5258
3350 - $A16C
3360 - $FA79
3370 - $11C2
3380 - $674E
3390 - $7B3C
3400 - $5CCD
3410 - $FC6E
3420 - $D7F0
3430 - $B7C0
3440 - $C915
3450 - $3323
```

DESTRUCTIVE FORCES

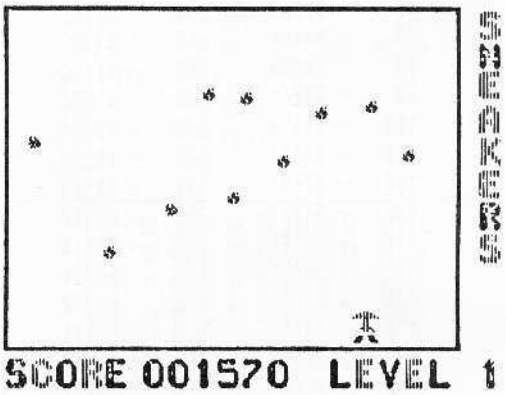
Hexdumps

```
8A00- A9 00 85 24 85 25 20 24  $B32F
8A08- FC A2 00 B1 26 85 00 24  $A6EC
8A10- FF 30 56 70 08 29 0F 20  $6A72
8A18- 35 8A 4C 0B 8A 48 29 0F  $61A1
8A20- C9 03 68 B0 F0 4A 4A 4A  $CB1D
8A28- 4A 29 07 84 01 09 B0 20  $7F51
8A30- 3B 8A 4C 0B 8A 84 01 A8  $80F7
8A38- B9 5A 8A 24 00 10 02 29  $C1C5
8A40- 3F 20 F0 FD A4 01 E0 03  $E379
8A48- F0 08 C8 D0 0C E6 27 E8  $CCB1
8A50- D0 07 C8 C0 48 D0 02 68  $8846
8A58- 68 60 C9 C1 C8 C6 C3 C0  $244F
8A60- C2 D2 D3 CC BE A0 20 AA  $6BA2
8A68- AE 50 09 4A 4A 4A 4A 85  $8D47
8A70- 00 4C 15 8A 29 7F 10 F7  $91FE
8A78- A4 24 C8 C8 C8 C0 29 90  $3DF1
8A80- 02 A0 28 84 01 A4 24 F0  $DE70
8A88- 04 88 F0 01 88 84 00 A5  $50B4
8A90- 25 18 69 03 C9 16 90 02  $8D1A
8A98- A9 15 85 24 A6 25 F0 04  $5A7A
8AA0- CA F0 01 CA 86 25 20 CB  $3693
8AA8- 8A A5 26 65 28 85 28 A5  $7035
8AB0- 27 65 29 85 29 B1 28 09  $E128
8AB8- 80 91 28 C8 C4 01 D0 F5  $4E66
8AC0- A4 00 E6 25 A5 25 C5 24  $4568
8AC8- D0 DC 60 A5 25 0A 0A 0A  $3DBF
8AD0- 85 28 0A 26 29 0A 26 29  $4E49
8AD8- 18 65 28 85 28 A5 29 29  $4866
8AE0- 03 69 00 85 29 60 A9 80  $93DF
8AE8- 85 29 A9 00 85 28 A8 AA  $8AD9
8AF0- A9 0B 91 28 E0 06 F0 08  $1595
8AF8- C8 D0 F7 E8 E6 29 D0 F2  $F0FD
8B00- C8 C0 90 D0 ED A9 BB 91  $9595
8B08- 28 E0 09 F0 08 C8 D0 F7  $8C8F
8B10- E8 E6 29 D0 F2 C8 C0 D8  $CB59
8B18- D0 ED 60 A0 00 24 FF 50  $5340
8B20- 12 A9 F0 85 01 A9 E0 85  $9A45
8B28- 00 A9 0F 85 28 A9 B0 85  $33AE
8B30- 29 30 10 A9 0F 85 01 A9  $7FFB
8B38- 0E 85 00 A9 F0 85 28 A9  $F4F3
8B40- 0B 85 29 B1 26 25 01 C5  $1EBC
8B48- 00 D0 08 B1 26 25 28 05  $2446
8B50- 29 91 26 C8 D0 ED E6 27  $2FF6
8B58- A5 27 C9 89 90 E5 A0 48  $823B
8B60- B1 26 25 01 C5 00 D0 08  $FD41
8B68- B1 26 25 28 05 29 91 26  $C687
8B70- 88 10 ED 60 A2 19 A0 01  $0760
8B78- B1 FE A8 88 D0 FD 8D 30  $A293
8B80- C0 CA D0 F2 A9 00 85 25  $79F9
8B88- A0 27 20 24 FC B1 28 48  $73F4
8B90- 18 69 01 29 0F 91 28 68  $8B30
8B98- 29 F0 18 69 10 11 28 91  $2627
8BA0- 28 88 10 E9 E6 25 A5 25  $C018
8BA8- C9 14 90 DA 60 A9 04 85  $0CBA
8BB0- 29 A0 00 84 28 A9 60 91  $1C7F
8BB8- 28 C8 D0 FB E6 29 A6 29  $B386
8BC0- E0 08 D0 F3 60 A2 04 A0  $CEB6
8BC8- 00 B1 26 29 0F C9 03 B0  $5076
8BD0- 0C B1 26 29 70 D0 06 B1  $1F70
8BD8- 26 09 0B 91 26 E0 00 F0  $3019
8BE0- 08 C8 D0 E5 CA E6 27 D0  $1977
8BE8- E0 C0 47 D0 F4 60        $D258
```

Continued from page 19

Sneakers
Sirius
10364 Rockingham Dr
Sacramento CA 95827
$29.95

One of the best shooting, home arcade games with many layers of play in which the player must destroy such objects as, stomping feet, spacecraft and asteroids.



Space Raiders
United Software of America
750 Third Ave
New York NY 10017
$29.95

Very fast action with top quality hi-res graphics. You are the pilot of a spaceship, and the monitor is your windscreen through which you see the aliens you have to shoot.

Super Invader
California Pacific
39 E. Hanover Ave
Morris Plains NJ
$29.95

This was one of the first hi-res arcade games available for the Apple. Basically it is the same as the commercial arcade version but, nonetheless, it's still very addictive.

STRATEGY

Castle Wolfenstein
Muse
347 N Charles St
Baltimore MD 21201
$29.95

This is basically a game of strategy, requiring thinking and planning, but it is also a successful fusion of strategy with fantasy, in the arcade game tradition. Here you are challenged to escape from a Nazi-held castle with the enemy's secret plans. Special features include the enemy speaking in German and changing room layouts with each game.

Flight Simulator
SubLogic
713 Edgebrook Dr
Champaign IL 61820
$33.50

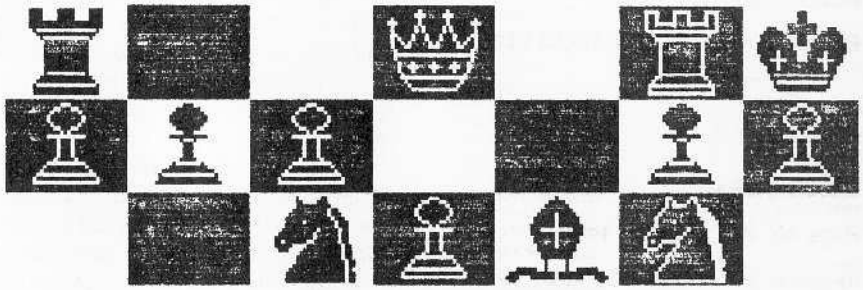
This is a strategy-type program in which you are the pilot of an airplane in a realistic flight simulation and have to face takeoff, flight and landing situations. Also includes British Ace 3-D air battle for honing your dogfight skills.

RobotWar
Muse
347 N Charles St
Baltimore MD 21201
$39.95

In this game you have the opportunity to write programs to control robots in robot battle tournaments. This game is a good excuse to learn computer programming.

Sargon II
Hayden
600 Suffolk St
Lowell MA 01853
$34.95

Here the player is pitted against the machine in a multi-level chess game. This is one of the best chess games available for microcomputers.



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COLLEGIATE MICROCOMPUTER, Rose-Hulman Institute of Technology, Terre Haute IN 47803.

corrections

We want to thank those alert readers who called in to point out last issue's typographical (or other) errors.

PROGRAM: DYNAMIC MENU

Page 11, 1st column:

1605 END

should be completely deleted.

LINE FIND

Page 34, 2nd column, 25th line:

BSAVE LINE FIND A$290,L$132

should read:

BSAVE LINE FIND A$29D,L$132

QUICK COPY

Page 40, 2nd column, 1st line:

5) Enter and save the hex dump for "Copy.0".

should read:

5) Enter and save the hex dump for "Copy.O".

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characters displayed can also be enlarged by a factor of from one to eight.

Hi-res character graphics are a powerful tool for game creation and with GraFORTH they are an integral part of the language.

Three-Dimensional Imaging

GraFORTH's three-dimensional imaging commands provide the Apple with capabilities which are not available in any other high-level language that I am familiar with.

To use these three-dimensional capabilities, first, the image is created using GraFORTH's image editor. Once the image is created and is in memory, GraFORTH commands can be used to manipulate the object on the screen.

GraFORTH has 13 commands for manipulating three-dimensional objects. These include commands for the object's scaling, translation and rotation in the x, y and z planes. The object's x and y position and color can also be specified. Up to 16 three-dimensional objects can be manipulated at once by the GraFORTH language.

When using GraFORTH's three-dimensional commands for animation it is not necessary to worry about erasing the current image after each animation cycle because both hi-res pages are used for the animation. One page is updated and displayed and the alternate page is erased with each use of the DRAW command. This technique does tend to slow down the animation somewhat.

If quicker animation is desired, the GraFORTH programmer can also erase his own three-dimensional image by using the UNDRAW command. This command will noticeably speed up animation but requires that the programmer pay more attention to the finer details of the animation process.

Music Synthesizer

If GraFORTH's graphic commands are not enough to pique your interest, the language also comes with several commands which make the process of adding music, or general sound effects, to your programs much easier.

GraFORTH has the commands NOTE and VOICE. The NOTE command provides for a note of a certain pitch and duration determined by the two numbers on the top of the language's stack. The VOICE commands allows you to set the tone quality of the notes which are played. Acceptable values for VOICE range from -6 to 2.

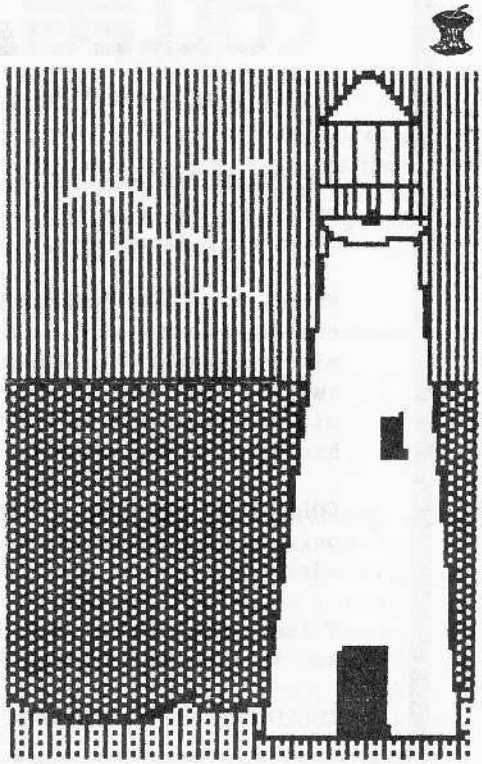
But before you rush out and plunk down 75 of your hard-earned dollars for the GraFORTH package, you should be warned of some of the language's shortcomings.

Because GraFORTH is meant to be mainly a graphics processing language, floating point arithmetic is not supported. This eliminates the possibility of doing any heavy number-crunching with GraFORTH because, like integer BASIC, the language only recognizes integers in the range -32767 to 32767. The string handling capabilities of GraFORTH are also very limited.

To date I have seen three arcade games written in the GraFORTH language: Zargs, Grapple, and Spider Raid; all marketed by Insoft. Although the three games have very nice graphic images and are enjoyable to play, their animation is just not quite as smooth as a lot of other top-notch arcade games which have been written in assembly language. In certain cases there appears to be no substitute for compact and speedy native machine code.

One more word of warning. Because of the quirks of programming in a FORTH-like language, GraFORTH is not a language I could recommend for anyone as a first language on the Apple. To use GraFORTH on the Apple requires a good understanding of the sceen graphics setup which is best acquired by first learning to program in Applesoft.

Just so I don't end this evalutation on a sour note, I should mention a very admirable aspect of the GraFORTH package. As all application packages should be, GraFORTH is distributed in a non copy-protected format.



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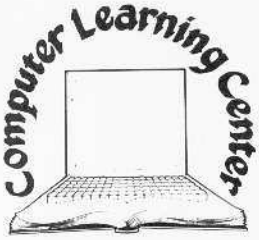

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Code Requirements

- A Applesoft in ROM or Apple soft firmware card or Language card and DOS master disk.
- I Integer in ROM or Integer firmware card or Language card and DOS master disk.
- B These programs are written in machine code and will work in any Apple. However, if the program uses routines from Integer or Applesoft, then the requirements for I and A programs apply.
- T These are text files and are used by the other three program types.

The second column is the number of sectors on the disk used by the program.

APPLE III OWNERS

Most of these PDS disks will work on the Apple III in emulation mode. We have not tested all of the programs nor do we have a list of what works. So be careful."Caveat Emptor."

PROGRAM CRASHES

If a program crashes,the disk may have a bad sector. We will replace any disk that has a bad copy of a program or that has media defects. Some programs will give SYNTAX errors. These are not media defects or bad copies.

ONE FINAL NOTE: PDS is not commercial quality and is supplied as is.

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APPLE TUTOR

Apple Tutor 001

I 004 Basic Programming
I 036 Basic Programming 1
I 047 Basic Programming 2
I 048 Basic Programming 3
I 044 Basic Programming 4
A 004 Basic-Integer
B 022 Basic-Integer.X
I 019 Conventions
I 016 CPU 6502
I 002 Hello Sample
I 030 Micro 6502 Simulation
I 051 Mini Assembler Tutorial
A 022 Random Drill Tutor 3.2 Only
I 007 Sweet 16 Disassembler
I 004 Sweet 16 Speed
B 002 Sweet 16 Speed.X
I 026 Top Down Programming

BUSINESS & FINANCE

Business & Finance 018

A 005 Annuity Principal & Interest
A 003 Annuity Regular Deposits
A 018 Annuity-NW
A 013 Bond Price & Interest
A 012 Bond Value
A 032 Budget Monthly
A 013 Decision Matrix
A 054 Financial Pak
A 016 Investment Annuity Forecasts
A 012 Keogh Savings Program
A 014 Loan Amort Schedule
A 008 Loan Direct Reduction
A 004 Loan Interest
A 029 Market Evaluator Pak
A 009 Mortgage Calculation
A 007 Nicer Writer-NW
A 003 Regular Deposits I
A 007 Sales Tax at 6%
A 017 Security Analysis
A 006 Security Analysis Copy Data
A 003 Simple Interest
A 010 Stock Option Analysis
A 016 Stock Option Covered Hedge
A 015 Stock Option Pricing I
A 021 Stock Option Pricing II
A 008 Stock Portfolio Valuation
A 028 Stocks
A 018 Trip Cost Analysis

BUSINESS & FINANCE

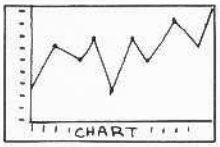
Business & Finance 019

I 030 Calendar Personal
I 006 Letter Writer
I 006 Letter Writer Enhance
I 014 Phone List
I 005 Real Estate Plot
B 034 Real Estate Plot.X
A 012 Stock Monitor I
A 015 Stock Monitor II
A 024 Trend Line Analysis
A 006 Visicalc Coord Formulas
A 012 Visicalc D File Printer
A 014 Visicalc Formulas
A 006 Visicalc Formulas Instr

BUSINESS & FINANCE

Business & Finance 020

A 025 Apartment Mortgage
A 052 Banking and Finance
A 058 Business Finance
A 006 Check Stub
A 020 Household Expenses Profile
A 041 Income Tax 1040 for 77
A 029 Inventory Company
A 004 Inventory Cost File Entry
A 016 Inventory Home I
A 022 Inventory Model
A 009 Inventory Print-NW
A 003 Inventory Shortest
A 003 Inventory Shortest Read
A 023 Inventory
A 003 Inventory.DOC
A 019 Inventory.File Create
A 029 Inventory.File Read
A 018 Stock Market Forecaster
A 011 Stock Valuation



MATH & STATISTICS

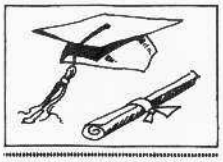
Math & Statistics 061

A 003 Angle Conversion
A 012 Angle to Metric III
A 003 Area of Polygon
A 008 Binomial Distribution
A 004 Blackbody
A 003 Chi Square Distribution
A 004 Chi Square Test
A 004 Coordinate Conversion
A 008 Coordinate Plot
A 003 Curvilinear Interpolation
A 002 Derivative
A 016 Dfit
A 011 Differential Eqn Solver Demo
A 004 Exponential Regression
A 004 F Distribution
A 004 Gaussian Quadrature I
A 003 Geometric Mean
A 004 Geometric Regression
A 004 Greatest Common Denominator
A 005 Histogram
A 003 Linear Interpolation
A 007 Linear Programming
A 004 Linear Regression
A 005 Mann Whitney U Test
A 022 Math Drill III
A 019 Math Multiply Drill
A 019 Math-NW
A 013 Matrices
A 004 Matrix Inversion I
A 004 Matrix Multiplication
A 004 Matrix Operation Simple
A 004 Mean Vari Stdr Devia I
A 007 Multiple Linear Regression
A 004 Normal Distribution
A 006 Nth Order Regression
A 004 Number Combinations
A 002 Parabola Plot
A 003 Permutation Combination I
A 007 Permutation Combination II
A 003 Poisson Distribution
A 005 Polar Equation Plot
A 011 Polyfit
A 013 Polynomial Regression
A 006 Power Curve Fit (c)
A 003 Prime Factors I
A 006 Prime Factors II
A 003 Quadratic Formula
A 006 Quadratic Surface
A 015 Right Triangle Solver
A 016 Root Finder
A 005 Roots of Poly Half
A 005 Roots of Polynomials
A 004 Simpson's Rule
A 004 Simultaneous Equations
A 004 T Distribution
A 005 T Distribution Test
A 003 Trapezoidal Rule
A 005 Triangle Factors
A 007 Triangle Parts
A 003 Trig Polynomial
A 004 Vector Analysis
A 003 Vector Operations

UTILITY

UTILITY 086

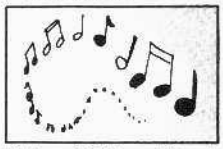
B 002 Ep1.3
B 002 Ep2.3
B 002 Ep3.3
B 003 Ep4.3
A 002 Epson Catalog Dbl Strike
A 008 Epson Driver Instr
B 002 Epson Driver
A 002 Epson Greeting
A 004 Epson Labels I
A 005 Epson Labels II
A 006 Epson Labels III
A 002 Epson Lower Case
A 002 Epson MX/FX-80 List Capture
A 008 Epson MX/FX-80 List Format
A 005 Epson MX/FX-80 List Instr.
A 003 Epson MX80 Catalog
A 005 Epson MX80 Demo I
A 007 Epson MX80 Demo II
A 024 Epson MX80 Label Maker I
A 052 Epson MX80 Label Maker II
A 053 Epson MX80 Label Maker III
B 034 Epson MX80 Label.PIC
A 003 Epson MX80 Letterhead
A 015 Epson MX80 Program List
A 023 Epson MX80 Reminder Calendar
A 033 Epson MX80 Setup I
A 035 Epson MX80 Setup II
A 005 Epson Utility 3.3 Demo
A 023 Epson Utility 3.3 Info
A 022 Epson Word Game
A 003 Epson.Exec.Maker A3.3
I 003 Epson.Exec.Maker I3.3
B 005 Text.Demo
B 004 Text.MXtest
T 002 XEpson.V3.3



EDUCATION & SCHOOL

Education & School 028

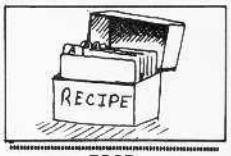
I 026 Alphabet & Sound
A 004 Class Boy Girl Ratio
A 038 Class Grade Book
A 038 Class Grader
A 004 Class Grader Initialize
A 015 Final Grade
A 004 Final Grade Doc
A 014 Fourth Grade Demo
I 007 Letter Discrimination
I 006 Spelling
A 016 Student Grade Average
A 022 Student Head Count
A 004 Student Head Count Doc
I 010 Test in Woodworking
A 042 Test Maker
A 019 Test Maker Multi Choice
I 013 Typing Practice
A 016 Typing Practice-NW
A 005 X-Averages
A 003 X-Date
T 002 X-E File
T 002 X-File
A 005 X-File Init
I 009 X-Grading Instr
I 002 X-Intro Needed
I 002 X-School Menu Needed
B 048 X-School 1
I 002 X-Schoolfile
A 005 X-Student Names
A 005 X-Student Names Grades
A 004 X-Test Grades



MUSIC & SOUND

Music & Sound 065

T 003 America
I 012 Hanon Etude #1 in C
T 002 Happy Birthday
A 015 Harmonic Analysis
I 019 Music Computer
I 036 Music Functions
I 011 Music Gee
I 023 Music in 18
I 014 Music Maker
I 017 Music Mozart Theme
I 007 Music Rigby
I 026 Music Stairway to Heaven
A 004 Music Start
I 030 Music Two Voices
I 022 Music Writer 3
I 008 Musical Keyboard
B 002 Musical Keyboard.X
A 017 Musical Memory
I 010 Name That Tune
I 007 Sound Effects Demos
A 005 Sound Effects How to
I 007 Sound Effects Random
A 003 Sound Routine
I 011 Sounds And Music Starwars
I 006 Swanee River
T 038 Tunes



FOOD

Food 035

B 004 Alpha#
A 026 Calorie Counting Program
A 014 Calorie Rqmts
A 029 Food Values
A 033 Ideal Body Weight
A 031 Life Expectancy
I 026 Life Expectancy Test
A 017 Metric Kitchen
A 043 Recipe Box
T 002 Indexrecipe File
T 002 Recipe File
A 042 Recipe Calorie Cost
A 003 Recipe Cost
A 026 Recipe Cost Per Serving

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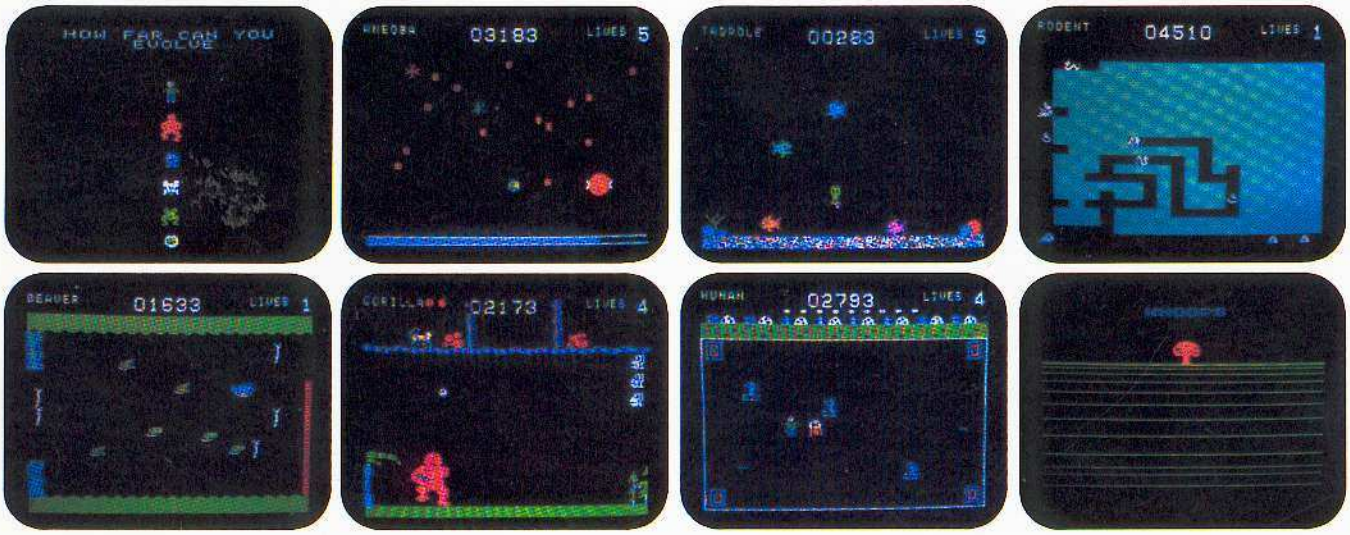

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