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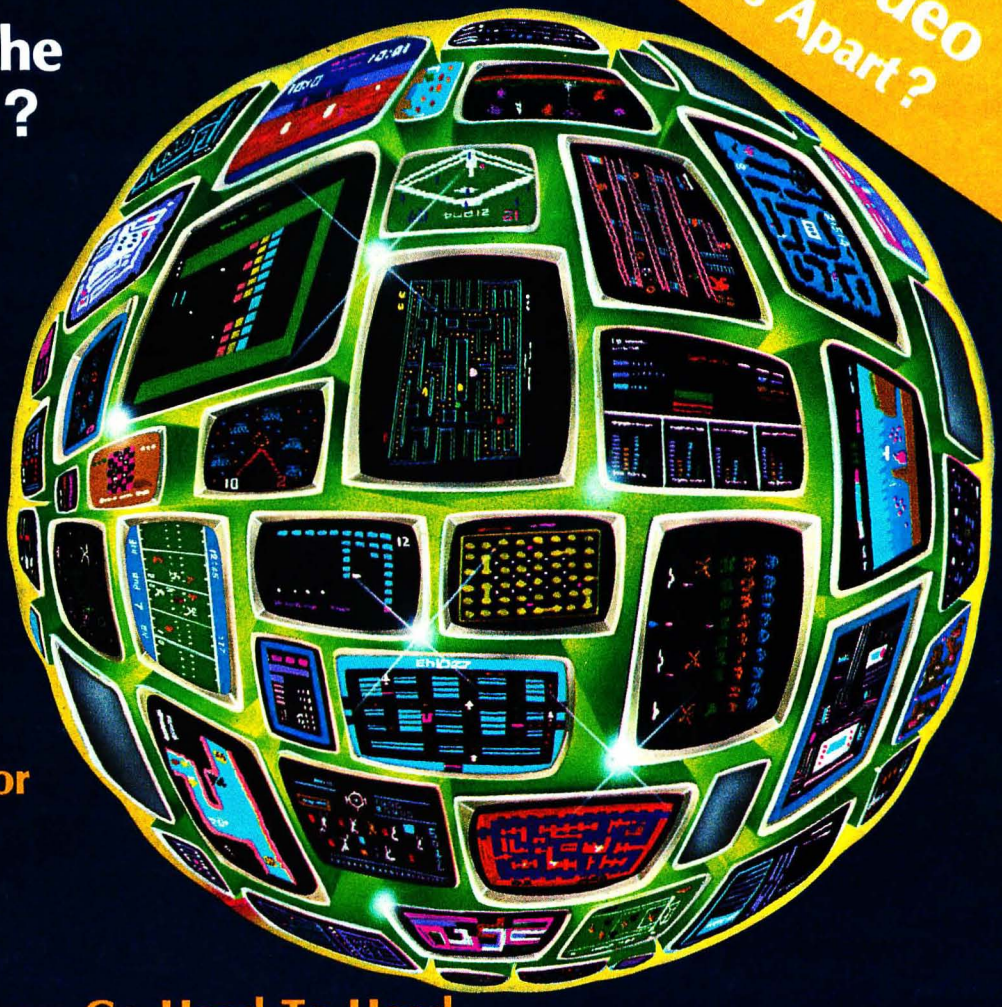

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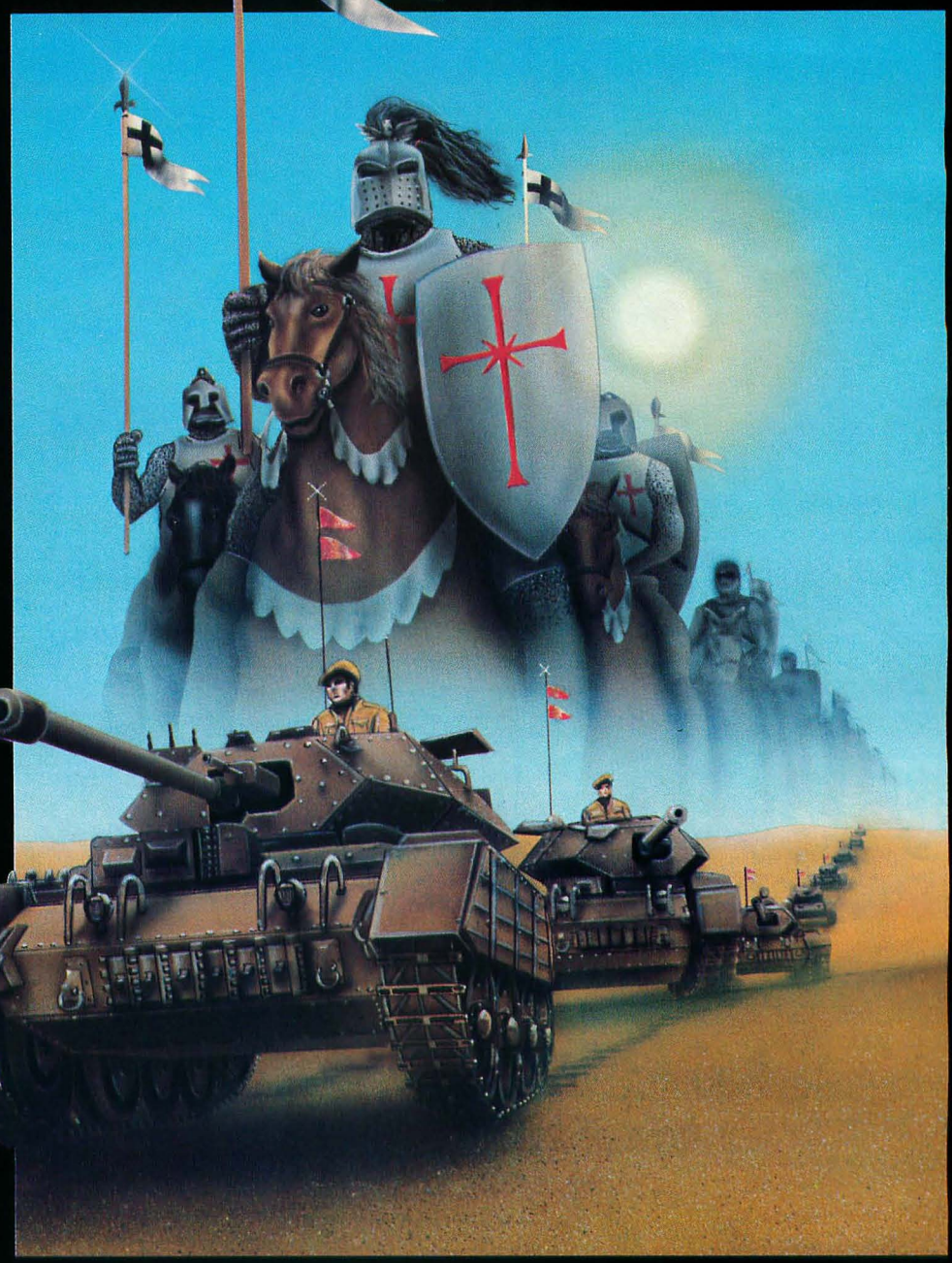

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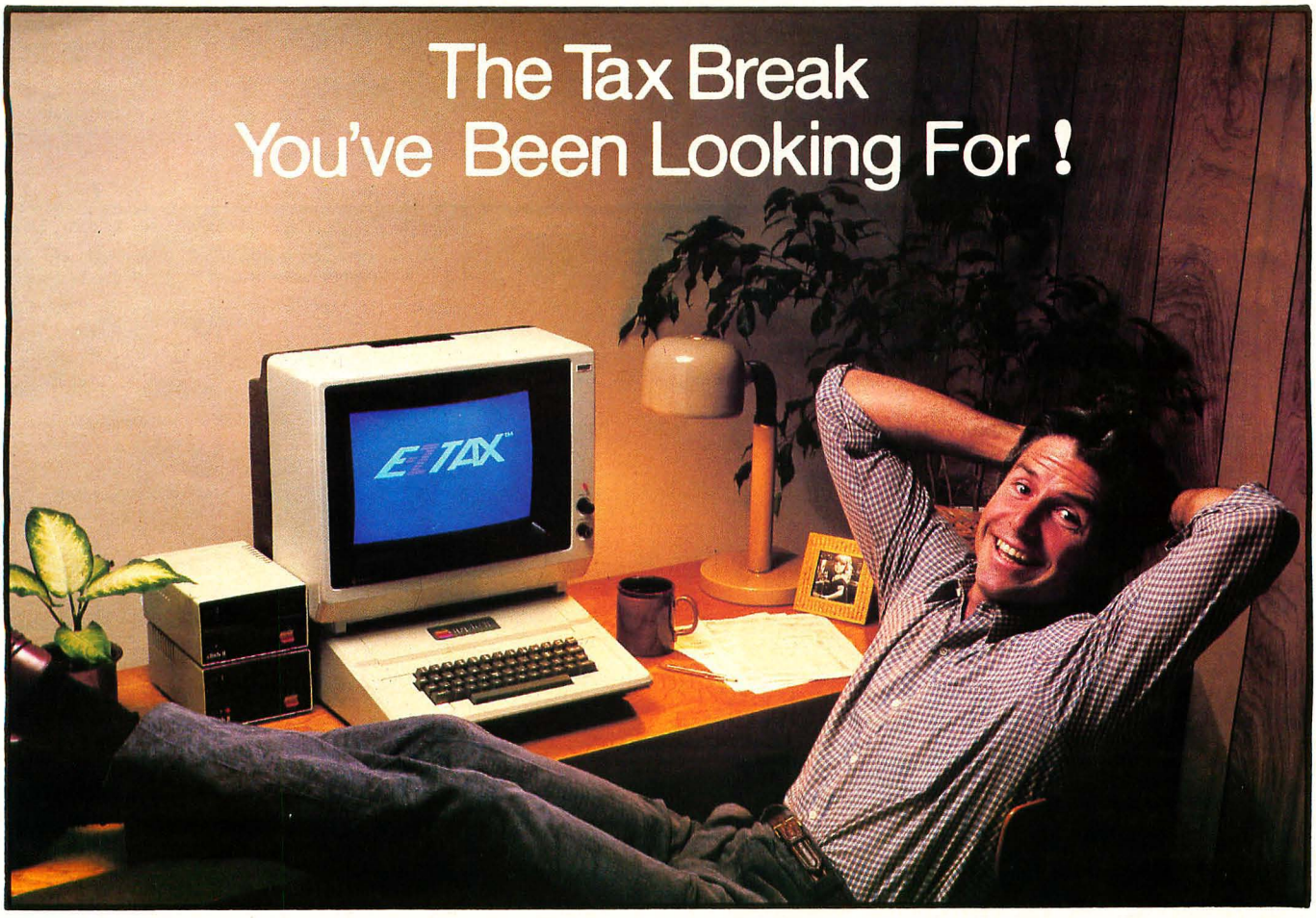

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Cover illustration by Tom T. Tomita

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PC/SIDE

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TRS-80®/SIDE

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EDITORIAL

It All Boils Down To Ones and Zeroes

One of Mexico's delightful Christmas traditions is the "piñata." Young children gather around a dangling giant papier machĕ ornament. One at a time, the children are blindfolded, handed a long stick and given a chance to swing at the piñata. When broken, the giant ornament rains down its contents of candy and small gifts. All of the children run to the center of the circle to lay claim to their share of the bounty.

The participants in the international information marketplace are like the children gathered around the piñata. One by one, they are blindly swinging their sticks at our information dollar, hoping to break the bauble and gather the rewards.

The many books and magazines covering this new information utility almost always address the topic of *the* media of the future. Will viewdata via the telephone lines negate the need for interactive cable? Will the mass storage capabilities of laser discs and cards become so inexpensive and available that on-line databases will become obsolete? Will the public need access to enough "perishable" information (information which is valuable for only a short period of time) to support an immediately accessible database? The answers to these questions will determine which of the competitors will get the most bounty from our information piñata.

As Europe and Japan march boldly ahead in nationalized information utilities, the government of the United States has decided to mark time and let the market determine the need, viability and standards for such a utility. This policy has advantages and disadvantages. Because national pride is not vested in the support of one particular system, open debate is possible on a wide variety of options — possibly preventing our adopting a system which would soon be outdated. However, in the past, the US has debated the public interest and social benefits of a technology only *after* it has been chosen and implemented.

There's no particular reason to believe the circumstances will be different with the installation of our information utility. The typical consumer simply will not be aware of the potential of any of these services until they are commonly available to his home and he begins to use them. How aware were we of the options cable television brought to our living rooms until the service was available and the promotional literature came in the mail?

The private sector is **very** interested in the potential of the information utility. AT&T restructured and gave up a large portion of their business in order to gain access to the market. However, for companies with less financial security, the hesitancy of the government to establish standards makes the risk of financial disaster too frightening. Consider what might have happened if the FCC had permitted ABC, CBS and NBC to support different standards for their video signals, rather than confining them to a single system. You might need three different television sets, or decide to watch only one of the networks. One of them might have survived, or we might not have network television at all because it couldn't be made profitable. The providers in our new utility could face that problem. They will have to make the services extremely expensive in order to be supported by a small number of customers, or "bet it all" on their ability to predict which information delivery standard will gain mass acceptance.

The terminology of this marketplace is confusing, at best. Teletext, viewdata, videotex, viewtron, cabletext, video discs, laser cards, satellites, dial-up databases — the list of available media and communication standards goes on and on. I won't try to define them here. (See *Cardboard To Cable* elsewhere in this issue for further information on teletext, videotex, and viewdata.) However, one thing rings true through all of them — the information they send or store always boils down to ones and zeroes — digital data to bring a myriad of information and services to our senses.

While the government, communications industry, and hardware manufacturers battle over the proper delivery standard for our new utility, it should be clear that the information they will deliver will have to be in a digital form. All of the associated communications technologies now converge around the microprocessor and its ability to process digital data. It seems the only sense we've not yet managed to digitize input for is that of smell. But then, we weren't very successful at storing or sending input for that in analog form either.

With the digital standard set for encoding the data our new utility will deliver, the information providers can stop hesitating and prepare for whatever distribution media the market chooses. The digital format suffers certain vagaries, but we shouldn't wait to start capturing our national information database in a digital format. It will be relatively simple for the proper software to translate data from one digital form to another, once we know the distribution media.

I often wonder if the people who predict ready access to any information in the Library of Congress have considered the gargantuan effort will take to key in all of those words, and digitize all of those graphics. There is very little writing printed anymore that doesn't pass through a digital form somewhere along the way, whether in a word processor or a typesetter. Now is the time to start storing those words, and converting the words of the past into a similar format, if we're to have any hope of being ready for the coming information revolution.

In the end, I'm sure that more than one of the prospective delivery media will survive. Various combinations and permutations may occur along the way, but we use information in too many ways for one medium to serve in all circumstances. We must consider how we will deal with perishable information, such as airline schedules and weather reports, as opposed to more durable information such as history books and movies. We will always want our information to be portable so we can read on the train or follow a map in the car. These and many other factors will influence which of the media will survive and remain profitable. However, now is the time to debate the options. The choices we make for our information utility will shape the minds and lives of the future. Whatever our choices, we don't have very long to make them. The information age tidal wave is looming over us, and there is no way to stop it. This is our opportunity to sieze control and direct it for our best interests.

Randal L. Kottwitz
Publisher/Editor-in-Chief

ATARI SINGS YOUR FAVORITE SONGS!!!

THE Original VOICE BOX Speech Synthesizer by the ALIEN GROUP has received rave reviews:

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ANTIC–"There is a great potential for teaching children to spell and an added dimension to games overall. I believe the VOICE BOX is well worth the price tag."

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POPULAR SCIENCE–"The speech quality is excellent. Besides creating speech, the software has a bit of fun with graphics."

and on the new VOICE BOX II.....

TIME MAGAZINE–"Machine of the Year" "The VOICE BOX by the Alien Group enables an ATARI to say aloud anything typed on its keyboard in any language. It also sings "Amazing Grace" and "When I'm 64" or anything else that anyone wants to teach it.

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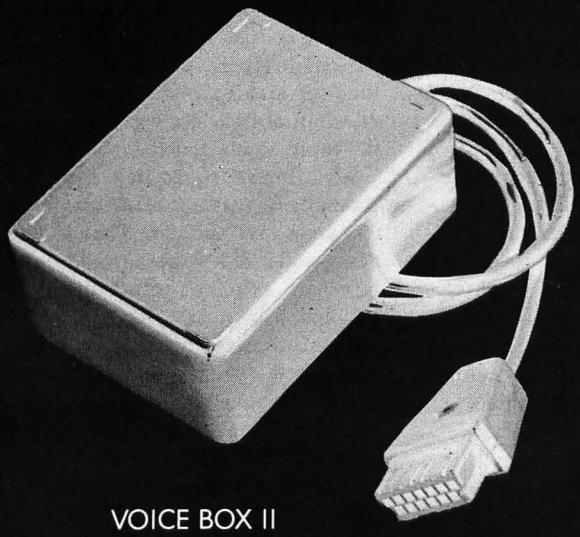

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- Software that can convert the bottom two rows of the **ATARI** keyboard into a piano with a range of 3½ octaves using the shift and control keys.
- Programmable musical sound effects such as tremolo, vibrato, glissando and click track.
- A singing *human* face with lip-sync animation designed by Jerry White.
- A talking or singing ***ALIEN*** face with software that allows the user to change the face and 8 mouth patterns as he sees fit.
- The ability to speak with inflection and feeling.
- Can speak in a foreign language with correct foreign spelling as input.
- A talk and spell program by Ron Kramer. Users can program any vocabulary for this spelling game. In fact, this program can even speak in a foreign language like French, where the user must spell the correct word in English, or vice versa.
- **GREEN GOBLINS**–A talking arcade game by John Wilson.
- Random Sentence Generator–An amusing grammar game that helps teach school children to identify parts of speech and recognize a variety of sentence structures.
- **NUMBER SPEAK**–A subroutine by Scott Matthews that converts up to a 9 digit number into normal English pronunciation. *Ideal for building your own math games.*
- **STUD POKER**–A talking poker game by Jerry White.
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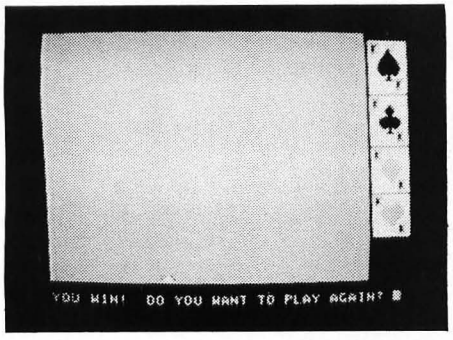
From our readers

Apple® Solitaire

Dear *SoftSide,*

I just wanted you to know that the solitaire game from the May 1982 issue of *SoftSide* can be won. I enclose the picture from my monitor as proof. This was done using John Voskuil's modification from issue #32. It's a great game. Keep up the good work.



Richard Sturtz
New Baltimore, MI

Player/Missile Graphics

Dear *Softside,*

I have nothing but praise for your magazine, and out of the many that I now subscibe to, yours is the only one that I plan to renew. I owned a TRS-80 when I originally subscribed, and had become quite proficient at programming on it. However, the poor graphics and other complaints led me to look at Atari, and I bought their 800 model. So now I know all the Basic commands, but am a bit bewildered by the power that this machine posesses.

Therefore, I am making a plea for help. Please show us beginning Atari users the basics on Player/Missile Graphics! Your articles on the modification of the Display List were excellent, so I am positive that you could present it in a manner that could be easily understood. I realize that it is a long, complicated subject, but given a start, many would try their own ideas, and learn simple things without difficulty. Keep up the great work!

Darrell Maronde
Ft. Worth, TX

Editor's Reply: *Exploring The Atari Frontier* will cover not only the basics, but advanced applications of Player/Missile Graphics as well in an upcoming installment.

Esperanto

Dear *SoftSide,*

Among Allen L. Wold's very to-the-point comments on computer languages in general and BASIC in particular in his article "Alternatives to BASIC" in issue #36 of *SoftSide,* he had made some unsubstantiated — because unsubstantiable? — comments about "artificial verbal languages." I hope that you will permit me to set the record straight...

I have been using Esperanto for the last twenty years, both here and in Europe, and I find that much of what Wold says, when applied to Esperanto, is simply opinion...

Esperanto, as developed by Dr. L. L. Zamenhof, never claimed to utilize elements from every language ever spoken. The vocabulary is, for the most part, Indo-European in origin, although more recently, elements from several East Asian languages have been creeping in.

Finally, Wold states that artificial languages are frozen and, if allowed to change, would break into dialects. This is wrong. Esperanto (which started out with a vocabulary of about nine hundred words, and now boasts about twenty thousand different word-roots expandable into some hundreds of thousands of words) has been evolving for the better part of a century...

With respect to the computer revolution, Esperanto also seems to have a role. Currently, two European organizations are studying the possibility of using Esperanto as a bridge language for computer translation of such things as videotext messages; the study is being funded by the Common Market...And, for those of your readers who subscribe to *The Source,* an Esperanto lesson for the uninitiated is available on that network (type R ESPERO).

Donald J. Harlow
Central Office, ELNA

Allen Wold's Reply: I do not find my lack of knowledge of Esperanto, or of other artificial verbal languages, remarkable. The library at the University of North Carolina at Chapel Hill is a multi-million volume research library, and most of the two dozen or so books on the subject of artificial, or "universal" languages date from the twenties and thirties. I did not try to track down current journals, or spend a great deal of time researching these languages, since the question of their use was rather marginal to the topic of my article...

Mr. Harlow states that Esperanto never claimed to utilize elements from every language ever spoken. That is true, and I never said it did. Esperanto has "the advantages of extreme grammatical simplicity coupled with a fair degree of logic, utter ease of sounds, absolute correspondence between the spoken and the written form, and a vocabulary based mainly on the Germanic, Greek, and Latin-Romance elements of Indo-European."

I did not state that languages are too complex to be designed. I said that the difficulty of learning a natural language *implied* that they were too complex to be designed *by any one person or group of persons...*

Of course I was in error when I said that artificial languages are frozen. They are not like classical Latin, Greek, Hebrew, or Sanskrit, in that Esperanto and a few others of the 700 or so artificial languages are in fact being spoken today, added to, and perhaps even changed. But my argument still holds. In order to be truly universal, such a language, whatever is chosen, would have to be at least partially fixed, as Mr. Harlow says Esperanto is...

Perhaps we can think of Esperanto as the verbal language equivalent of Pascal (which, like Esperanto, is showing signs of evolution and division into very similar but

incompatible dialects). In any case, in no way did I intend to denigrate or cast aspersions on Esperanto as a language, whether a possible universal alternative or not...

I do admit to a rather vast ignorance, which my meager scholarship cannot completely negate. If there are readers who do know the answers to some of the questions, both stated and implied, by my article, Mr. Harlow's letter, or my response, please let me know, in care of this magazine.

SoftSide Game Plan

Dear *SoftSide,*

I am unhappy with the direction your magazine is taking. Other magazines that I subscibe to and read provide excellent articles on computing, utility programs, and news of the computer industry. In October of 1980, I subscribed to your magazine as the best source of entertainment program listings for my TRS-80. The 10/80 issue had an historical simulation, two maze programs, and a space landing program. Three or four entertainment programs used to be the norm. Last month, there was one, this month, none. I am sure you get letters from those that like your special issues on graphics, education, music, or other topics. However, I think your subscription base comes from those that want more programs like TRS-MAN, Space Rescue, Quest 1, Titan, and ABM Command. Others like me may be considering letting their subscription expire.

B. T. Campbell
Issaquah, WA

Program Listings

Dear *SoftSide,*

I have had my Apple II + since December and have found your magazine interesting and helpful. However, I do have two complaints, which, incidentally, apply to other computer magazines as well.

I have, with some success, entered various published programs into memory and saved them on disk. In some cases, however, after spending quite a few hours entering part of a program, I have had to abandon the project because the printed program does not differentiate between a "zero" and an "o." I think it is unfair to the reader to induce him to begin entering a program that later has to be abandoned due to this ambiguity. I do not know much BASIC and cannot tell from the context if the character is a "zero" or an "o."

My second complaint is that many of the programs are printed in type that is too small. Using reading glasses and a magnifying glass, I still have trouble reading some programs. If space is such an issue, perhaps you should publish fewer programs but in a type size that is 50% to 100% larger. Also, as many of the programs appear to be photographic copies of printouts, it is often very difficult to distinguish between similar characters such as I and 1, N and M, M and H, etc. The quality of the original printout is often very poor.

Your magazine is excellent, but these problems should be corrected. I would appreciate your comments. Thank you.

Dennis Constant
Chicago, IL

Editor's Reply: As you can see from the two preceding letters, you still can't please all of the people all of the time. We are doing our best to provide a varied mix of entertainment and practical application programs for your enjoyment and edification. Our new format should make the program listings easier to read and type into your computer. The uncoated paper has made the reproduction of the printouts more accurate. We are as frustrated as you by the use of zeros and o's, and 1's and I's in program listings. Our own *Phantom Programmer* commented on the confusion they cause in issue 32. Regrettably, in most cases, their use in the programs we publish is determined by the author of the program and there is little we can do about it in the editing process. When possible, we do our best to resolve these ambiguities.

Torn Covers

Dear *SoftSide,*

I have a problem with my subsciption, or more specifically, a problem with the condition in which the magazine arrives each month. The cover and the first several pages (through 18 for issue #38) are torn, cut, mangled, etc. I have even received them with a large chunk torn out of the front cover and the first page under the cover.

I need an immediate solution to this problem. In a previous letter, I mentioned the problem, and I received an acknowledgement of the situation, but no solution...

Thank you, in advance, for your assistance and cooperation.

James Leonard Hobby
Lewisburg, TN

Editor's Reply: We've taken the first step to solve the torn cover problem. We added a second cover to issue 39 both to protect the magazine when we mail it to you and make it sell better on the newsstand. We are looking into other protection methods, but will be waiting to hear your reaction to the effectiveness of our mailing cover before we proceed further. Please keep us informed of the condition of your *SoftSides* when they arrive at your mailbox.

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Produced by Northeast Expositions, nationwide producers of the National Computer Shows, PC '83 and CP/M'83,
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Friday-Sunday, May 13-15, 1983
Bayside Exposition Center
10:30AM-5:30PM daily

Applefest/San Francisco:
Friday-Sunday, October 28-30, 1983
Moscone Center
10:30AM-5:30PM daily

Any Questions? Call 800-841-7000 (Boston)

HINTS & ENHANCEMENTS

TRS-80 Solitaire

Here is an enhancement for the TRS-80 version of *Solitaire (SoftSide* May 1982) which makes the game easier to play by placing all the command keys on the numeric keypad.

Delete line 1335

Add or change the following lines.

```
1340 IFA$="6"THENGOSUB200:GOTO1330
1350 IFA$="4"THENGOSUB240:GOTO1330
1360 IFA$="1"THENGOSUB100:GOTO1330
1370 IFA$="5"THENGOSUB280:GOTO1330
1380 IFA$="8"THENGOSUB410:GOTO1330
1390 IFA$()"2"THEN1400ELSEGOSUB930:IFF(1
)<13ORF(2)<13ORF(3)<13ORF(4)<13THEN1330E
LSEPRINT@960,CHR$(30);"YOU WIN!  CARE TO
 PLAY AGAIN? (Y/N)";
1400 IFA$="0"THEN1420
1460 PRINT@960,CHR$(30);"4=L  6=R  8=DRO
P  1=NEXT  5=PICK UP  0=END  2=FOUNDATIO
N";
```

Diana L. Tullos
Denver, CO 80227

Atari Quick Tricks

Although the GTIA chip and the revision B operating system chips have been around for many months, there are still many Ataris without them. There is an easy way to tell which version a given system is without taking it apart.

To determine whether you have GTIA or CTIA, type in and run the following two-liner:

```
10 GRAPHICS 10
20 GOTO 10
```

If the screen remains blue, you have CTIA. If it clears to black, you have GTIA.

To find out which version of the op sys you have, PRINT PEEK(58383). A result of 56 means revision A, 0 means revision B.

Robert A. Carr
Grand Forks AFB, ND 58205

Atari Hopper

I enjoyed working with, and finally playing, the Atari translation of *Hopper (SoftSide* Issue 35). I think it should be called an adaptation rather than a translation because of the effective way you have put the sound and graphics of the Atari to use. Now that I have the program running, I have a suggestion.

The following program changes polish the exit routine, although you will still have to hit RESET after the program has stopped.

```
1700 ? :? "   ARE YOU SURE YOU WANT TO
 QUIT?""
1702 OPEN #N2,N4,N0,"K:"
1705 GET #N2,A
1710 IF A=89 OR A=121 THEN 32000
1715 CLOSE #N2:GOSUB 2200:GOTO 100
```

Aside from eliminating the "STOPPED AT LINE #" message, this modification gets rid of the INPUT statement (and therefore the need for a TRAP) and the use of the RETURN key. Play resumes if the user hits any other key than "Y."

Selden S. Deemer
Dharan, Saudi Arabia

Applesoft® Extensions 2

Within 48 hours of receiving Issue 37, I had ordered the Disk Version so as to obtain the Applesoft Extensions 2.

I cannot begin to tell you how useful I find these extensions and as a consequence, I have a request: Is it possible to place the extensions on a Language Card? Ideally, I would like to place both DOS and the extensions on my Language Card and so free my lower 48K. I have a program for DOS, but to date my attempts to place the extensions up there have met with failure.

Can it be done and how?

Jean-Pierre Sefczek
Belle Mead, NJ

Kerry Shetline replies: The problem you are having loading Applesoft Extensions 2 into the Language Card is because of the address range that the Language Card occupies. Applesoft Extensions 2 (AE2) makes many calls to routines in BASIC, which is in the same area of memory as the Language Card.

If you do the appropriate bank selecting to call a copy of AE2 that is in the Language Card , AE2 will try to call BASIC routines that will not be available, because they will be in a deselected area of memory.

There is a technique that would allow AE2 to run in the Language Card, but it would require heavy modification of the code. Any JSR to a routine in BASIC must be replaced with a JSR to a routine in the lower 48K that selects BASIC, JSR's to the appropriate routine, re-selects RAM, and then returns. For example, the instruction JSR $DD67 (evaluate a numeric expression) could be replaced JSR $300, and the routine at $300 would be as follows:

```
300: 8D 81 CO     STA $C081
303: 20 67 DD     JSR $DD67
306: 8D 88 CO     STA $C088
309: 60           RTS
```

It is assumed that BASIC is in ROM and AE2 is in the first 4K RAM bank. JMP's to BASIC are handled more easily. You need only JMP to a routine that does the bank select, and then JMP's to the originally intended routine.

Bugs, Worms, and other Undesirables

Pokey Player III

The disk files for the *Editor* changes and the "Blues" song were inadvertently omitted from the Issue 38 disk and tape. We will include these files on the issue 40 media.

Also, the *Pokey Player III* article (*SoftSide* issue 38) contained a rather serious error. The banner on the program and the step by step instructions (page 94) for merging the changes into the *Editor* incorrectly refer to *Pokey Player II.* The correct instructions are shown on the next page.

BUGS, ***continued***

To update the *Editor* to include these new revisions, first type in the enhancements, check them with SWAT and list them to disk or tape. Example:

LIST "D:POKEY.TMP" (or LIST "C:" for tape)

Now LOAD the *Editor* program and ENTER the temporary file you just created. Example:

LOAD "D:EDITOR"
ENTER "D:POKEY.TMP" (or whatever you called your file)

Now SAVE the modified *Editor* under some new name.

SAVE "D:EDITOR2"

Poster Maker

An obscure bug has been discovered in both the IBM and Apple version of *Poster Maker* (Apple version May 1982, IBM version Issue 37) which causes characters to be scrambled if the print width is set less than 6 *and* the first character is a punctuation mark. The problem is easily corrected by making the following changes in the middle of line 650.

Apple: 650 ... :PRINT CHR$(WW);" ";: ...

IBM PC: 650 ... :PRINT #1,CHR$(WW);" ";: ...

Atari Dungeon of the Gods

In Issue 33 we published corrections which were supposed to show where the original listing should have been underlined to indicate inverse text. Somehow a line of the correction did not get underlined as it should have. The word "Command " in line 630, including the trailing space, should be typed in inverse. Now the correction is correct. Sigh...

Apple Solitaire Enhancement Correction

In Issue 32 we published an enhancement to ***Solitaire*** (May 1982) which allowed the use of a joystick instead of the keyboard. The original game works fine, but a line was dropped from the listing of the enhancement. This was a line to read the keyboard to see if "E" had been pressed to end the game. The missing line should look like this.

```
1400 KB = PEEK ( - 16384): IF KB
     = ASC ("E") + 128 THEN 1415
```

Deluxe Personal Finance

There was an error in the instructions for *Deluxe Personal Finance* (Issue 37). The sample data shown in Table 7 is not correct for the examples used earlier in the article. The corrected figures are shown below.

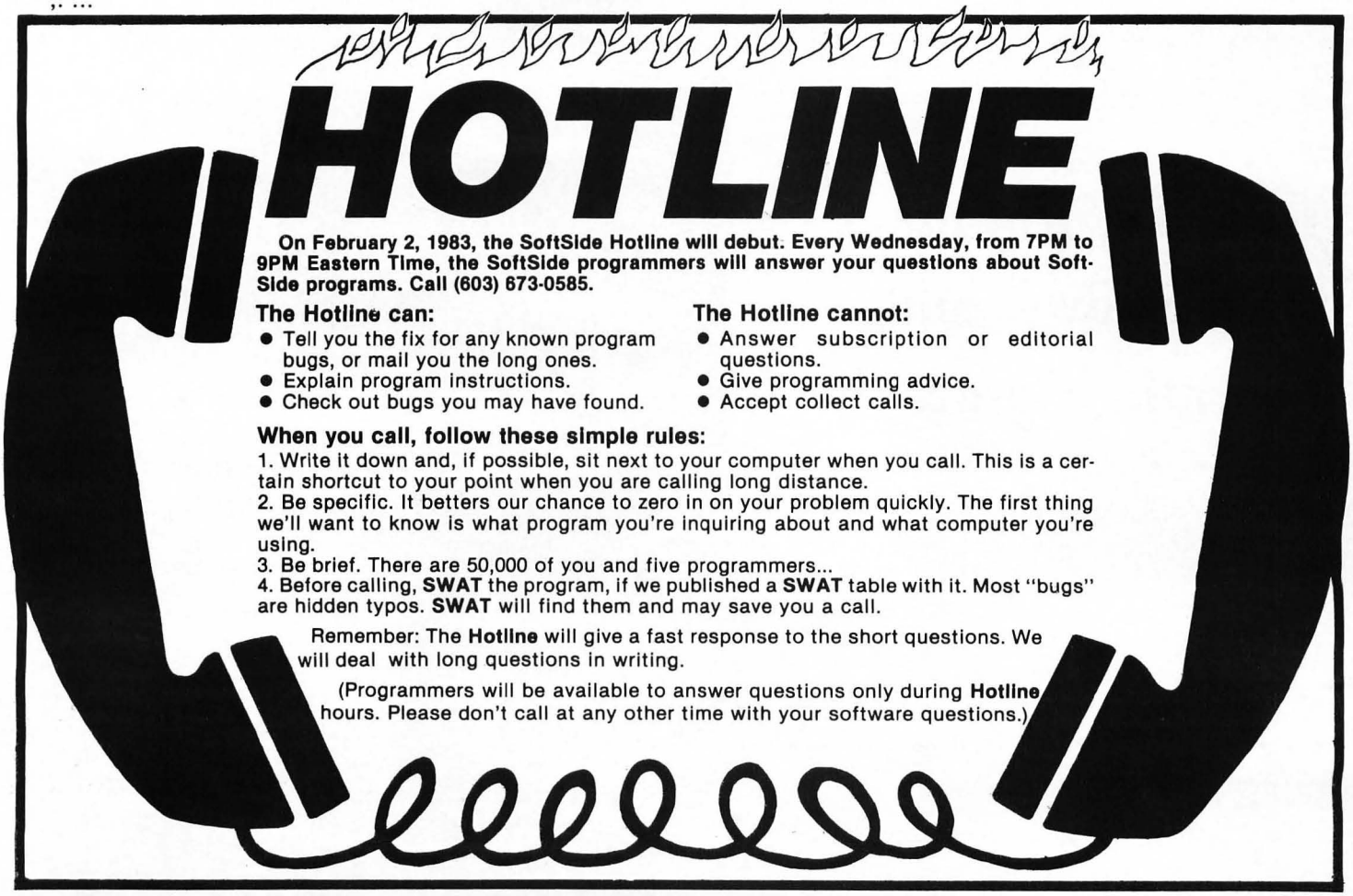
In addition, the discussion of Option 8 refers to 14 checks totalling $414.60. This should read 8 checks totalling $314.43.

Table 7.

*** ERROR ***	$0.00	(Not Displayed If No Error)	
Bank Statement	$209.36	Cancelled Checks	$290.64
Outstanding	$314.43	Cancelled Deposits	$500.00
	--------		--------
Totals	$523.79		$209.36

Current Balance $523.79

ENTER NEW BALANCE TO BE USED BY
PROGRAM $



On February 2, 1983, the SoftSide Hotline will debut. Every Wednesday, from 7PM to 9PM Eastern Time, the SoftSide programmers will answer your questions about SoftSide programs. Call (603) 673-0585.

The Hotline can:

- Tell you the fix for any known program bugs, or mail you the long ones.
- Explain program instructions.
- Check out bugs you may have found.

The Hotline cannot:

- Answer subscription or editorial questions.
- Give programming advice.
- Accept collect calls.

When you call, follow these simple rules:

1. Write it down and, if possible, sit next to your computer when you call. This is a certain shortcut to your point when you are calling long distance.
2. Be specific. It betters our chance to zero in on your problem quickly. The first thing we'll want to know is what program you're inquiring about and what computer you're using.
3. Be brief. There are 50,000 of you and five programmers...
4. Before calling, **SWAT** the program, if we published a **SWAT** table with it. Most "bugs" are hidden typos. **SWAT** will find them and may save you a call.

Remember: The **Hotline** will give a fast response to the short questions. We will deal with long questions in writing.

(Programmers will be available to answer questions only during **Hotline** hours. Please don't call at any other time with your software questions.)

THE WORLD IN A

EPCOT, Robots, Quiz Shows, and Learning Games

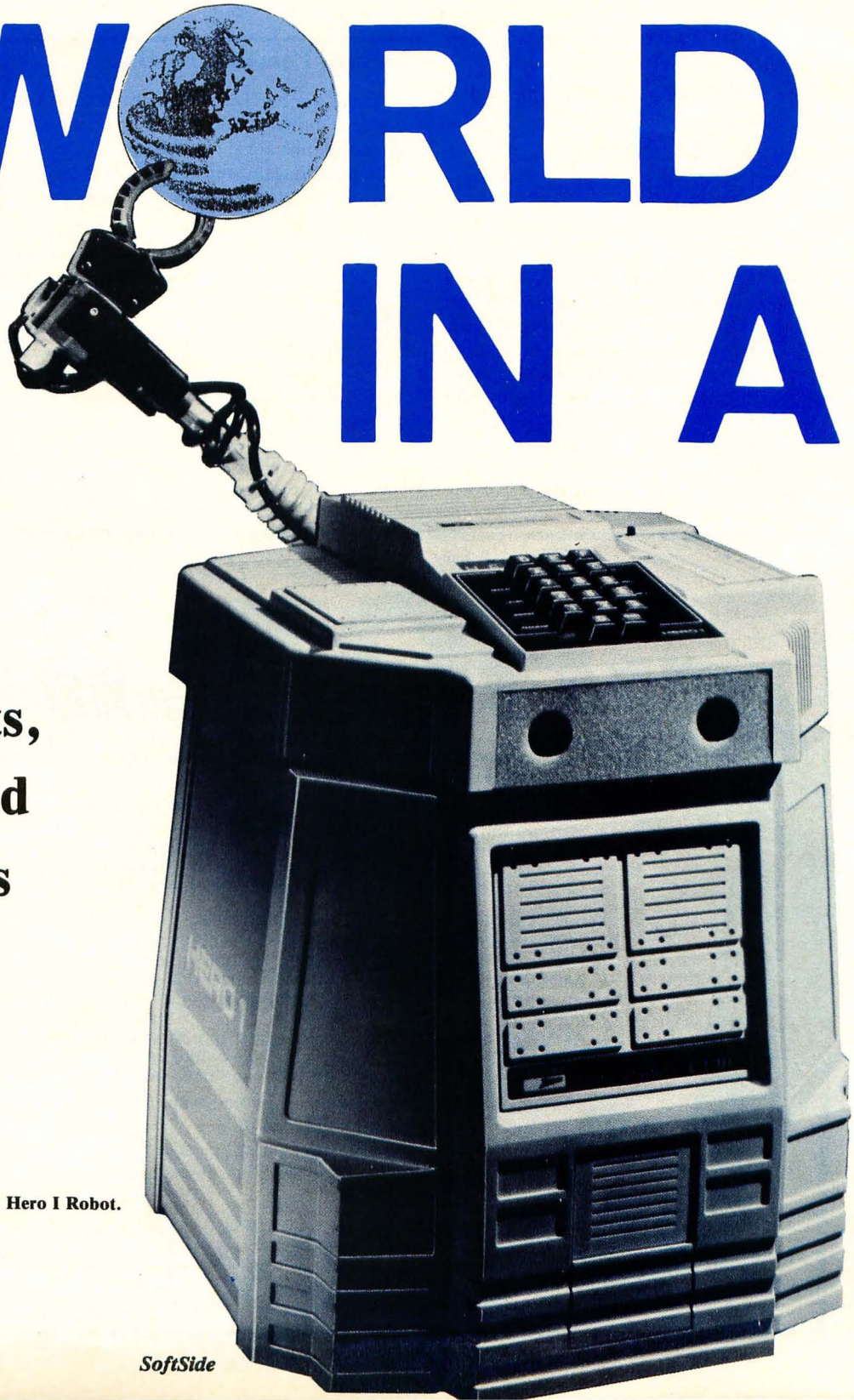


Photo 1. The Heath Hero I Robot.

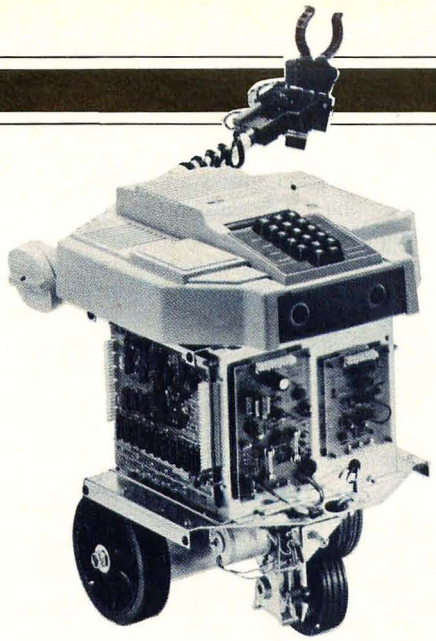


Photo 2. The Heath Hero I Robot (Model ET18).

SPIN

by Fred D'Ignazio

Here I sit in my ivory-tower study in western Virginia, in the heart of the Blue Ridge Mountains. At the moment, the mountains are hidden by billions of tiny snowflakes corkscrewing outside my windows.

You'd think I'd feel isolated, but I don't. Although I sit alone in my little study, I'm wired electronically into the world around me. The elastic, rubber-band beat of a Top-40 song is blaring out of my wristwatch radio, and I've got a Telelink cartridge plugged into my Atari® 800. I'm casually roaming through data banks, information networks, electronic mail and bulletin boards. My electronic reach extends thousands of miles, across the continent and even farther. In an instant, I am in touch with dozens of friends, business associates, and correspondents.

As the snowstorm worsens, obscuring the view of the elm tree in my backyard, it seems a good time to reflect on a few trends in our society that will affect the type of electronic entertainment we can expect in the near future.

EPCOT and Small Computers

In my last two ***SoftSide*** columns, I discussed Walt Disney's new EPCOT park, near Disney World, in Florida. I enjoyed writing the EPCOT articles, but one nagging question remained. Nowhere had I seen any mention of personal computers at EPCOT. Had Disney's showcase of the future skipped over one of the biggest revolutions in American life?

To answer that question, I resorted to that old-fashioned instrument, the telephone. I called Suzanne McGovern, a public relations specialist at EPCOT, and asked her if EPCOT had any personal computers. Suzanne's response was, "We don't use personal computers." "But," I said, "personal computers are hot. They're the wave of the future. EPCOT is a park whose theme is the future. Why don't you use personal computers?"

There are two reasons. First, 35,000 to 40,000 people move through the park every day. There isn't time for people to sit down at a personal computer and operate it. Personal computers would clog up the high-speed flow of people through the park's pavilions. Second, according to Suzanne, "personal computers might put people off." In her opinion, most adults are still uncomfortable operating personal computers — especially computers with keyboards.

"We wanted to make our computers as user-friendly as possible," Suzanne told me. "We found we could do this with advanced terminals connected to large computers. The Bell System performed most of the work for us in this area."

I worried that EPCOT's dependence on large computers, their emphasis on efficiency and on "keeping the people moving" might prevent park visitors from interacting with computers. According to Suzanne, however, this is not a problem. EPCOT may not have any personal computers, but it offers plenty of opportunitites for *personal interaction* with computers.

For example, in the main information center, the Bell System has a group of terminals with *touch-sensitive* display screens. Visitors to the center can interact with the computer by pressing spots on a grid displayed on the computer's screen.

Elsewhere, in the CommuniCore pavilion, adults and kids can play the "Computer Coaster" game. Without a keyboard, they can instruct the computer to build and run a roller coaster. They are advised if their cars are too heavy, if their track is too steep, or if their cars are moving too fast.

Computer terminals are scattered all over the park. With them, visitors play games or access electronic databases. You can play demographer on the U.S. census game, or airplane czar on the airlines game. At American Express's Travel Port pavilion, a computer tells you about interesting places to visit all over the world. A computer at the Energy Exchange pavilion helps you save energy in your home. A computerized "Amazing Microchip Game" lets you probe some of the secrets of integrated circuit miniaturization.

EPCOT designers are committed to making their computers user-friendly, and have gone out of their way to avoid keyboards. For example, the Information Age display at the Future Com pavilion has a voice-activated computer. Kids interact with it via a computerized robot named Smart-1. To operate Smart-1, kids don a telephone headset. They talk to the robot and it talks back. Smart-1 even plays games.

EPCOT has one keyboard-operated computer, named Phaser. Phaser tries hard to avoid intimidating you. When you type something on its keyboard, Phaser repeats each word in a very friendly voice.

(ed. For a related article on interactive terminals and videodiscs at EPCOT, see Popular Computing, *April, 1983.)*

continued

Robot Warriors

Robot "entertainers" may soon be as popular as the user-friendly computers at EPCOT. Robots were a big hit last summer at the World's Fair in Knoxville, Tennessee, but they were not the mild-mannered types you find at EPCOT. They were robot warriors.

You played the robot-warrior game at the World's Fair by operating a control box which relayed messages to your robot. You pressed buttons to send your robot into battle with another robot, similarly controlled by another human pressing buttons.

The robots wrestled each other in a ring. Your robot won if it was able to pin or trip the other robot. People's inexperience operating the controls made for many crazy, chaotic matches. Holds never seen in professional wrestling matches were routine. Sometimes, the matches dissolved into games of tag, with robots racing comically round and round the ring.

"Home and leisure" robots are also growing in popularity. Several companies now produce computer-controlled robots costing anywhere from $1,200 to $8,000 — only one to ten percent of the cost of a typical industrial robot.

The most famous of the new robots is the *Hero I* from Zenith Radio's Heath Company. There is also the 21-inch-tall *RB5X* robot from RB Robots, Inc. of Golden, Colorado; *Topo* from Atari-founder Nolan Bushnell's Andorbot Inc.; and *Genus 1*, made by the Jackson, Michigan-based Robotics International Corporation.

These robots, although they carry a relatively small price tag, are quite sophisticated. They boast electronics packages that include ultrasonics, microwave, and infrared sensors, speech synthesizers, onboard microchip CPUs, internal real-time clocks, robotic arms, video display screens, and up to 48,000 bytes of onboard RAM storage.

Right now, the companies that make these robots market them as pets, mobile computers, teaching aids, and junior maids and butlers. It won't be too long, however, before the companies and their bored customers turn the robots into mobile, electronic game machines.

Household robots are already playing chess and checkers with their owners. Some hobbyist robots even arm wrestle. This is just the beginning. A whole new generation of robot *gladiators* may soon come rolling out of the factory and through your front door.

I can imagine that toy companies like Coleco, Mattel and Parker Brothers will pick up on this trend and issue dozens of models of miniature toy robots — robot soldiers, robot superheroes, robot tanks and robot dragons and monsters. In five or ten years, the average household may resemble an enchanted forest, with little electronic gremlins, Smurfs, and demons scurrying around the house fighting fierce battles, and hiding out in closets, under tables, chairs and beds.

Computer Quiz Shows

In late December last year, I journeyed to Philadelphia and met with a producer for one of the major TV networks. The producer's job is to take a budget of several million dollars and come up with a new network TV show that will be a hit for five years down the road.

The subject of our discussion? A computer quiz show along the lines of the game show now being aired on cable by WTBS (Ted Turner broadcasting).

Computerized shows are the subject of much discussion right now among TV executives (network and cable). These shows need the right slant, however, or they will be dismal failures. The main danger is the computerized show will focus too much on computers themselves and not enough on people. Spotlighting people in rough, tough, or bizarre situations is what makes shows popular. The fancy electronics should highlight dilemmas people face when they compete, head-to-head, on TV, or slide into an electronic hot seat.

For example, people could appear on the game show and embark on computerized "dangerous missions," adventures and treasure hunts. The treasure would be the typical manufacturer-donated game show loot. People appearing on the show could form competing teams (as in the popular show, *Family Feud*).

The computer would be the electronic game master. It would decide where the treasure was hidden and what obstacles to place in the path of the treasure hunters.

Second, it would monitor and control all the game's spectacular special effects. They might include giant display screens, computer-generated sound effects, and lighting effects patterned after those developed by rock bands. The computers could flash all sorts of things on the display screens including mazes, simulated monsters, video clips from an interactive videodisc, and animated signs and graphics.

Last, the computer would interact with the game audience. Each member of the audience would have a miniature display screen and a simple computer keyboard on the right arm of the seat. While the game contestants were sweating it out on stage, the audience would be plotting with the computer, deciding all sorts of fiendish new predicaments and boobytraps. The audience could vote, via the computer, for or against the opponents at crucial points, and collectively choose major branch points in the game. In short, the audience would have the thrill of directly rewarding and punishing the game contestants.

The game audience might easily be expanded, over two-way cable and telephone networks, to the huge home audience. Thousands or millions of home viewers could become active participants in their favorite game show.

Educational Games

Up to now, the purpose of most computer games has been only to entertain. However, a new generation of kids' games is now appearing which are very entertaining, but also *educational.*

For example, the folks at Children's Computer Workshop (a spin-off of Children's Television Workshop) produce educational games for popular computers and for their "Sesame Place" theme parks scattered around the country. Theodore Geiss and Coleco are teaming up to produce educational "Dr. Seuss" electronic games. (Can you imagine an electronic Grinch or a computerized Cat in the Hat?) Mass-market publishers like Random House and Scholastic, and mass-market game manufacturers like Milton Bradley, are producing their own educational games.

Spinnaker Software of Cambridge, Massachusetts is foremost among a new breed of kid-oriented software publishers who recognize the enormous market for these educational games. They have gone after this market with high-gloss, slickly packaged materials. Spinnaker, for example, has come up with a series of *Snooper Troops* electronic mystery games. Each game is a mystery case. *Snooper Troops I* is the Case of the Granite Point Ghost. *Snooper Troops II* is the case of the Disappearing Dolphin. The games turn kids into electronic detective heroes.

Entertainment Tomorrow ***continued***

Snooper Troops and other junior adventure games are a lot of fun, and sell like hotcakes. They are also educational. They teach young people how to assemble and organize facts, form and test hypotheses, and make deductions — the essentials of the scientific method.

The adventure games are joined by a large number of educational *video games.* Instead of shooting alien invaders out of the sky, kids are blasting away at letters of the alphabet, numbers, and answers to multiple-choice questions. In order to destroy enemy tanks converging on a fortress, the kids must solve arithmetic problems. When they punch in the correct solution, they activate a cannon and blow up the tanks.

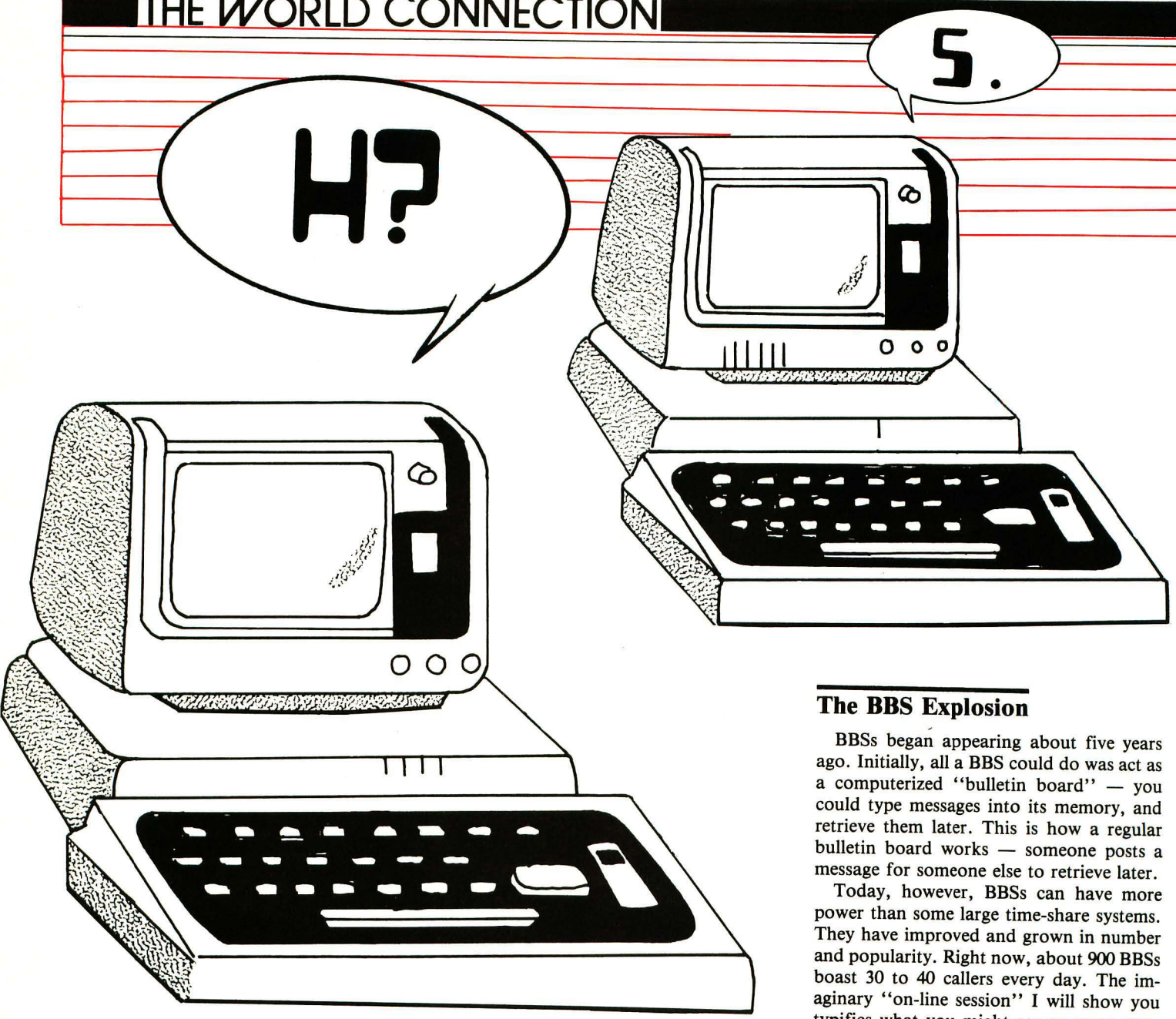
Educational games feature fast action, animated color graphics, electronic music, and terrific sound effects. They are a dramatic improvement over the educational computer games of the past, including text problems, drills, and complicated simulations.

So why should they be just for kids? I, for one, would enjoy adult computerized educational games. I'd love to learn more about robotics, genetic engineering, astronomy, Italian, acting, Latin American literature, and mountain climbing. And there are millions of adults just like me. They are out of school, and they are not financially able or inclined to enroll in some sort of continuing education program. They would love to learn a new subject on their personal computer — *if* the presentation were interesting, at the right level, substantive, exciting, and the price were right.

Adults represent a huge market for the new kinds of educational games — a market too big to ignore. I'll bet someone has spotted us already.

See page 64 for ordering information.

THE WORLD CONNECTION



As I see it, there are basically two types of computer communications bases for the personal computer user: the "big guys" and the "little guys." The big guys are the giant time-sharing databases such as *CompuServe* and *The Source,* which we will investigate next time. In this installment, we will talk about the little guys.

The little guys are the hundreds of computer bulletin board services (BBSs) scattered across our country and abroad. The primary difference between the little guys and the big guys is that a computer bulletin board service is owned and operated by an individual, rather than some large company. In addition, a BBS is practically free to the user.

The BBS Explosion

BBSs began appearing about five years ago. Initially, all a BBS could do was act as a computerized "bulletin board" — you could type messages into its memory, and retrieve them later. This is how a regular bulletin board works — someone posts a message for someone else to retrieve later.

Today, however, BBSs can have more power than some large time-share systems. They have improved and grown in number and popularity. Right now, about 900 BBSs boast 30 to 40 callers every day. The imaginary "on-line session" I will show you typifies what you might see on your computer screen if you called up a BBS and communicated with it.

Calling the BBS

To contact a computer bulletin board service, all you need is the phone number. While at your terminal, you call that number and listen for a high-pitched whine. At this point, your computer and the "host" (or BBS) computer start communicating with one another, and you might see something like this on your screen:

> Welcome to Forum-80 computer bulletin board in operation since June 9, 1982 owned and operated by Timothy Knight Please feel free to leave any messages or comments.

Computer Interaction

by Tim Knight

This type of "welcome" message tells you what BBS you have called, and conveys a friendly feeling. After this, you will be asked to "log-in." You type in your name, and your city and state, something like this:

```
What is your first name? Franken
What is your last name? Stein
Where are you calling from? Evilville,
Transylvania

You are Franken Stein from Evilville, cor-
rect? YES
```

At this point you might want to leave a message for someone, retrieve a message, or chat with the person who owns the BBS. These options generally require a one-letter command. The commands vary slightly from one BBS to another, but they usually follow a pattern.

The Commands

When the BBS asks you what you would like to do next, it usually prints out something on your video screen resembling this:

```
Please type in the function you want; B, C,
D, E, G, H, K, N, R, S, T, U, X
```

Each letter represents a specific command. The majority of BBS commands are for saving and retrieving messages. These include "E" for entering a message, "K" to kill (remove) a message from the database, "Q" for a quick scan of the subjects of all of the bulletin board's messages, and "R" to retrieve a particular message. "S" permits you to scan the subjects of all current messages and the date and time each one was entered, along with the name of the person who left the message. Messages, incidentally, are simple to compose and enter, since the computer guides you through the process step by step.

You will also find commands for uploading (sending) and downloading (retrieving) computer programs. These are "D" for downloading and "U" for uploading. The programs available on bulletin board services should be in the public domain, or the SYSOP (the SYStem OPerator) and the BBS users could be accused of pirating copyrighted software.

Most of the other commands are "general purpose." For example, the "G" command is for "goodbye" and tells the computer you want to log-off the system. The "C" command, which I use frequently, alerts the SYSOP, through the host computer, that I want to talk to him. If the SYSOP is around and wants to talk, he enters the *chat* mode. The "B" command switches from 300 baud to 110 baud and vice-versa. The "H" command tells the computer you need help using the BBS, and the "N" command tells the computer to pause when it reaches the end of a line. This way, if you are printing everything the BBS types out, the letters on the display won't get ahead of the letters on the printer because of the speed difference. Finally, the "X" command tells the computer you are an expert so that the commands the host computer gives you are shortened and more efficient.

"Messages are simple to compose and enter, since the computer guides you through the process step by step."

These commands represent the BBS standard, and are very simple to learn. Don't assume, however, that these commands are *exactly* the same on every BBS. Some bulletin boards have more, some have less, and on some, these same commands do different things. Type "H" for help when you are on a new system so that you know what the host computer will accept as proper input. Sending and retrieving messages is easy and fun to do on a BBS, and is certainly more efficient than sending a letter.

Advantages of the BBS

Bulletin board services have certain advantages over the large time-sharing systems. Even though a BBS can usually support only one user at a time, and are operated on a simple personal computer rather than a huge and sophisticated machine, advantages balance out these disadvantages fairly well.

Many SYSOPs have become my friends. We exchange ideas, programs, and advice. Meeting a SYSOP can be rewarding, and if you are going to use a system regularly, it is important to have at least *one* friendly conversation with your system operator.

CompuServe charges a minimum of $5 an hour, and *The Source* usually charges more. Bulletin board services, on the other hand, are almost always free, even though the phone call may cost money. However, there is probably a BBS in your local area. In that case, it wouldn't cost *anything* extra.

Another advantage is that a BBS is more personal than a large time-sharing system. If there is a problem with the computer you are calling, you have the attention of the SYSOP who will fix it as soon as he can. However, on a giant system like *CompuServe,* I have experienced long delays because of technical problems, which can become very aggravating. In addition, you can develop friendships with the SYSOP, and with other system users.

A BBS also has many features you cannot find on large time-sharing networks. A small BBS can fit the needs of the 25 or 30 people who call it regularly. In fact, suggestions from users make a BBS almost "custom designed." On something like *The Source*, with such a variety of users, it is impossible to meet the needs of everyone. You will not find the "frills," like uploading and downloading games, local happenings, and chatting with the SYSOP, that you find on most bulletin boards.

Getting to know the system is simple. By using the "H" command, you can find out what advice the bulletin board has to offer. Use each of the commands to find out what they will do, and read any bulletins or special notices from the SYSOP about the system. The best teacher is experience, and you will soon find that using a BBS is not as hard as it may seem.

Use the chat command (whatever it may be — "C" for CHAT, "S" for SYSOP, or "Y" for YELL) to call the SYSOP. Tell him about yourself, your interests, and comment on how much you appreciate the system. Once you strike up a dialogue, you may find that the system operator can offer advice on almost any computer-related subject.

continued

World Connection *continued*

Lastly, get to know the other people who use the system. Leave messages to one or two of them to introduce yourself. People are almost always willing to help you out, and the BBS is a great way to make new friends who share your interests and possibly your ambitions. To get you started, I have included the following list of BBS's. Try some of the numbers and have fun.

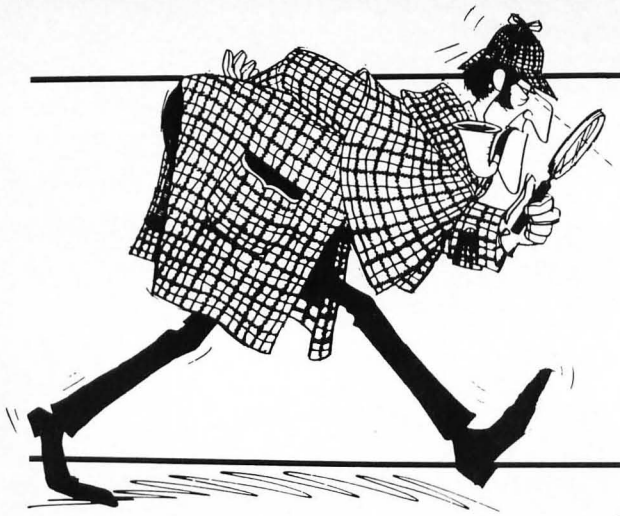
NUMBER	NAME	LOCATION
201 790-6795	MSG 80	Haledon, NJ
201 835-7228	ABBS	Pompton Plains, NJ
201 887-8874	Mike's Rat's Nest	
201 992-4847	MSG 80	Livingston, NJ
203 744-4644	Bullet-80	Danbury, CT
205 492-0370	Bullet-80	Alabama
206 334-7394	MSG 80	Everett, WA
206 524-0203	ABBS	Seattle, WA
212 787-1520	ASTRO BBS	
213 291-9314	PMS	Los Angeles, CA
213 340-0125	ABBS	San Fernando, CA
213 349-5728	ABBS	Los Angeles, CA
213 394-1505	ABBS	Santa Monica, CA
213 431-1443	Odyssey-80	
213 675-8803	ABBS	Hawthorne, CA
213 821-7369	ABBS	Marina Del Rey, CA
213 843-5390	CBBS	Los Angeles, CA
214 634-2668	ABBS	Dallas, TX
214 769-3036	Forum-80	Hawkins, TX
216 724-1963	MSG 80	Akron, OH
216 745-7855	ABBS	Akron, OH
301 344-9156	GAS-NET	
303 759-2625	ABBS	Denver, CO
305 566-0805	ABBS	Ft. Lauderdale, FL
305 683-6044	INFOEX-80	Florida
305 689-3234	ABBS	W. Palm Beach, FL
305 821-7401	ABBS	Miami, FL
305 965-4388	The Greene Machine #1	FL
305 968-8653	The Corsair	FL 300/1200
312 337-6631	ABBS	Chicago, IL
312 420-7995	ABBS	Naperville, IL
312 545-8086	CBBS	Chicago, IL
312 622-5969	Greene Machine	Chicago, IL
312 622-9609	ABBS	Chicago, IL
312 964-7768	ABBS	Downers Grove, IL
313 288-0335	CBBS	Detroit, MI
313 484-0732	PBBS	Ypsilanti, MI
314 838-7784	ABBS	St. Louis, MO
315 337-7720	TRASH (80) BIN	
404 394-4220	CBBS	Atlanta, GA
404 939-1520	North*	Atlanta, GA
404 953-0723	ABBS	Atlanta, GA
406 256-3813	The Most Significant Byte	
406 656-9624	IBM PC BBS	Billings, MO
417 529-1113	Bullet 80	Springfield, MO
417 862-7852	ABBS	Springfield, MO
503 646-5510	CBBS	Portland, OR
602 957-4428	ABBS	Phoenix, AZ
607 754-5571	TCBB	Endicott, NY
612 929-8966	ABBS	Minneapolis, MN
703 281-2125	CBBS	Washington, DC
713 233-7943	PMS	Freeport, TX
713 977-7019	ABBS	Houston, TX
714 354-8004	Greene Machine	
714 449-5689	PMS	Santee, CA
714 574-6220	VERGA-80	
714 582-9557	ABBS	San Diego, CA
714 582-9557	PMS	San Diego, CA
714 644-0474	Bullet-80	Newport, CA
714 739-0711	ABBS	Buena Park, CA
714 751-1422	ABBS	Irvine, CA
714 772-8868	PMS	Anaheim, CA
714 898-1984	ABBS	Westminster, CA
803 771-0922	North*	Columbia, SC
808 488-7756	ABBS	Honolulu, HI
808 521-7312	ABBS	Honolulu, HI
901 761-4743	ABBS	Memphis, TN
904 243-1257	ABBS	Ft. Walton Bch., FL
916 971-1395	Bullet-80	Sacramento, CA

COMPUTERS AND VIDEO

Are They Worlds Apart?

The term "convergence" is used frequently today when discussing computer and communications technology. It's true, all of the communication methods we've come to regard as separate media, over the years, seem to be coming together. Two of these media seem inexorably linked — computers and video. Yet, two sets of distinctive terminology, often for the same purpose, have developed in these fields, and aficionados of one tend to discount the relevance of the other.

In this and coming issues, **SoftSide** will help you bridge the gap between video and microcomputer technology. Reports such as "Cardboard To Cable" will inform you of some of the new communications capabilities possible through the marriage of computers and video. Articles like "Where Has All The Resolution Gone" will burn off some of the fog between video and computer terminology. We'll review available hardware and report developments on the horizon which may revolutionize how you think of the relationship between your computer and its screen. Whenever you see the globe of video screens taken from this issue's cover in the pages of an article, you'll know that article is part of our video series. We've intentionally scheduled no end for this series. The convergence of the technologies will be important for some time to come, and we want to report the most important information as soon as it becomes available, rather than waiting to group the articles together around specific issues of **SoftSide.** If you have suggestions for this series, or specific questions concerning its topic, please write to us so we can tailor its information to your needs. We believe that the worlds of computers and video should no longer be considered separately. We hope you'll join with us in bringing them closer together.



Where has all

An Introduction to Video

by Tom Flynn

...so little vertical movement occurs in the average picture that having 800 lines is overkill.

In more computer graphics articles than I care to remember, the authors boldly proclaim that high resolution color pictures on the Apple® are limited because of the "funny" way the television industry makes color (the NTSC system). This statement reveals the fact that a large communications gap exists between television broadcasters and those who create computer graphics.

I first noticed this gap when my wife delved into the field of computer graphics. She showed me several articles about a new rage in graphic presentation called "raster" graphics. The way the subject was treated led me to believe that this could not be my old broadcast friend of 525 scan lines on a television screen, simply called "the raster." Conversely, I encountered two strange terms, *CAD/CAM* and *vector graphics*. To avoid losing many of you, let me define a few terms:

- **Raster** — A canvas of white lines traced by an electron beam on the face of a "picture tube." A graphic picture may be displayed on this canvas.
- **Vector Graphics** — A graphics application in which the beam traces the *design* directly on the face of the picture tube, instead of painting it on a raster already existing on the tube.
- **CAD/CAM** — *Computer Aided Design* and *Computer Aided Manufacture.* CAD has used vector graphics for design since it lays out what is needed accurately and simply. CAM equals robots and production.
- **Refresh** — Means "go over the lines again" and "do it quickly before it fades out!" Counter to the popular theory, the major factors influencing screen flicker are the frequency of refresh, the screen phosphor decay time (how long the light lasts), and interlace.

Tom Flynn is no newcomer to video technology. He has been involved in television broadcasting for 35 years, almost from its inception. He is currently in management of television operations for one of the major commercial networks. For the last five years, he has been working with the Apple II+ and is a proficient programmer. Most recently, he has become intimately familiar with microcomputer graphics through his wife, Ame Flynn's commercial graphics firm, TechniGraphics.

Trace, Retrace and Interlace

The term *interlace* requires more than a brief definition. Television pictures tend to flicker if the lines are traced sequentially from top to bottom, one after another. If the phosphor retains the image long enough to prevent screen flicker, picture smearing (trails created by movement) would be objectionable. What to do? The solution is to trace 1/2 of the picture (every other line from top to bottom), then trace the other 1/2 of the picture (*interlace* the missing alternate lines) from top to bottom. This makes the refresh twice as fast, and maintains the full picture's vertical resolution at an acceptably high level.

Each scan from top to bottom of the screen is a *field,* and two fields comprise a complete picture, called a *frame.* The interlacing is not magic. The beam traces 262½ lines from top to bottom because of the mathematical relationship between the field rate (approx. 60 hertz, or 60 times per second) and the line rate (approx. 15,750 Hz). In other words, if you divide the number of lines generated in one second (15,750) by the number of fields generated in one second (60), you arrive at 262½ lines per field, or 1/2 of a full frame.

Retracing over the same line gives no added vertical resolution. The vertical resolution is the *number* of lines from top to bottom in a complete frame. A French system had, at one time, 800 lines from top to bottom for a full picture. This gave exceptional vertical resolution. However, so little vertical movement occurs in the average picture that having 800 lines is overkill. The British system of 625 lines seems to be a good middle ground. The British field rate is 50 hertz, so, although the vertical definition is better, I find the 50 Hz flicker objectionable.

Resolution

Horizontal resolution is the number of *vertical* lines visible in one frame. More lines provide better resolution. To rephrase this for the computerist/television person, horizontal resolution is the number of cycles (one "off" bit and one "on" bit) per line. One complete cycle represents one line of resolution.

Horizontal resolution varies from a color resolution of 140 lines for an Apple to approximately 700 lines for a TV camera. Extremely high resolution is possible with a large computer and special recording techniques. This resolution could be as high as 5000 lines. I was once asked if 5000 line pictures could be used for high quality broadcast. Since the *best* TV camera gives only 700 lines, and an excellent TV transmitter puts out approximately 350 lines of horizontal definition, I was not particularly thrilled with the prospect. Sadly enough, most TV receivers are so detuned and mismatched that 150 to 200 lines is what the viewer typically sees. With these limitations, high quality pictures have no practical value for broadcast television.

Looking at the Apple in these terms, it has horizontal resolution almost as good as the average television viewer sees. The vertical resolution is another matter. The Apple provides only 96 lines of vertical resolution whereas the color television picture has

The Resolution Gone?

approximately 250 lines. This gross lack of vertical resolution is what gives the computer artist a bad case of the "jaggies." Jaggies (a.k.a. staircasing and aliasing) give a sawtooth appearance to what really should be a smooth diagonal line. As I stated before, since ordinary scenes have little vertical movement compared to horizontal movement, the computer artist is not far from having the same picture quality he sees on home TV.

Television Set vs. Monitor

This brings me to my pet peeve. Every computer magazine I have read has complained how bad a computer's color resolution is when viewed on a television set. Articles further claim you can obtain fantastic advantages when you buy expensive monitors, and here's the rub, even more expensive RGB monitors.

Let's see what we get for our expenditure. Color monitors are merely color TV sets without the front end (RF tuner). Tapping into a TV set past the tuner stage (called "jeeping") has long been a common method to convert it to a monitor for ordinary purposes. TV control rooms, where the producer wants to see the highest quality 700 line pictures, have "wide band" monitors, with phosphor matched tubes costing many thousands of dollars, to achieve this quality.

But wait a minute! Our Apple's HiRes color screen has a maximum of 140 x 96 lines resolution. Our color TV set (*with* the RF) has 250 x 250 lines resolution, so we haven't gained any ground for our extra expenditure on a monitor. Now, if someone wants to sell you a high quality high resolution monitor cheaply, and if all you want to look at is your friendly computer — snap it up. I'm sure home computers shortly will have graphic generators with much higher resolution.

To sidetrack just a little, those who buy black and white monitors to view 80 column text, do so with very good reason. 80 column text requires 320 lines of horizontal definition for clear representation. The poor old color TV hobbles along with only 250 lines because of the RF section's limited bandwidth.

Why RGB?

Dare I say the magic letters, RGB? For still more money, the manufacturer will leave out video amplifier and decoder sections. To drive your picture tube's (R)ed, (G)reen and (B)lue guns, your Apple must send red, green and blue signals (plus a synch signal). Since the Apple II family supplies the colors orange, blue, green and violet, you must invest in an interface card to derive the R, G, and B signals. After all this, you are left with the original Apple color picture that could be seen just as clearly and colorfully on a TV set or a "jeeped" TV set (monitor). You may, however, be consoled by the fact that now you can see your black and white 80 column alphanumerics.

To sum up, consider the old computerists' adage of GIGO (Garbage In, Garbage Out). An expensive, high quality picture reproducer cannot transform a mediocre source into an excellent picture.

ed. — Frequently, using a monitor in place of a TV set ***does*** *give you a better picture. The reason is that the RF modulator the computer store either threw in for free or charged $14.95 for is a miniature transmitter. It sends the computer's output on a specific channel to the TV, which then tunes it in. Putting the signal through the transmitter and tuner will degrade the signal to some extent. If the modulator (transmitter) is of poor quality, the signal suffers more distortion. Dispensing with both of these complex and unnecessary circuits is what causes a monitor to produce a better picture. You could do the same by connecting your computer to your TV just after the RF section. The point is that monitors have no special qualities* per se, *and are less expensive to make. Although high quality RF modulators are manufactured, in most cases, an RF modulator is a less than satisfactory way to connect a computer to a display screen.*

SoftTakes

"No, Mr. Baker! A subroutine is NOT when the U-Boat captain does a song and dance!"

FROM CARDBOARD TO CABLE

Computer Graphics Promote Community Awareness

by Ame Choate Flynn

Once upon a time, the most essential piece of equipment for any non-profit, under-budgeted organization was the old, unreliable mimeograph machine. You drew or typed on wax-based stencils and ran off pamphlets or leaflets by the thousands, hoping all the while that the stencil would not self-destruct. I gathered much experience in the 60's and 70's, trying to get an eye-catching piece of work done on a stencil, only to have it tear, the machine eat it, or break down during a run. If a project had to be more expensively publicized, you went to the local printer. Posters — at their affordable best (one color on colored stock), were reserved for special events. They were never wonderful, but they looked slightly more professional.

When you joined any non-profit organization, you found there was always a need for volunteers to stand on street corners, distributing leaflets. It was quite discouraging to see trash cans stuffed with pieces of literature that took time, tears and sweat to create. For any under-budgeted, under-staffed group, however, this was the main way of getting information across to the general public.

In the technologically-advanced 1980's, most public-service organizations still have the same monetary problems. Keeping organizations *alive* during budget cut-backs is hard, when most community organizations are competing for the same dollar. Investing in electronic media, computers, videotex, etc. is a virtual impossibility.

Apple Bytes

Enter *Apple Bytes*. Stage right, Channel 10, Manhattan Cable, brought to you by the Alternate Media Center, Tisch School of the Arts, New York University. (Figure 1) The service broadcasts stories, news briefs, and up-to-date information on public oriented local happenings...all created with computer graphics.

Now, it could be named *Apple* because it's located in New York City (the Big Apple); *Bytes* is fairly evident to those who dabble in computers. All of the above is true. It's created and run from an Apple® II+ and is taking the place of our old friend, the leaflet.

Let me try to explain a bit of the new technology that's difficult to get straight. Please be aware that these definitions change day to day, from article to article:

● **Teletext** is a one-way broadcast on television, constantly cycling pages of graphics and information. There is no interactivity. Viewers can see a "page" only in sequence. If the information you're interested in was on page 55, and the current page is 56 out of 500 — you'll have to wait 444 pages until it comes around again.

● **Videotex** (no final "t") is truly interactive broadcasting. You can select a page of information or graphics and receive it immediately. Many users can interact with the same system and receive information on any subject contained in the database. In a truly two-way system, you would be able to get airline schedules or lists of hotels from the database, and then reserve plane tickets or rooms.

There are ongoing Teletext and Videotex systems around the world. In Great Britain it's called *Prestel;* Canada — *Telidon;* France — *Antiope;* and in Japan, the system is called *Captain.* There is no universal standard for these systems, and it's anyone's guess which one the United States will adopt. Right now, there are many experiments and trials starting around the U.S. For more information, you can read *"Teletext and Videotex in the United States",* published by McGraw-Hill.

Apple Bytes is a microcomputer-based, one-way, "electronic text & graphics system" public information service. It delivers its information to viewers via cable television. The service originates at the Alternate Media Center and is funded by the Charles Revson Foundation.

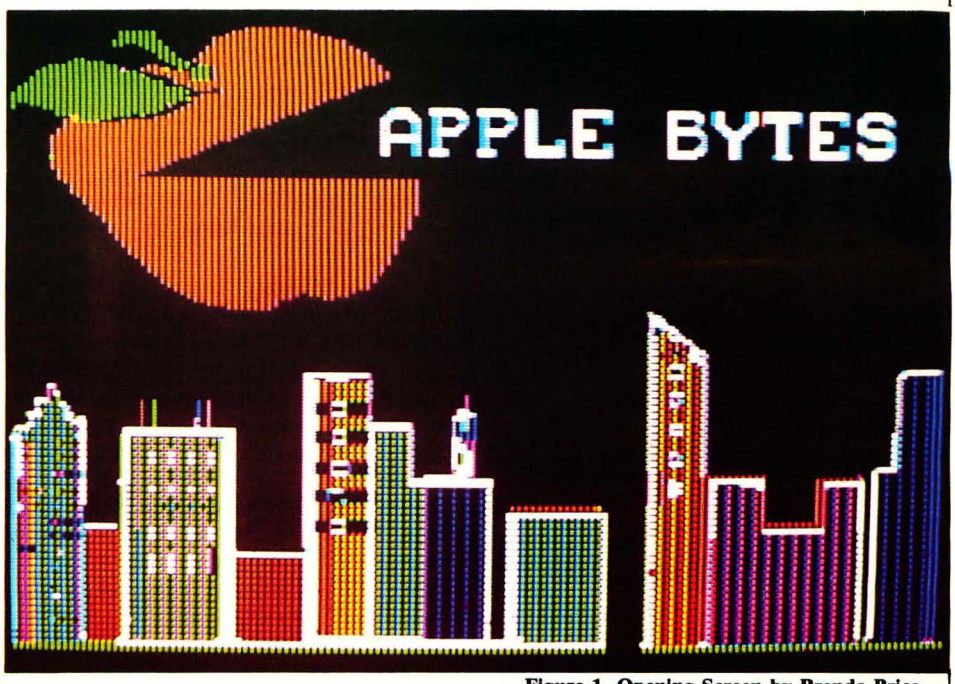


Figure 1. Opening Screen by Brenda Price

The Alternate Media Center

The Alternate Media Center (AMC) (Figure 5) is a unique organization devoted to the exploration of new communications technologies and to the promotion of their most socially beneficial uses. In its ten-year history, the Center has worked with a variety of technologies, including public access cable, interactive cable, computer conferencing, telephone conferencing and broadcast teletext. AMC also researched and planned New York University's Interactive Telecommunications Program (ITP), the first Masters Degree program of its kind in the country. Because ITP and AMC share space and resources, many ITP students have participated in *Apple Bytes.* The AMC created, designed and managed a broadcast teletext project on WETA-TV in Washington, DC. They felt there was nothing to lose in founding *Apple Bytes;* they could learn a lot and grow a lot — so they took the plunge and went on the air.

Several factors had to be considered in the creation of *Apple Bytes*, not the least of which was cost. Large videotex/teletext systems can cost hundreds of thousands of dollars. Using graphics produced on an Apple II+, the "Apple Byters" were able to construct a working system for approximately $15,000. The system can be considered in two major parts; page creation and storage/transmission.

The page creation hardware is an Apple II+ (48K), a disk drive, color monitor and a graphics tablet. Paddles, and/or a light

continued

Figures 2 and 3. "How Do You Make Apple Bytes?" by Francois Roux

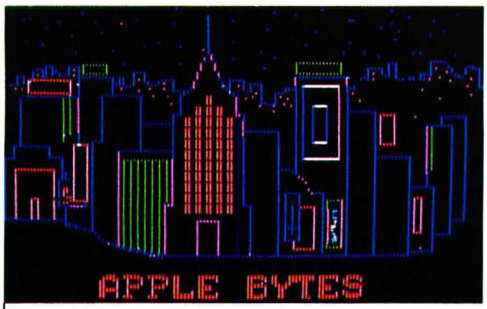


Figure 4. New York Skyline Screen by Francois Roux

From Cardboard to Cable *continued*

pen could be used for page creation. (The graphics tablet, as of this writing, seems to have wandered off the market.)

Drawing and text entry are executed with the Apple graphics tablet software supplemented by *The Complete Graphics System* (Mark Pelczarski, Penguin Software). *Special Effects* (Mark Pelczarski and Dave Lubar, Penguin Software) is used for more...well...special effects, i.e. move, scroll, shrink, or flip.

In between the drawing and transmission modes, a printout of the story being created is made on an Epson MX-80 F/T printer. These pages form a finished "storyboard" of the program base for the week. They are loaded into the Corvus hard disk, replayed for testing purposes, fixed if need be, and stored for transmission. The pages are also temporarily stored on 5 1/4" floppy disks to keep reusable images on file for future retrieval.

Apple Bytes' organization and display of pages for broadcast is managed with a custom operating system designed by Ian Kinkade. Run on a Corvus hard disk, the system coordinates with a Mountain Hardware clock and starts transmitting the fifteen-minute show automatically — fourteen times a week.

On The Air

In February, 1982, four local groups started selling their wares through *Apple Bytes*. Two typical voluntary organizations are:

- Citizens Committee for New York City, which promotes and supports neighborhood-based, self-help programs. If a block association wants to try for a "Mollie Parnis Award" (named after the fashion designer who funds it, they can find out how to enter their block through *Apple Bytes*.
- The Neighborhood Open Space Coalition, is involved in the development and protection of open space facilities in New York City. (Figure 4) They might be announcing a "Ranger Walk," a tour through a local park with a Park Ranger as guide.

Apple Bytes seeks to enrich New Yorkers' experience of their city by increasing their awareness of what's happening in its streets and how they can participate. There are now a total of eight voluntary groups represented in the *Apple Bytes* database.

The first few months on the air were a shakedown period. No matter how much pre-planning goes into a project, something unexpected always shows up in execution. Many preconceived ideas were blown apart. A 35-page editorial essay, albeit very informative, lost its audience. No one could concentrate on so much text! Skills in editing both the text and graphics had to be immediately honed.

If some facet of the "state-of-the-art" did not exist, they helped create it. I was asked to act as a graphics consultant to *Apple Bytes* in September, 1981. After the first trial pages were created by the staff, I got a call complaining about the size of the hi-res text; "Either we can't see the text with the small font or, with the large font, you can only fit the information of a telegram on a page." Working with Mark Pelczarski, I designed a medium-sized font that seemed to solve the problem. James Eisenman, a professional graphic designer and typographer, has also designed special *Apple Bytes* fonts that give a very sophisticated look to their material.

The program started with silent broadcasts, no sound. Silence may have been fine for Charlie Chaplin, but it clearly upset viewers who expected something aural with their television. It's difficult to find the right tune to accompany how to buy a tree for your block, so a compromise tape is running at the moment — street sounds are filling in the audio void.

On-Line Contributors

Since the participating organizations — the information providers — are not located near AMC, a means of getting copy back and forth expeditiously was needed. The Apple Bulletin Board system is now used to send and receive text between computers via modems in the outside groups'

continued on page 26

Figure 5. From The Alternate Media Center Byte by M. Manahattan

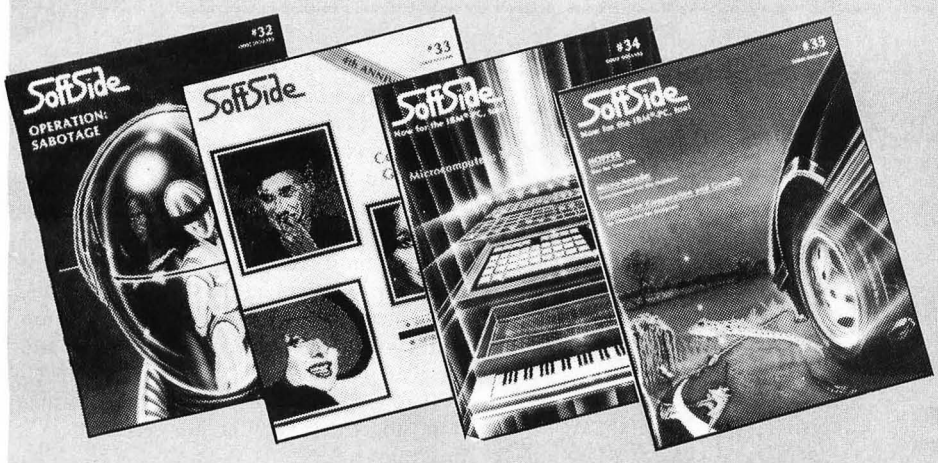


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Photo 1. Brenda Price working at a creation station.

From Cardboard To Cable ***continued***

offices and AMC. Text is typed in as a message, received, and later printed out. This direct method for exchanging information eliminates the cost of messengers or stamps. Best of all, it doesn't care if someone is out of the office or attending a meeting. The lead time is relatively short for an information service of any kind. Magazine lead time is usually several months, and a television show of any magnitude can require two weeks to several years depending on its complexity. It takes from five to eight working days to put an *Apple Bytes* presentation together.

Numerous people and organizations have been involved with *Apple Bytes.* There has been an incredibly cooperative spirit among AMC, ITP and their community organizations. Almost everything they've accomplished has never been produced before with such limited resources. Thousands of dollars were not available for experimentation; whatever they came up with had to work. Here are a few of the organizers:

Brenda Price, (Photo 1) an ITP graduate with a background in conceptual art and video, directed the design and editing process. Gary Shober, a professor at ITP, was responsible for the design, assembly and troubleshooting of the technical system. David Harkins, an ITP part-time student, built the technical system and helped train many non-computer people on the system. Mary Abadie, Assistant to the Director of AMC, worked on text editing and building of the weekly program. Anne McKay is the Project Manager and has overall coordination responsibility. She also serves as the unofficial "den mother" to all who enter the *Apple Bytes* domain.

The *Apple Bytes* project became a creative cauldron, drawing people from all over the area to add their own flavor to the "soup."

Artists were found both within and outside the NYU community. In one experiment, the Alternate Media Center invited New York artists to come and learn the Telidon videotex entry system and create art works instead of information pages. Several of these artists, Maria Manahattan for example, stayed on to learn the *Apple Bytes* system and became proficient in its use.

The different "look" of *Apple Bytes* interests the people who tune in on Manhattan Cable. Communications networks need an inexpensive information dissemination medium for small service areas (i.e. bounded by the broadcast range of a small cable station). This *Apple Bytes* certainly accomplishes!

One virtue of the project for all involved was the opportunity to use the system for their own growth; to compare and develop various styles of drawing, writing, and thinking. Everyone waited for the program's own wit and charm to develop.

What's In A Program?

At first, second and even third glance, the pages seem quite vivid. (Figures 2 and 3.) The Apple's colors are fairly overblown because they have been used to their fullest, high-chroma extent. This showiness has a reason. The program must exist in a "television environment" where colors are bright and movement is constant. They are competing not only for space on a viewing timeline, but must also stand out to be retained in viewers' memories.

Equally important as the graphics are the stories of the events they portray. It is easy to write a long, wordy press release of a community conference or happening, but to limit that description to a few words and still convey a sense of excitement is difficult.

The *Apple Bytes* editors have found their own style of very direct and concise writing and illustration. There is no room for rhetoric. They must package information quickly and concisely. Red Burns, Director of the Alternate Media Center, insisted that its responsibility to the audience was to make the stories interesting and clear.

In this "one-way electronic medium," the stories are short segments. *Apple Bytes* is used mostly as a source of information for community resource organizations. This information can be in the form of referrals, announcements, or short point-of-view editorials covering issues, events and services.

Three types of workers pull the information together and create each week's program:

- **Word People,** who take the messages left on the bulletin board system by the organizations, and rewrite them into a cohesive story. The story is then edited for the screen and storyboarded into pages.
- **Artisic People,** who draw the art and graphics, and add text — i.e. create the pages according to the instructions left by the *word people.*
- **Conceptual People,** who may do an entire segment of the program. This might be a theme section having to do with anything from food to Senior Citizens.

The most important aspect of this experiment in small computer technology/cable television is probably the research involved in putting it all together, and the knowledge gained thereby. *Apple Bytes* is working on an information packet, a "How-To Cookbook" for other organizations to be published at a nominal cost. If you want to start a neighborhood information service, you can write *Apple Bytes*, Alternate Media Center, New York University, Tisch School of the Arts, 725 Broadway, New York, NY 10003.

Because it does not demand a lot of start-up money, there is a good chance that other organizations throughout the country can take up the gauntlet and start their own version of *Apple Bytes.* After all, it could be Boston Baked Bits on an Atari; whatever the name, it's a very important concept in electronic communication for a worthwhile purpose.

Apple Graphics Slide Service

The Screen displays in this article were furnished courtesy of **Computer Slide Express.** With custom-created equipment, this slide service creates slides from Apple computer disks. This eliminates much of the pain and agony of trying to photograph them from the screen. From 35mm slides, you can go to color Xerox, Cibachrome prints, or use slides of your charts and graphs directly in a presentation.

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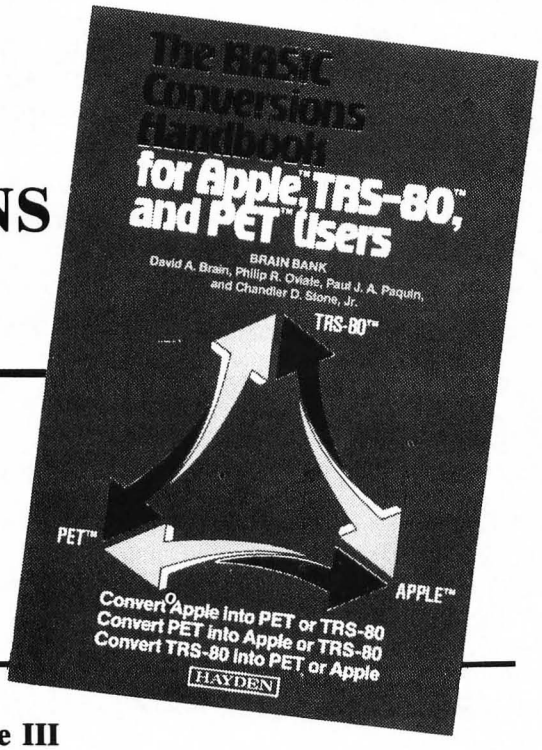
The BASIC CONVERSIONS HANDBOOK

For APPLE®, TRS-80®, and PET® Users



Reviewed by Stephen G. Stone III

from Hayden Book Company, Inc., 50 Essex St., Rochelle Park, NJ 07662. Retail Price: $7.95.

BASIC is the "standard" language for microcomputers today. Anyone who tries to run an Apple II program on a TRS-80, however, soon discovers that BASIC has dialects not universally understood by all micros. Each micro vendor tacks unique enhancements onto the "standard" BASIC released with his machine, limiting the portability of all but the most basic of BASIC programs. *The BASIC Conversions Handbook* provides the answer to all who have drooled over a program in one of the micro magazines, only to discover it was written in a "foreign" BASIC.

In a brief 80 pages, this book offers all you need to know to convert most programs for the Apple II, the TRS-80 or the PET to run on each of the others. The book contains three main chapters, one for each machine. The chapters break down into two sections, each containing a table of instructions comparing the statements of the subject computer with the comparable statements of one of the other two computers.

The beauty of the book is that when a function on one machine has no corresponding function on another machine, the authors explain how to duplicate the function. In some cases, they furnish a subroutine to accomplish the desired results. When a function need not be duplicated, the authors tell what the function does and why it is unnecessary in a conversion to the machine in question.

The most detailed explanations appear in the section on translation from Apple II to TRS-80. Someone converting to or from the PET may have to refer to this section for a more complete description of what an instruction is supposed to accomplish.

The BASIC Conversions Handbook falls short in its coverage of sound and graphics. Sound is not mentioned anywhere in the book. Although both high and low resolution graphics are discussed, only the low resolution, or text screen, is explained for the Apple II. Graphics are covered adequately for the TRS-80 and PET but it will be very difficult to convert a high resolution Apple II program without reference to other sources.

The absence of a memory map for each machine may also make some conversions more difficult. More and more software these days uses PEEKS and POKES to memory. It would help to know whether these functions control system processes, strobe the keyboard, place characters on the screen, and so on.

In spite of its shortcomings, this is an extremely useful book. To convert many business applications, it may be the only reference you will need. High resolution graphics games on the Apple II may require an Apple II BASIC manual. A quick trip to the local library should fill in the gaps. All in all, this book is a must for anyone who wants to access *both* the TRS-80 and Apple II software worlds.

Speaking

- **The *Software Automatic Mouth (S.A.M.),* by Don't Ask Software, 2265 Westwood Blvd. Suite B-150, Los Angeles, CA, 90060. System requirements: Apple® II/II+ with 48K, disk drive and speaker, an Atari® 400/800/1200 with 32K and disk drive. Retail price: $124.95 (Apple version);$59.95 (Atari version).**
- **The *Echo Speech Synthesizer,* from Street Electronics Company, 1140 Mark Ave., Carpinteria, CA. System requirements: The *ECHO-GP,* a stand-alone unit, is available for the Apple, Atari, IBM® PC and TRS-80® Models I and III for a retail price of $300.00. Also available is a RAM board for the Apple for $149.00, and the IBM PC ($225.00).**
- **The *Alien Voice Box II,* from the Alien Group, 27 West 23rd St., New York, New York 10010. System requirements: Atari 400/800/1200 with 32K and disk drive. Retail price: $169.00.**

Shortly after receiving my assignment to write this comparative review, I invited a group of my friends to watch me demonstrate (gloat over) the art of electronic eloquence.

For almost three quarters of an hour, *S.A.M.* and the *Echo* played verbal guessing games and delivered famous addresses and soliloquies, while the *Voice Box II* talked, played music and sang songs — everything short of "the ol" soft shoe. My friends nodded and chuckled their approval throughout the demonstration. When it was over, however, they said to me, practically in unison, "Gee, Pete, that's really cute. What else can they do?"

"For crying out loud, what else do they have to do?" I shouted at them. "Didn't you *hear* them?" I first interpreted their behavior as mere jealousy, but soon the voice of reason reared its ugly head, and persuaded me to ponder the more serious uses of speech synthesizers. Why would you want a talking computer in the house? Is spending between $60 and $300 actually worth adding an "ouch" noise to your favorite space attack game, or are there more practical applications? These questions are as important as the relative strengths and weaknesses of the speech synthesizers themselves.

The Software Automatic Mouth (S.A.M.)

S.A.M.'s demonstration program begins, "Hello, my name is *S.A.M.*. I am a software speech synthesizer for the Atari computer...," in a somewhat nasal but very animated voice. *S.A.M.* has *personality.* In fact, *S.A.M.'s* ability to mimic the complex variations in pitch and intonation of human speech is downright uncanny.

S.A.M. is a software-based speech synthesizer written in Machine Language. I tested *S.A.M.* and the other speech synthesizers on an Atari 800 with 48K. The *S.A.M.* program occupies about 9K, and the program which allows *S.A.M.* to translate text directly to speech, as opposed to translating phoneme combinations (see "Phonetic Favorites"), occupies an additional 6K RAM. *S.A.M.* flaunts its speaking abilities with the help of Atari's internal POKEY sound chip.

Yes, *S.A.M.* can be copied, *but* beware, it is not easily nor completely copyable. Page two of the documentation clearly specifies the limitations placed on copying and selling programs incorporating *S.A.M.'s* verbal abilities. For those who intend to make legitimate archive copies of *S.A.M.,* it will not copy completely with either an Atari DOS 2.0 duplicate disk or duplicate file option. The disk uses a mem.sav. procedure similar to that of Atari Microsoft BASIC. You load *S.A.M.,* create mem.sav. on a separate disk and make duplicates of the copyable files. All but two sectors will copy using Atari DOS copy routines, but these two sectors contain the subroutines which actually allow *S.A.M.* to speak. The disk will not operate properly or completely without going through this backup procedure, so read the manual carefully.

The accompanying documentation for *S.A.M.* is superb. It is aesthetically pleasing, printed by a *real* printer, has a *real* cover, and is instructional and informative as well, containing a brief section on the rudiments of computerized speech synthesis.

The *S.A.M.* disk contains demonstration, translation and speaking programs.

SAYIT, GUESSNUM, and SPEECHES are all demonstration programs which confidently, if not boldly, show off *S.A.M.'s* speech capabilities. These demonstrations are very well done. The few errors *S.A.M.* does make are immediately noticeable, but are no worse than the other synthesizers reviewed here, even the more expensive *Echo.* Eventually, you adjust to these irregularities and begin to perceive them merely as an "accent."

The SPEECHES program recites well known soliloquies, the DEMO program gives a short spiel about *S.A.M.'s* capabilities, and SAYIT allows you to type in strings of phonemes or text and play them back immediately. SAYIT is one of the most useful programs in the package; with it you can practice what you would ordinarily include in a much longer program. GUESSNUM, an auditory guess-the-numbers game, was a favorite among the second and third graders who play-tested it. The program's success undoubtedly rests in the fact that its enthusiastic "YOU ARE RIGHT!" nicely reinforces the correct answer.

The programs which allow *S.A.M.* to talk are easy to implement in your own applications. A string statement and a USR call are all it takes. The phoneme code (a phoneme is a basic sound unit of speech, like "ah" for the sound of "a" heard in "cat") is difficult to master, but the manual gives good direction and provides an English to *Phonemese* dictionary for assistance. If you would rather skip the phoneme code, *S.A.M.'s* RECITER program translates text directly to speech. The disk also includes an RS-232 handler program which allows your favorite bulletin board or information service to "speak" to you.

The program has one major disappointment. *S.A.M.* blanks the screen while it (he?) talks. This is not because *S.A.M.* has bad manners. The screen-blanking occurs because *S.A.M.* dominates the Direct Memory Access (DMA) when it speaks. The manual explains that you can reactivate DMA, but this usually distorts the speech, making it unintelligible. For most applications, except perhaps haunting and animal noises, you have to suffer with a momentarily blank screen.

A blank screen could add an interesting variation to text adventure games. An auditory adventure might tap memory skills and imagination even more than the visual text adventures.

Easy

by Peter Favaro

Figure 1. *Voice Box II's* human face animation.

The Alien Voice Box II

While *S.A.M.* has personality, the *Voice Box II* has panache. Its demo programs are mostly showbiz, somewhat obstreperous and never modest — a definite canned ham. Before I try to describe the *Voice Box II*, I must briefly reference its less sophisticated brother, the *Voice Box I.* I tested both of them and there is absolutely no comparison. Gently put, when the two are stacked up against one another, the *Voice Box I* is, well, boring. Physically, the two are nearly identical except for the pitch and control knob present on the *Voice Box I.* Some of the differences lie in the software, but I can also detect differences in the sound resulting from hardware modifications.

Voice Box II disks do not run on the *Voice Box I,* further supporting my guess that the ROM hardware (both *Voice Box I* and *II* are ROM and RAM resident) has been modified. The unit (a small black box) plugs into the serial port of the Atari 850 interface or disk drive. Also included in the package are two disks containing the BASIC demo programs and utilities which help the unit perform its vocal and musical magic.

The *Voice Box II* uses either an external speaker or your television speaker and requires a minimum of 32K RAM. At the heart (throat?) of the *Voice Box* is a Votrax chip, the same chip that drives the popular *Type N' Talk* speech synthesizer.

The *Voice Box II's* documentation seems inadequate at the outset, but when you read it closely, almost everything is well explained. It is written in plain English and does not assume much knowledge on the user's part. I have two complaints about the documentation, however. First, the instructions on how to combine the three musical voices with the singing voice are unclear. Also, the documentation fails to explain how, or if, you can use the *Voice Box* to speak during animations in programs.

Yes, the *Voice Box II* can sing and play music, as well as speak. The technique to mix the voices with the singing compares to laying down a multitrack record in a recording studio. The voice and music "tracks" are laid over one another, one at a time. The trick is to control which "track" is layed down with the MUSIC SUPERVISOR program options. More about the music and singing programs later.

In general, whatever the documentation lacked could be learned, with a little perseverence, by examining the programs on the demo and utilities disks. The *Voice Box II* taught me a lot about music. The

continued

animation question, though, remains a mystery. If I discover a technique, I will pass it along.

The Demo

Two disks come with the *Voice Box II.* One disk is devoted entirely to showing off the *Box's* talents. This disk boots with an AUTORUN.SYS file which introduces itself, and dramatically announces "I shall now reveal my face." Then the "alien" draws itself in a modified GRAPHICS 8 (Atari's highest res mode) and modestly exclaims, "I must admit, I am a handsome brute." The rest of the time the alien speaks, he does a lip sync animation, complete with facial gestures. This, however, is just the beginning. The next set of programs is a repertoire of country and western, gospel, soul, and rock-and-roll music. Alternating throughout the demonstration is the face-lip sync combination of the "alien," and the truly remarkable "human" face animation by Jerry White, (Figure 1) which you must see to believe. The Alien Group cordially invites anyone to improve or modify the face, and provides a Machine Language program for assistance.

The second disk contains a few more songs and a *Speak and Spell* game, demonstrating the capabilities of the *Voice Box II.* The spelling program can be modified to ask words entered by the user, and can become a nice educational program.

You access the programs allowing the *Voice Box* to speak from a main menu program. The main menu and the special function keys (on the Atari) get you to and from the music editor and the face and speaking programs quickly and easily.

Text to Speech

The *Voice Box II* employs a slightly different method than *S.A.M.* to encode and decode speech. The *Voice Box II* also uses phoneme codes, (*Voice Box II's* phoneme system is easier to learn than *S.A.M.'s* code) without direct text to speech conversion. However, a *Voice Box II* technique allows you to create phoneme "dictionaries" to store and associate sounds and their written English equivalents.

For instance, the phoneme combination for the word "cup" is C-UH-P. With the *Voice Box II*, the computer remembers the phonetic equivalents by typing CUHP = CUP. Then, the *Voice Box* will translate the written English to the proper phonetic equivalent every time. The method for saving and destroying dictionaries is self-prompting and marvelously idiot-proof. The price you pay for such convenience is the gobbling up of RAM in copious quantities. Each translation costs you ten bytes. One way to avoid this rather expensive proposition is to create a dictionary of commonly used prefixes and suffixes that can be recombined again and again. This is a compromise between English and phonetic spelling you can make for a nice cost-benefit ratio. If you want to skip creating your own dictionary, three dictionaries, thoughtfully provided on the disk, are adequate, and you can master them in one or two sittings.

Programming emphasis, pitch, speed and volume control are all accomplished with symbols and numeric codes. Making this or any synthesizer mimic the subtle shifts and changes in human utterances is a monumental task you cannot learn overnight. You might work with any of the three synthesizers here for 100 hours before becoming proficient enough to accurately mimic very realistic speech nuances.

After playing with the demonstration programs, you will probably want to try programming your own applications with either the PHSPK.BLS program or the SPK.BLS program. The PHSPK.BLS program cannot use the lip sync animation routines or the dictionaries. When you use PHSPK.BLS in a BASIC program, you are limited in intonation and must rely on phonetic equivalents of the words. On the positive side, this is the only file you need on the disk. Actual programming requires only two GOSUBs and a string statement. With the SPK.BLS program, the dictionary and the face programs must be on the disk, but the program capabilities expand to allow your own dictionaries and the animation routines supplied by the Alien Group. All files are copyable with Atari DOS.

One of the *Voice Box II's* most pleasant surprises is the ease with which you can program and store songs. By the second sitting, I was programming songs with musical accompaniment. The self-prompting MUSIC SUPERVISOR and EDITOR options were child's play to master.

Three nice features of the music programs are the clicker, the vibrato and the glissando features. The clicker helps you keep time, sounding the console speaker like a metronome. The glissando feature helps you achieve the gliding sound between notes in a song, and the vibrato feature wavers the voice to give the illusion of resonating or vibrating vocal chords. The documentation gives brief instructions on how to incorporate the songs and music into your BASIC programs.

The *Voice Box II* lacks RS-232 handler capability, a feature that is present on both *S.A.M.* and the *Echo Speech Synthesizer.*

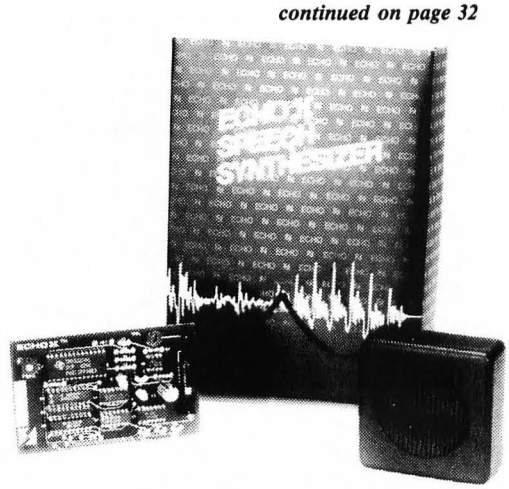
A final word about the Voice Box II concerns the pleasantness and willingness of the customer support and service divisions of the Alien Group. On the several occasions I contacted them regarding the *Voice Box* and other technical information, they were extremely helpful and courteous.

The Echo Speech Synthesizer

The *Echo Speech Synthesizer* is a ROM resident, hardware-based speech synthesizer. Unlike *S.A.M.* and the *Voice Box II, The Echo* does not include a "canned personality," although it does come with an impressive documentation package complete with tutorials on how to get your system speaking. This piece of equipment is meant for serious, professional applications — no singing, dancing, or telling jokes. That didn't stop me from programming it to do just that (except the dancing), but in general, it was difficult to get the same inflection and intonation as the other models in a short period of time. In the long run, however, *Echo's* capabilities are well worth the extra time you'll spend to learn how to program it.

The *Echo* is available in an RS-232 serial version and Centronics parallel version. Setting up the RS-232 serial version is a chore. You need a DB-9 male to DB-25 female pin connector. The nine pin side plugs into the first serial port of the Atari 850 interface, and the 25 pin side plugs into the back of the unit. In addition, a power pack goes from the back of the unit (make sure you don't plug it into the external speaker jack), to your wall outlet. Finally, you must set the data transfer rate with the DIP switches on the underside of the unit. Set-up would be less tedious if the documentation were a little clearer. After a

continued on page 32



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few minor disappointments, however, the *Echo* and I were off and talking.

Because the system is ROM resident, no serious memory limitations hamper the *Echo.* It speaks through its own speaker or an external speaker you provide. It will take a while to get used to the bell-like tones produced by *Echo* and its Texas Instruments TMS 5200 chip, especially if you have worked with some of the other speech synthesizers. While it sounded a little more "robotic" at first, the documentation tutorials helped me produce crisp, clear speech with The Textalker and Speakeasy programs.

The Textalker converts English text directly to speech with a very low error rate. I found the *Echo* accurate indeed, but it had difficulty stressing the right syllable. Also, to achieve maximum success with the unit, I had to spell some words phonetically — not with a phonetic code, mind you, but by ear. For instance, vowels often sounded better when I substituted "aw" or "ah" for a simple "a." This minor demand for flexibility and creativity was quite tolerable.

Pitch and intonation are controlled with the CONTROL-E character on the Atari. The *Echo* has a wide range of inflection and pitch options, although they are somewhat difficult to control at first because of the many possibilities. For example, the Textalker program allows the unit to spell words letter by letter. Using the Textalker through Atari BASIC is a breeze. The documentation is very clear and provides a specific example to type into your computer.

The *Echo* can be controlled via Machine Language, although the documentation really doesn't go into it. Because it is handled by an RS-232 interface, it can be defined and accessed like any other Atari peripheral with OPEN, PRINT#, PUT and GET statements.

You use the CONTROL-V character to access the Speakeasy program. It also requires a phonetic code, supplied with the documentation. I had tremendous difficulty with this program, and would have appreciated a few more examples in the documentation.

If you are thinking about buying the *Echo,* you should apply some simple cost-benefit logic. The *Echo* is capable of producing the best speech of any of the synthesizers reviewed here. Whether the average user will become proficient enough to produce a significant difference in quality is questionable. For those with the patience to delay gratification, this is the speech synthesizer for you, and worth every cent you spend on it.

Professionals Rate the Units

Pat Schaum, a licensed and certified teacher with the William Floyd School District, screens, diagnoses, and treats hundreds of children with language and articulation disorders. She preferred the *Voice Box II,* which was also the favorite of many children. Its voice reminded her of her childhood favorite, Popeye.

Ms. Schaum described the *S.A.M.'s* voice accent as similar to that infamous bloodsucker, Count Dracula, but was impressed by *S.A.M.'s* ability to vary pitch and intonation. All of the therapists noted *S.A.M.'s* slight frontal lisp (that is, a slight tendency to substitute "th" for "t"), and its tendency to drop some word endings. Others noted a slight nasality in *S.A.M.'s* voice, but good performance on some of the more difficult blends. Almost all of the speech professionals agreed that *S.A.M.* required the least "break-in" time for understanding the "accent" of the speech.

S.A.M. was the personal favorite of another school speech teacher, Mrs. Robin Walsh. Both Ms. Schaum and Mrs. Walsh thought *The Voice Box* was the most entertaining system, however. The therapists were duly impressed with *The Voice Box's* musical ability, and recognized its potential as an aid in learning situations.

The Voice Box's main articulation difficulty is with stressed vowels, which are sometimes "held" too long. Dr. Donna Thal, Professor of Speech at Hofstra University, had already attended demonstrations of singing computers, and could not be swayed by the on-stage shenanigans of the *Voice Box II.* Dr. Thal consistently talked about the *Echo* in terms of its "potential," and not its actual speech, which again reflects the amount of work the programmer needs to invest to produce high quality speech from the *Echo.* The *Echo* was most severely criticized for its difficulties with syllable stress, and praised for its ability to clearly pronounce individual sounds and blends of extreme difficulty.

I rated each unit from different perspectives. As a consumer, I felt *S.A.M.* was better than the other synthesizers because it offered so many features at such a low price. As a programmer, interested in developing educational applications, I would rate the *Voice Box II* as the best system for me. As a school psychologist with training in the development and production of human speech, I wholeheartedly agree with the comments of other professionals regarding the potential of the *Echo.*

After I Buy — What Can I Do?

Once you have your speech synthesizer, can this expensive toy make your life easier? Here is a brief list of applications which only begins to tap its capabilities:

● The World's Most Expensive Talking Alarm Clock

This was the first application I found for the speech synthesizers I tested. Using Atari's Microsoft BASIC to access the system real-time clock, and the Alien *Voice Box II*, I left my system on all night and had it sing a wake up song in the morning. I rigged the joystick so that hitting it allowed me five extra minutes of snooze time. You wouldn't buy an entire home computer and speech synthesizer to play music in the morning, but this application spawned two more practical applications.

● Home Security System

You could fashion a relatively simple security system from a home computer, a speech synthesizer, some telecommunications equipment and a few parts from the local electronics store. You could connect a number pad to an area close to the doors of your house that could be ready for input and interpretation by the computer once you pressed an access code. If this code were not pressed within a minute of entering the house, an autoboot program would execute and load, causing the computer to dial the police and, with an external two-way phone speaker system, announce that a robbery was occurring at your address. I'm sure that people more involved in home security could maximize the efficiency and the power of this relatively simple system.

● Aid for the Elderly

Devices have been marketed which assist the elderly, who are sometimes limited in their mobility and slow to react in emergency situations. Speech synthesizers that can be "taught to use the phone" could call police, ambulance and fire department aid in emergency situations.

● Help for the Handicapped

Advertisements for speech synthesizers suggest that they can assist handicapped individuals. This claim can be misleading. None of the synthesizers model appropriate human articulation, so they cannot train people with articulation disorders. Similarly, it is difficult to imagine that speech synthesizers could help individuals with communication disorders "speak" in any environment beyond the general location of their microcomputers. The impracticality of carrying around an Atari 800, disk drive, speech synthesizer and a very long extension cord is obvious.

However, the speech synthesizer can be helpful to handicapped individuals with communication disorders, who are also limited to the environment of their homes. It could allow them to place orders and request services over the phone. Once the hardware developers solve the problem of mass storage, the notion of talking books and newspapers for people with visual handicaps is very exciting.

● Programmer's Aid

One of the most helpful applications for the speech synthesizing equipment I reviewed was "checking" program statements during the debugging stage. DATA statements frequently cause undesirable bugs, particularly in Machine Language instructions, which can be the most difficult to detect. The speech synthesizers could "read" me the DATA statements while I checked to see if they were correct. The *Echo* is particularly good at this.

● Mechanic's Assistant

Did you ever have to build or fix something, and find it difficult to keep your eyes on the instructions and on the project at the same time? A speech synthesizer could "read directions." A joystick could control the flow of directions, going backwards, forwards, stopping at a particular place, or repeating a direction.

● Educational and Game Applications

No matter what kind of microcomputer you own, you are working primarily in the visual channel. Speech synthesis allows presentation of information both visually and auditorily. This is a fantastic step forward, because some people are better auditory learners than visual learners. In training children who have learning difficulties, a multisensory approach is most helpful. A program to teach reading, for instance, could combine visual stimulation, auditory stimulation and kinesthetic, or "touch" stimulation (that is, by having to use the keyboard). Speech synthesizers may help overcome some of the severe limitations in our current educational software.

I don't see synthesizers revolutionizing computer games as we know them. Most people enjoy computer games because they "project" themselves into what's going on. Sometimes, the more unstructured a game is, the more desirable it is (hence the popularity of adventure games). An alien voice or two might make games "different," but not necessarily better. However, a market exists for pure auditory adventures.

The Alien Group is currently sponsoring a contest which will pay a hefty $5,000 first prize to the entrepreneur who develops the best application for the Alien *Voice Box* speech synthesizers. A panel of thirteen- to eighteen- year-olds will serve as the judges, so sharpen up your alien attack subroutines. You can obtain contest rules and regulations by contacting the Alien Group, 27 W. 23rd St., New York, New York 10010.

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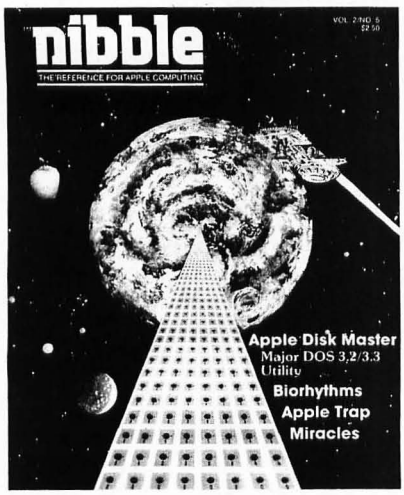

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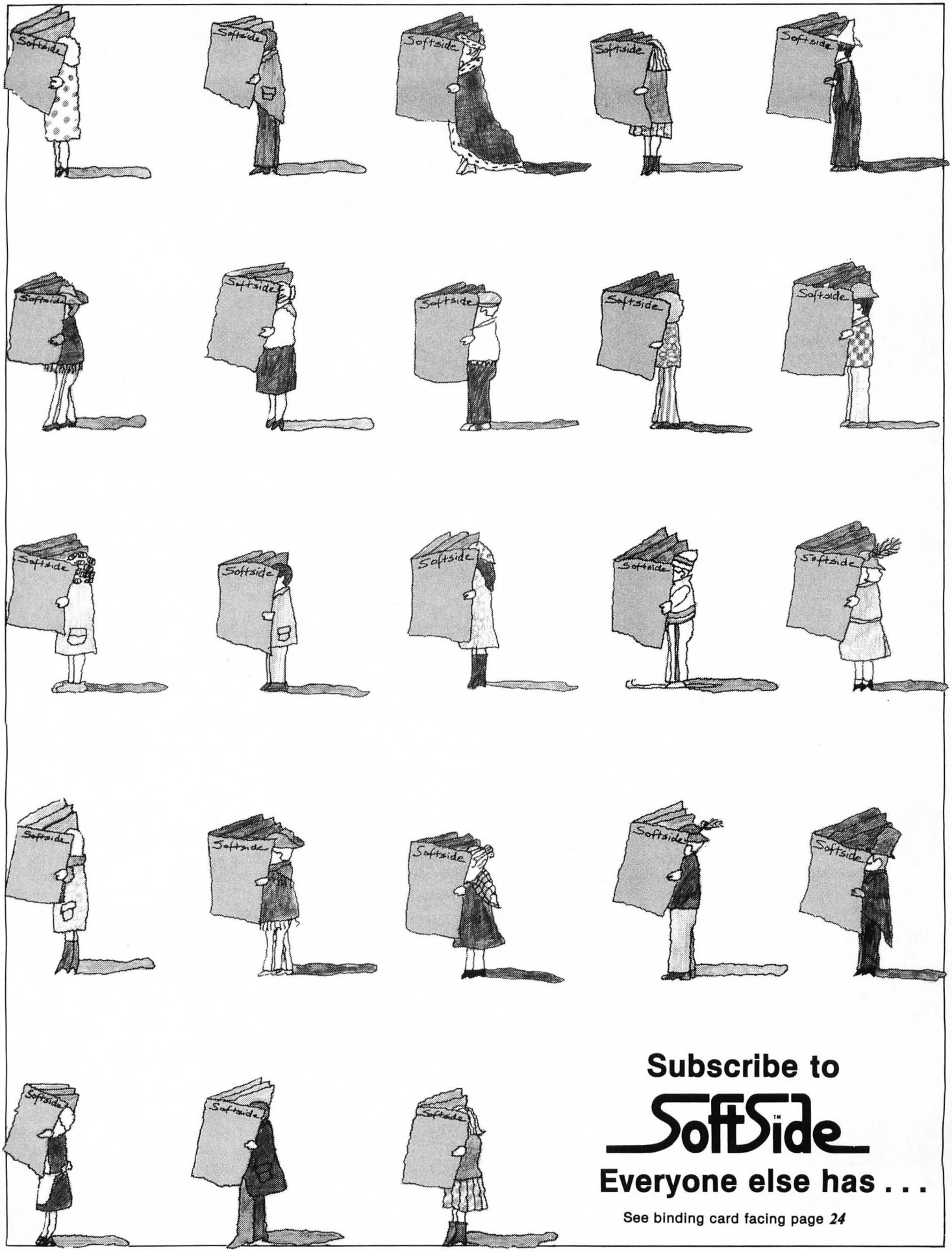

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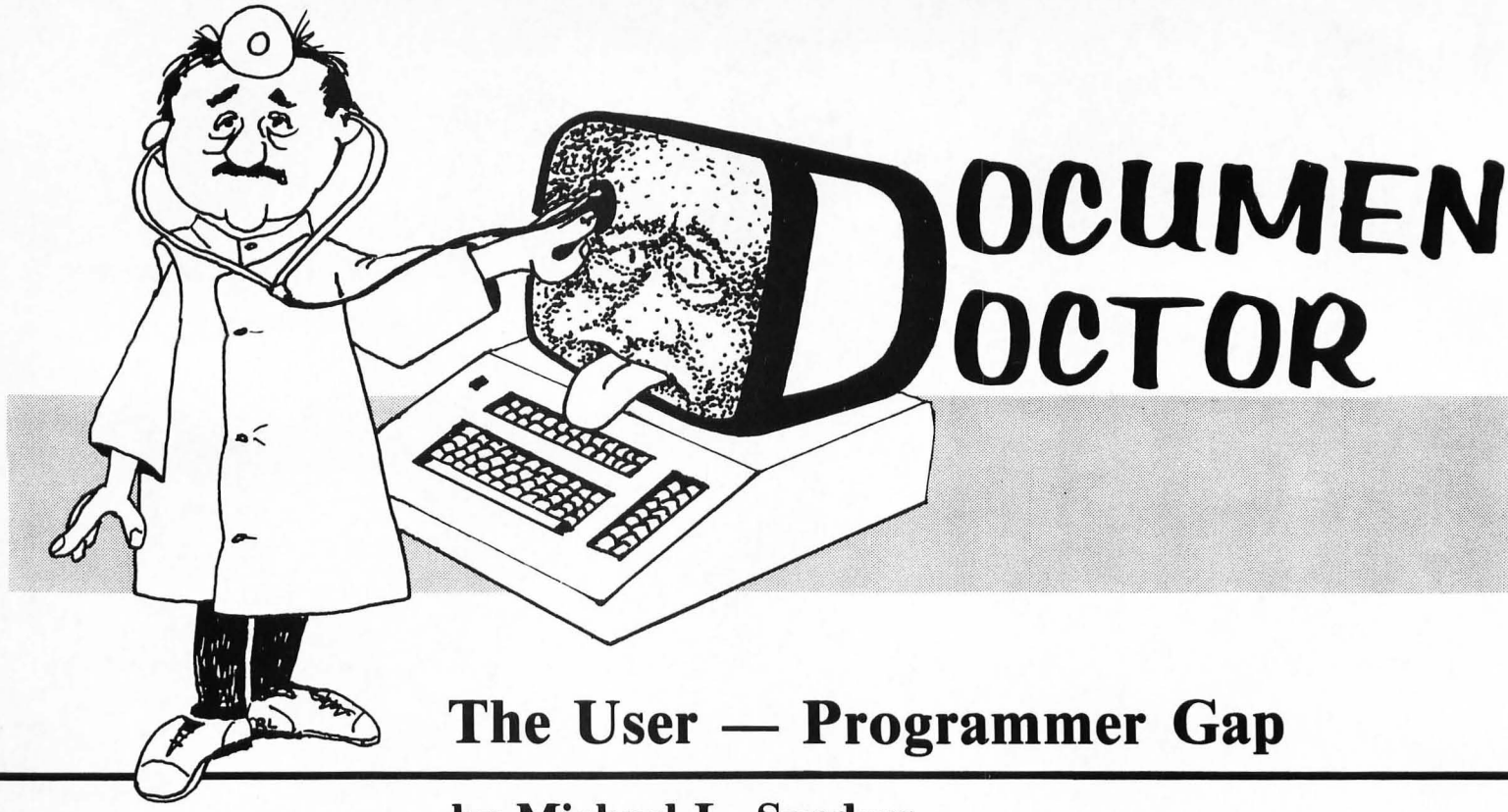


The User — Programmer Gap

by Michael L. Sanders

Figure 1

Table of Contents

Software documentation has been under the proverbial gun, lately. It is often incomplete and appears to be written by and for the original programmer. This is because so many manuals are software-oriented: They are broken down into the same modules that the program uses, such as printing, searching, sorting, and so on. The program *user,* however, wants a function-oriented manual that describes how to perform each task. He wants to know how to load a data file and work on it.

To illustrate effective documentation, I wrote a user's manual for the database management system (DBMS) for the TRS-80® written by Mark Pelczarski (***SoftSide,*** April 1982). I chose this program for its popular interest, and because it requires clear documentation to be useful.

Creating A User's Manual

The first thing a user needs to know is what a program can do. To document this for DBMS, I condensed the information in Mark's series of articles into two pages. Next, I described how to set up a database. I did not discuss databases in depth, but gave enough information to organize data prior to entering it into the computer.

TATION

Figure 3

Manual Description

1. Notation

Bold faced words are prompts as they are printed on the monitor.

Bold faced underlined words indicate data base dependent information that may be printed to the screen or printer. They may be:

headingn: Heading number n will be printed.

itemn: Item number n which is stored under heading n will be printed.

NH: Indicates the total number of headings in the record.

record number: Indicates the number of the record being displayed.

n: Indicates a heading or item number.

file name: Indicates the file name.

Prompts may be written in all capital letters or mixed and may not agree with the program in that respect.

2. Prompt description:

The program prompts the user to select from a menu or enter data. Each menu is shown and each option is discussed on one page. Following the menu, each option is walked through, showing each prompt that may be encountered and describing its function. Page numbers in parentheses indicate where to go after a step if it returns to a menu.

Figure 2

Screen print, default format
Line print, default format

Search criteria:
0) Record number
1) heading1
2) heading2

.
.
.

NH + 1) Begin
NH + 2) Return to menu

Which field? ____

Allows you to select the criteria for searching the data base for records to be printed to the screen. Multiple criteria may be selected. After each criteria is established you will be returned to this menu. After all criteria have been selected, choose **Begin** to start the search process. To print all records sequentially, choose **Begin** as the first criteria.

Selecting on record number
Indicate (1) Smaller, (2) Equal, or (3) Larger

Indicates that you selected record number as a criteria for sorting. Enter whether you want all records with a smaller, equal or larger record number than the number entered for the next prompt.

Compared to: ?____

Enter the record number to be compared against in the sort. Returns to the search criteria menu.

Field selected: heading
Indicate (1) Smaller, (2) Equal, or (3) Larger

Indicates the heading selected for search criteria. Enter the relation to be used with the string entered after the next prompt.

The heart of a user's manual describes all the prompts. Mark's DBMS is menu driven, but, like most programs, it requires that the user know what to expect from each option and what to enter when prompted for input. Limitations or restrictions are listed, as well as error messages. A user's manual should list, under each function, the prompts you may encounter in the expected order. Even though some will not appear because of options selected, you should be able to scan quickly for prompts. If you cannot find a prompt, you may soon become confused and frustrated.

If options are very different, each selection should be discussed on a separate page. Figure 1 is my table of contents showing how I broke down the DBMS functions. The default format and the select format print options were very different. Printing to the screen or printer used almost identical prompts, however, and required no separate treatment.

Clearly Functional

In a function-oriented user's manual, each function should be usable without referring to other pages. This requires duplication of some prompts. The DBMS has a

continued

Figure 4

System Specifications

Language: BASIC
Operating System: TRSDOS or TRSDOS compatible
Hardware required: TRS-80 Model I or III with 48K RAM, one disk drive
Hardware options: Two disk drives, printer
File type: Sequential
Number of records: 150
Number of headings per record: Limited only by memory size
Maximum length per item: 255
Search criteria: Greater than, equal to, or less than on up to 7 items simultaneously.

Figure 5

References

Pelczarski, Mark, "Developing Data Base," *SoftSide,* Sept. 1980.
Pelczarski, Mark, "*SoftSide* Data Base Part 2," *SoftSide,* Oct. 1980.
Pelczarski, Mark, "*SoftSide's* Data Base," *SoftSide,* Nov. 1980.
Pelczarski, Mark, "The Developing Data Base," *SoftSide,* Dec. 1980.
Pelczarski, Mark, "Developing Data Base," *SoftSide,* Jan. 1981.
Pelczarski, Mark, "Developing Data Base," *SoftSide,* Feb. 1981.
Pelczarski, Mark, "Developing Data Base," *SoftSide,* Mar. 1981.
Pelczarski, Mark, "Database," *SoftSide,* Apr. 1982.
Jacobs, Robert, "NEWDOS-80 Enhancements to Sequential Database," *SoftSide,* May 1982.

Documentation Doctor *continued*

search routine for three options — print, change and delete — so I duplicated these prompts under all of these menu choices. I did this easily on my word processor, although it required some retyping.

Figure 2 shows a typical page. To distinguish the prompts from the rest of the text on the page, I used bold faced letters. You could also put them in blocks, or use different colors or underlines. Some prompts may include information dependent on what was previously entered. To distinguish these, I underlined as well as bold-faced these words. Figure 3 shows how I defined them for the user.

It is important that you know what is required to run the program. Figure 4 is the system specifications page from the manual. It should include detailed hardware and software requirements. If a specific character generator is required, mention it here. At the very least, the system specifications page should include the number of disk drives, memory, and disk operating system required.

Another useful section for a manual is a list of references, as shown in Figure 5. The articles I listed are a series developing the DBMS program. These are very helpful if you wish to modify the program for any reason. You might include books or articles on database management programs in general, as well.

Error Messages

A listing of all error messages is essential so that you can understand what you did wrong and how to recover. Figure 6 shows how I listed the error messages, along with possible causes and corrective actions to take.

Other sections in this manual include recommendations for modifying the program and a blank page for notes. As you go along, you will want to keep notes on databases and modifications to the program. You may want to create some custom DBMS programs with slightly different prompts that need documentation.

To add a touch of class, get rub-on lettering sets from an office or art supply store and create an attractive cover. This adds a professional look that reflects the work you put into your manual.

Preparing this manual was not easy, but produced a serviceable document. When documenting your own software, you need to look at it as a user. He wants to know *how* to do something, not how something is done. Try to document all paths the user might take. This can be tedious, but if you want to market or exchange software, it is well worth the time and effort.

Figure 6

Error Messages

DISK ERROR

The program uses error trapping so that you will stay in the program when encountering an error during disk operations. Possible causes are full disk, wrong file name, and bad disk. Try a different formatted disk or examine the directory if your DOS allows.

PRINTER NOT READY!

The program checks the printer port to verify that the printer is connected and turned on. Check the printer and connector for proper configuration. Do not plug the printer into the computer while the computer is turned on.

OUT OF RANGE

A number out of range was entered for tab or line feed while preparing a custom format.

THAT'S ALL

All records have been searched.

CURRENT FILE IS NOT SAVED.
CANCEL COMMAND?
(Y)ES (N)O

You tried to quit or load a new file without saving the modified file in the memory. Allows you a second chance to save it.

NO DATA IN MEMORY

The program checks if there are any records in the file in memory and prints this message if there are none.

Other errors:

If any error should take you out of the program, you may re-enter by entering "GOTO200" in BASIC. If you are in the edit mode, immediately hit Q to quit, then enter "GOTO200".

Photo 1. New Atari VCS controllers: Remote Control Joystick System, Proline Joystick and Trak-ball.

bytes in

by Peter J. Favaro

The American Toy Fair introduced a mid-February blizzard of innovative games and entertainment systems to New York City. Sliding my way to and from the exhibition centers, I encountered computerized music-synthesis systems, interesting educational software aimed at the three- to six-year-old market, and games capable of speech recognition. I divided my tour through the world's largest toy store into four major computer-oriented categories:

- Inexpensive home computers, or accessories to convert current VCS units into fully functional home computers;
- EPROM-based home entertainment systems and their accompanying game and educational software;
- New hardware and software for existing home computers;
- New applications and introductions.

New Entries and "Add-Ons"

When the Timex/Sinclair 1000 compact, "no frills" personal computer was the new kid on the block, many larger companies were reluctant to take it seriously. A quick look around the Toy Fair confirmed that anyone who dismissed the concept of an inexpensive home computer for the beginner definitely got caught with his banker's suit pants down.

Photo 2.
The Atari 2600
Computer Keyboard

Atari®

The most notable introductions into this market came from Atari, Texas Instruments® and Mattel® Electronics. Atari introduced a system called *My First Computer™* — essentially a

Photo 3.
The keyboard attached to
the Atari 2600 VCS™.

Photo 4. The Intellivision® Computer System.

toyland

computer keyboard that rides piggyback on the Atari 2600 VCS system. (Photos 2 and 3) The unit will sell for under $90 and feature a sixteen-color display capability, 56-key typewriter-style keyboard, 32K RAM capacity, 16K ROM capability, a two-voice sound generator, and a 160 × 192 pixel graphic resolution.

The unit comes with built-in BASIC and will interface with a variety of low cost peripherals, including a standard cassette player for program storage and retrieval. Sounds like quite a package, doesn't it?

Adapting to the keyboard was a little difficult. Although the keys are raised, they still sit very close to the base, and don't have the "play" of a standard typewriter keyboard. The color and sound capabilities are generally very good on the demo programs, and the unit seems a remarkable buy. If Atari can market these materials on schedule, (a difficulty for them in the past), and if product support in the form of software arrives not far behind, this will definitely be an opportunity for many of the ten million VCS owners to try their hands at computer programming.

Texas Instruments

Competing in the same market is the Texas Instruments TI-99/2, a fancier version of the Timex/Sinclair 1000 with slightly more capability. Aimed at beginning computer users, the unit will sell for about $99, come with 36.2K RAM and 24K ROM, but have no sound or color capability.

Some of the software teaches Pascal and Fortran syntax, although the TI-99/2 will not *run* Pascal or Fortran programs. A variety of mini-peripherals will be available for this unit, and its big brother, the TI Compact Computer 40 (a more expensive, more sophisticated portable computer). The TI Wafertape™ Drive reads and writes data to cassettes which are the same general size as the microcassettes used with miniature tape recorders and dictaphone machines. The cassettes will store programs as large as 48K, and the drive runs on four AA batteries.

Mattel

Mattel Electronic's entry into the low price "extension unit" computer market is the Intellivision® Computer Keyboard. This 49-key unit will connect to the Intellivision game unit and features a built in BASIC language, 2K RAM, 12K ROM and six-channel sound generator capability. Expansion peripherals and modules include additional RAM and ROM, an audio cassette recorder for program storage and retrieval, and a unique software package that teaches children (or even adults) programming skills through an easy to understand color-coded method.

Of all the companies I visited at the Toy Fair, I found Mattel Electronics making the most creative and innovative leaps in the entertainment-systems business. All of the new products from Mattel offer the unique experience of learning an important skill while having fun. In addition, Mattel is entering exciting fields, including music education and music entertainment. This is a vast improvement over the repackaging of shoot-em-up games performed by many companies, big and small, year after year. In addition to the Intellivision Computer Keyboard, Mattel introduced a home computer system called the Aquarius™. The system uses a Z80A microprocessor and has memory and graphics capabilities to rival most popular home computers.

Entertainment Software

The games you will pop into your VCS or EPROM-based systems this year will not differ drastically from those you bought in '82, unfortunately. The major differences will be more hype in the ad campaigns, and titles that reflect popular movie and television shows. The graphics in these games have improved significantly, most notably in products aimed at the Atari 2600, but the major theme will remain unchanged: MBAFAS (move back and forth and shoot). In reaction to negative press,

Figure 1. Screen display from Dark Crystal Adventure Game.

Photo 5. The Dark Crystal, OITC Entertainment Ltd. 1981

Bytes in Toyland ***continued***

manufacturers are deemphasizing overtly violent games. Instead of space men and flying saucers, you will soon see hamburgers chasing french fries and similar sublimations of the shoot and chase theme.

A lot more attention is being paid to sports games for the VCS systems. EPROM-based entertainment will soon introduce more realistic sports games, and Atari has developed an entire series of realistic sports cartridges for the VCS.

Educational Games

The educational game market for three-to six-year-olds shows promise. Again, Atari is emerging as the leader.

The Atari Kids' Library is a series of cartridges developed with the Sesame Street (Children's Computer Workshop — CCW) computer crew. The games marketed for the 2600 include: *Cookie Monster Munch, Oscar's Trash Race,* and *Big Bird's Egg Catch.* They will retail for a hefty $34.95. I played most of the games and found them an interesting alternative to letting the very young child struggle through *Space Invaders.* However, some of the games may not be able to retain the relatively short attention spans of the three- to six-year-old population, and I'm not sure what the games will actually *teach* the children.

The *Alpha Beam* game is one of the better educational games in the Kids' Library, since it involves a letter recognition task; and I would choose *Grover's Music Maker,* designed to teach music skills, for my child because of its versatility and interesting sound and graphics qualities.

The key to creating software for young children is to present a wide variety of educational experiences in small chunks. The CCW series certainly does that, but the chunks are, by and large, limited to one per cartridge. Justifying the $34.95 cost against the possible gain achieved from playing with a product that is supposed to be educational may be a problem. In the future, individual cartridges may teach a hierarchy of skills. Right now, I am concerned that most three- to five-year-olds may "outgrow" these cartridges very quickly.

Mattel's Intellivision has undergone an interesting facelift in 1983. Intellivision II, a slick, high tech version, will be much smaller than the original master unit (10" x 6 5/8") and will support all of the software written for the original model.

Add-on peripherals and expansion modules will include a system with Atari VCS compatability, the Intellivision Intellivoice™ Voice Synthesis Module and the Intellevision Entertainment Computer System, which includes, among other features, a piano keyboard music synthesizer as an add-on option. More about this system later.

Last year's sleeper, ColecoVision™, introduced a line of shoot-em-up games with excellent sound and graphics capabilities and many titles adapted from their popular coin-op counterparts. Again, realistic sports games, including boxing and super-action football and baseball, will be available with the ColecoVision system. Expansion modules for car racing games and Atari compatability have been advertised and discussed for some time now, but a new expansion module (Expansion Module #3) will add a variety of extra features to the already realistic arcade games. These features will include "intermissions" during game play, a feature to allow the players to put their initials on the screen, and increased game variations for the existing software.

Entertainment Enhancements?

I was disappointed at the paucity of home computer entertainment enhancements, but what I saw is worth reporting. The most interesting innovations in this area came from Texas Instruments for the 99/4A home computer. I was fascinated by an add-on entertainment unit for this system developed by the Milton Bradley company. Called the Milton Bradley *Expander™ System,* the unit will retail for about $100. It features high resolution graphics, speech synthesis capabilities, and — get this — *speech recognition.* The player wears a lightweight headset like those worn by news broadcasters and astronauts, and can actually direct the action of the game by voice. The demonstration of the system was impressive.

Software compatable with the *Expander* System includes a line of children's educational activities; some of the nicest education programs I have seen for home computers. The *Arcade Plus™* series includes sports, space and adventure games with high resolution graphics, as well as speech synthesis and recognition abilities. Most of the software for the *Expander System* also plays on the TI 99/4A without the system.

Tucked away in a corner of one of the exhibition halls, I found Sierra On-Line's colorful display. I watched two previews of an educational software series for three- to five-year-olds (Apple® and Atari home computers), and The Dark Crystal Adventure Game (Figure 1 and Photo 5) developed with assistance from Muppeteer, Jim Henson. The educational package featured a main menu and offered a variety of attention-getting activities for younger children. These included letter and number recognition tasks and paint and draw activities. I was very impressed by the preliminary version of this program, and look forward to taking a closer look upon its completion.

SYMPOSIUM ON SMALL COMPUTERS IN THE ARTS

by Ame Choate Flynn

If one could afford, in terms of time and money, to attend all conferences in just one area of the computer "world," one would not have any time (or money) at all. If you take the area of graphics and extend it — i.e. computer graphics in education, video, the arts, communications and so on, there would probably be more conferences in more parts of the country than days of the year to hold them.

The above rationale could make you give up any attendence whatsoever, and stay at home attached to your modem and machine, or serve as a wonderful introduction to a smaller conference. The Philadelphia Symposium on Small Computers in the Arts, held annually in the fall, is such a conference.

The Second Annual Symposium on Small Computers in the Arts was held from October 15 to 17 at the University Center Holiday Inn in Philadelphia. The symposium grew out of a computer-music concert held in 1978, bringing together a small number of like-minded persons with interests in micros and their application in the arts. Sponsored by the Personal Computer Arts Group (PCAG), the Symposium consists of micro-based exhibits, workshops and presentations on music, art and graphic design. Every aspect from theory to application in animation — film and video — synthesizers, education and software development, is presented. Experts and interested bystanders come from around the country to learn and discuss the many developments in their fields. So many, in fact, that at times four separate presentations occur simultaneously. There is also a small exhibit area and a "Prints and Plots Gallery" for artists to exhibit their wares.

Occurring two months after the gigantic SIGGRAPH show in Boston, (Detroit in 1983) with its attendence of 22,000+, the Philadelphia show is delightfully intimate. Attendees and participants have a chance to confer, and because it is contained in one hotel, travel between events is simple.

PCAG publishes *Small Computers in the Arts News* (SCAN) covering new products, techniques, and happenings related to computers in the arts.

The Third Annual Symposium will take place October 14-16, 1983. If you have an interest in small computer graphics and music, mark this date on your calendar. If you live near, or want a reason to travel to Philadelphia, this micro-sized conference is a good excuse. For further information, you can call Dick Moberg — (215) 923-3299 or Eric Podietz — (215) 546-1070.

The high-res adventure game based on The Dark Crystal movie, developed by On-Line and Muppet-maker, Jim Henson, promises to be a big hit with adventure-lovers. The two-disk game features over 100 high-resolution pictures, and a level of difficulty bound to keep even the craftiest adventure detective at the keyboard for hours. A quick look through the On-Line product line proved that this company is dedicated to producing high quality software. One of the classiest versions of software packaging I have seen is their silkscreened fabric map that comes with Lord British's high-res adventure, *Ultima II.*

Finally, Mattel is making yet another attempt to penetrate the home computer software market with the introduction of six M Network game titles for the Apple and IBM® home computer systems. Titles will include *Baseball*, the arcade game *Burgertime,* and *Nightstalker.*

New Applications

The last new category in electronic entertainment is one that I call "new applications and introductions." In this category, one clear innovator — Mattel, is going all out to produce interesting and refreshing ideas for computerized entertainment. The heaviest thrust away from video games is the Intellivision Music Synthesizer. This 49-key music keyboard, accompanied with the Intellivision Computer Adaptor and Master Component, turns your Intellivision into a polyphonic music synthesizer. Along with the introduction of this innovative hardware, Mattel will also introduce several music education programs which teach music skills in a non-threatening and entertaining way. One of the programs is a re-application of the popular *Astrosmash* video game, tentatively called *Astromusic,* in which notes fall, seemingly at random, from the sky. The player must anticipate where the notes will fall and press the accompanying music keyboard keys. The successful player will find that the pattern of falling notes actually creates a song!

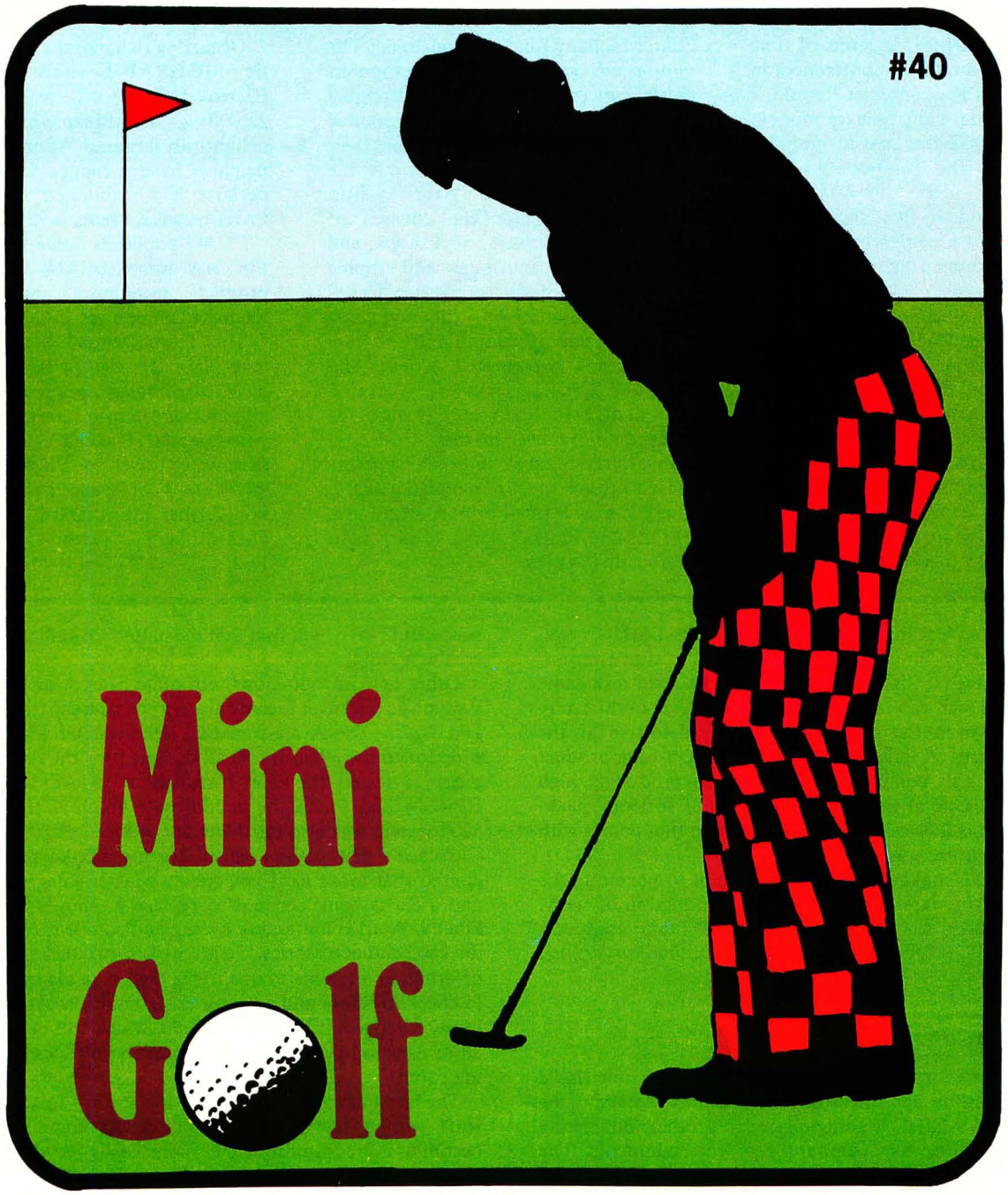
Other new introductions, not quite as exciting as the Intellivision music package, include an array of new controllers by Coleco and Atari. The Atari trackball (Photo 1.) for the 2600 is far superior to the Wico trackball designed for the Atari home computer. I tested the new trackball on Atari's new *Centipede* EPROM and found the action quite good. A trackball for the 5200 system was also introduced.

Coleco's new game control is a joystick-keypad, gun-trigger combo that looks as if you need a Master's degree to operate it and a Swiss bank account to replace it, should it break down. Finally, Atari is marketing a sleek and compact carrying case for the 2600 and accessories. To increase its product support, Atari is offering, as a freebie to qualifying dealers, a diagnostic testing kit to check joysticks and accessories. In addition, Atari is offering a joystick repair kit, for about $4.50, which will be a great help to all of us who have ten or twelve broken joysticks littering the living room.

The latest news from electronic toyland? — lots of the same old stuff with a few bright new ideas. As computer technology becomes more sophisticated, more easily produced and more available to the masses, I hope the creative people will respond by developing applications to enhance our leisure time and ultimately, our lives. Unfortunately, not nearly enough energy is being devoted to such pursuits. Five years from now, we should not be seeing "new" space war games. After video game companies finish playing off movie titles, will T.V. commercials come next? We can hope that companies will begin to realize that computers can entertain and teach at the same time. The development of those new products will require much more skill than creating another breed of alien monster. I think the industry should be ready for the challenge by now, don't you?

Here's your computer's handy, pull-out booklet with this issue's Front Runner.

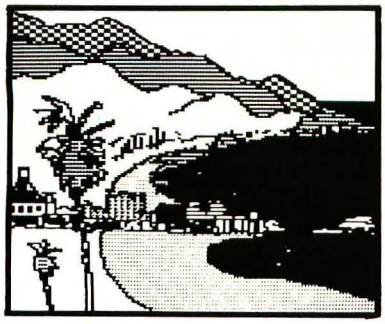
This issue, we present **Minigolf,** a graphic simulation game for the Atari®, Apple®, IBM® PC, and TRS-80®. Knock a "ball" around the nine-hole course with up to nine friends. Now you can play miniature golf even when the weather's bad.



The **Front Runner** and **SoftSide Selections** booklets include all the instructions, listings, documentation, and **SWAT** Tables for each version of **Minigolf.** Also available are the **SoftSide** Disk and Cassette versions (see the bind-in cards and ads elsewhere in this issue for more information.)

The Sides of SoftSide

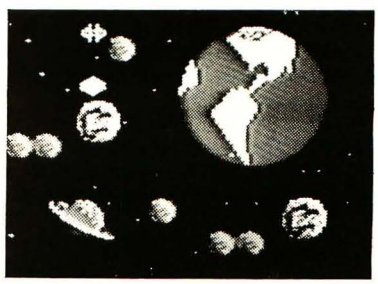
APPLE® SIDE



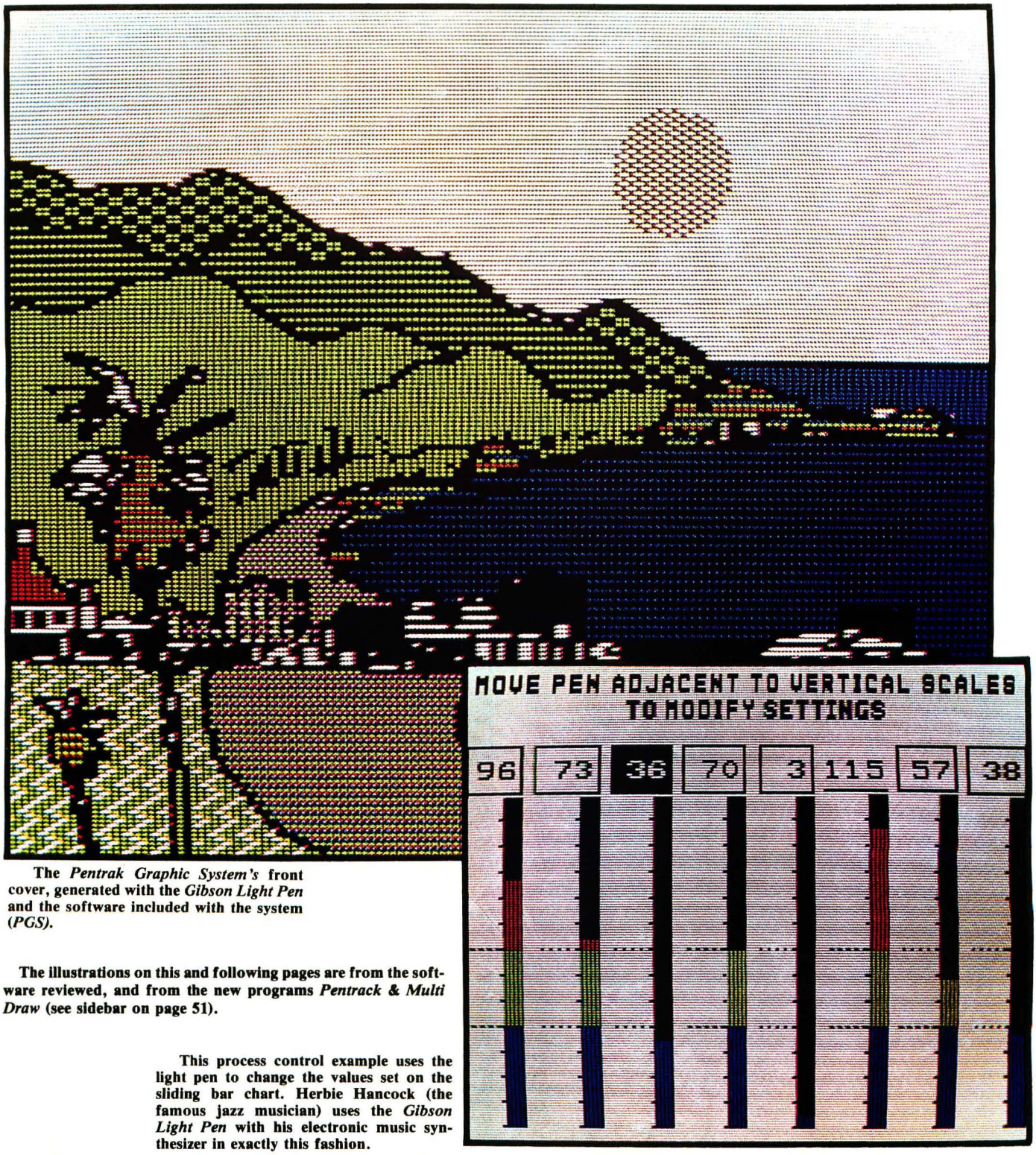
TRS-80® SIDE

PC/SIDE

ATARI® SIDE



The Gibson



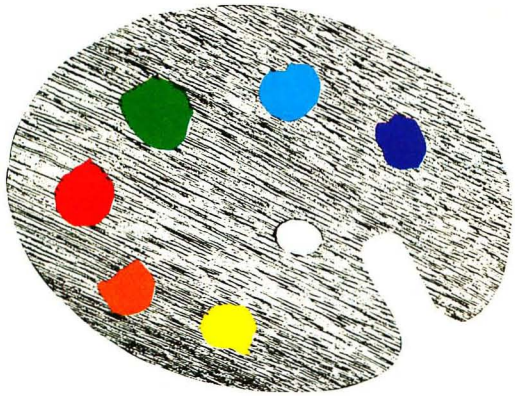
The *Pentrak Graphic System's* front cover, generated with the *Gibson Light Pen* and the software included with the system (*PGS*).

The illustrations on this and following pages are from the software reviewed, and from the new programs *Pentrack & Multi Draw* (see sidebar on page 51).

This process control example uses the light pen to change the values set on the sliding bar chart. Herbie Hancock (the famous jazz musician) uses the *Gibson Light Pen* with his electronic music synthesizer in exactly this fashion.

Light Pen

Reviewed by David L. Robitaille



from Gibson Laboratories, Irvine, CA. System requirements: Apple II® with 48K RAM, Applesoft, one disk drive, DOS 3.3 and any TV or monitor. Suggested retail price: $349.00.

Having a conversation with Steve Gibson of Gibson Laboratories is certainly an exhilarating experience, and for good reason. After completing two years of hardware development, he has successfully demonstrated his product, *The Gibson LPS II Light Pen* High Resolution Light Pen System for the Apple II, in a number of national shows and conferences around the country and sold over 2300 of them to Apple owners. The light pen is a tremendous hardware/software product deserving a prime slot in anyone's Apple. It is directly comparable to any number of graphics tablets and costs about a third as much.

The Gibson LPS II Light Pen system is composed of four parts: the light pen, an electronics module, the *PENTRAK* software driver, and the Operating Manual.

The Gibson LPS II Light Pen is a fast response (75 nanosecond) photodiode contained in a pen-like enclosure.

The Electronics module, with encapsulated electronics, fits into slot 7 of the Apple board.

The key software program in *The Gibson LPS II Light Pen* system is the *PENTRAK* Driver, a Machine Language driver. In effect, it integrates *The Gibson LPS II Light Pen* hardware, the Apple II electronics, and the Applesoft language. Contained in the *PENTRAK* driver is a sophisticated command structure that allows a number of impressive interactive activities.

The manual, at present, is a brief operating description of the system. Due to the unexpected demand for the product, the manufacturer has elected to issue the hardware with these brief instructions, but has promised to issue the complete manual soon. It should be ready by the time this review is printed. However, the current manual contains an adequate list and description of the command structure. With the repertoire of sample application software included, this should be adequate for most serious hobbyists.

The Gibson LPS II Light Pen Operation

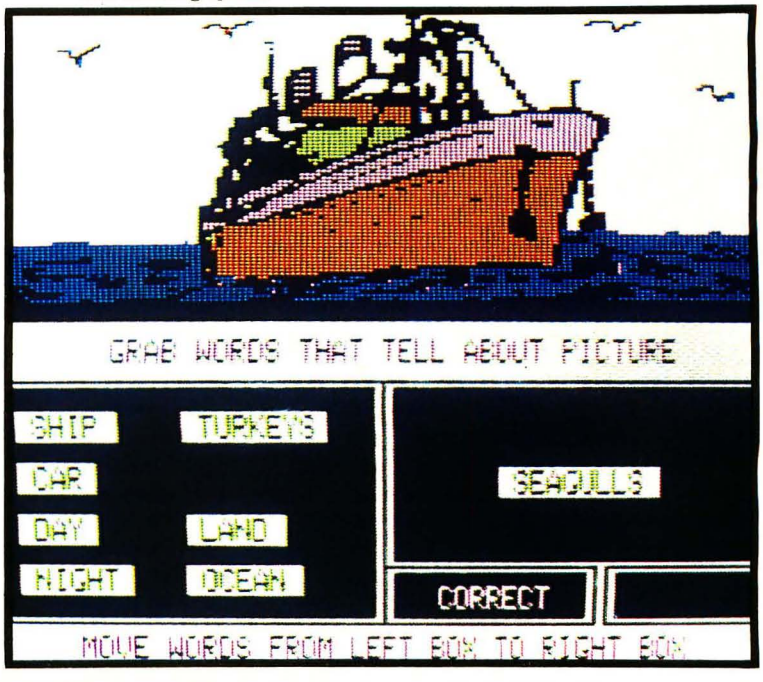
The Gibson LPS II Light Pen electronics module is located in slot 7 of the Apple, where the composite video signal is made available. Other slots may be used, but wiring modifications must be made. Thus, the composite video signal is simultaneously available to the monitor and *The Gibson LPS II Light Pen* electronics. The light pen, when in the presence of the screen, will send a signal back to the electronics the instant the electron beam scan passes the view of *The Gibson LPS II Light Pen.* Independently, the electronics module tracks the location of the electron scan beam by counting the number of horizontal sync pulses since the last vertical sync pulse for the vertical coordinate, y, and counting the clock pulses from the last issuance of a horizontal sync pulse for the horizontal coordinate, x.

At the time the beam crosses the pen location, the "Pen Hit" signal goes high, (or low, as the case may be) disabling the counters. Stored in the counters are the coordinate values of the pen location. They only need scaling in terms of the hi-res screen (279x192) field for Applesoft's use. Conversely, if no Pen Hit was detected, (The pen was away from the screen.) the counters at the end of the frame have the lower right hand coordinates stored. These are reset to zero at the start of the next vertical sync pulse.

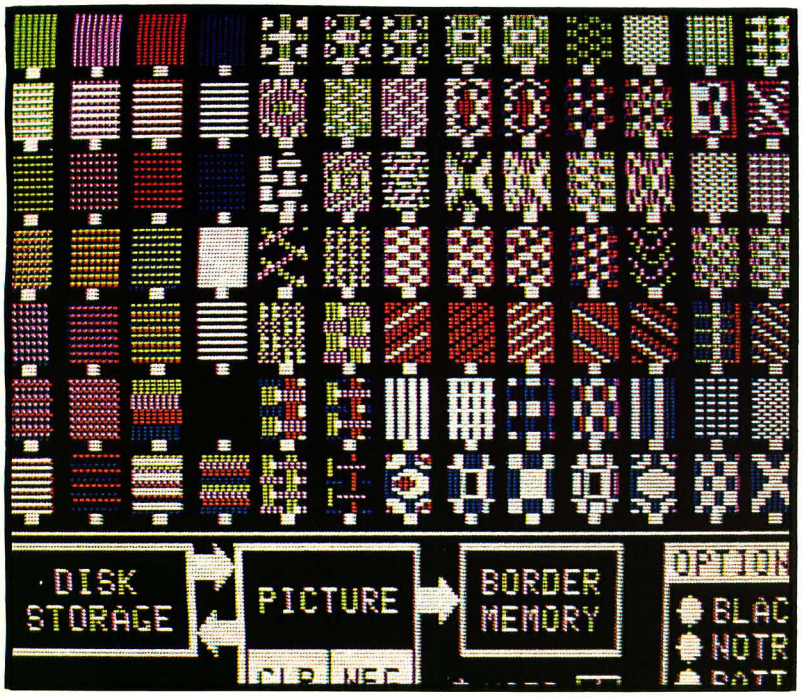
Certain conditional occurrences result in transferring control back to the Applesoft program. In the current version, these Escape conditions are hitting a key on the keyboard or no motion in the light pen for a specified period of time. Due to the inherent noise susceptibility of the photodiode, provisions are made for storing a number of x, y values for averaging and other filtering techiques.

continued

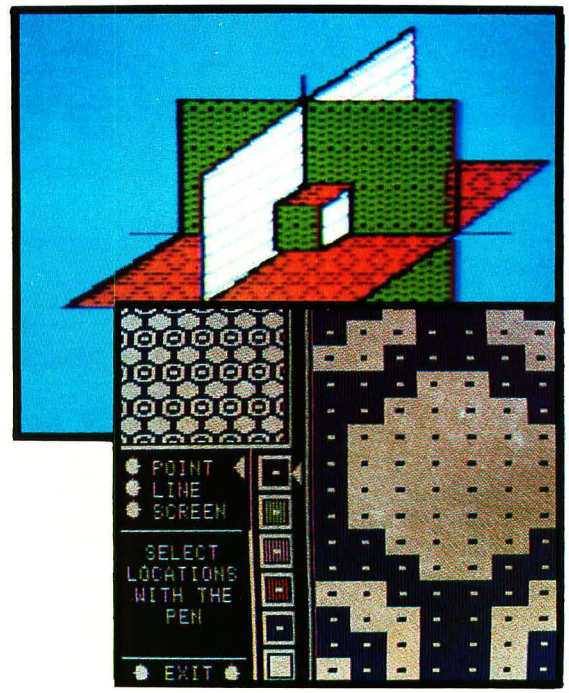
This image was taken from an educational software project. Using the pen, children can "grab" words on the lower portion of the screen and move them to the correct location. The children grasp the concept with startling speed.



The Gibson Light Pen ***continued***



This screen display, from the *PenPainter* program, shows the 91 different colors and patterns available for painting and filling in any random-shape figure. *Penpainter* also allows re-filling of images.



This is a detail of one of the patterns on the *Penpainter* slide. Pattern Editor allows users to create libraries of patterns.

PENTRAK 1.1 Software Driver

The key element in transforming this hardware into an effective interactive system is the supporting software driver, appropriately named *PENTRAK*. The *PENTRAK* driver is a Machine Language program. For speed and capability, it is BLOADed and relocated in RAM memory below DOS, above the DOS buffers, and protected by HIMEM. It is therefore ignored while running other Applesoft programs. *PENTRAK* uses the Ampersand (&) hook utility to add a number of unique high resolution graphic commands and options to enhance Applesoft. The current *PENTRAK* vocabulary contains sixteen unique commands, supported by an equal number of complementary options. These allow simple, concise programming of sophisticated interactive graphics and text editing capabilities.

PENTRAK Command Structure

As with most light pen systems, *The Gibson LPS II Light Pen* was conceived to aid and facilitate the creation of significant high resolution graphics in support of a variety of applications. In order to do this, the basic function is to provide an interactive (pen to screen) means of relating the screen image to whatever operation is being performed.

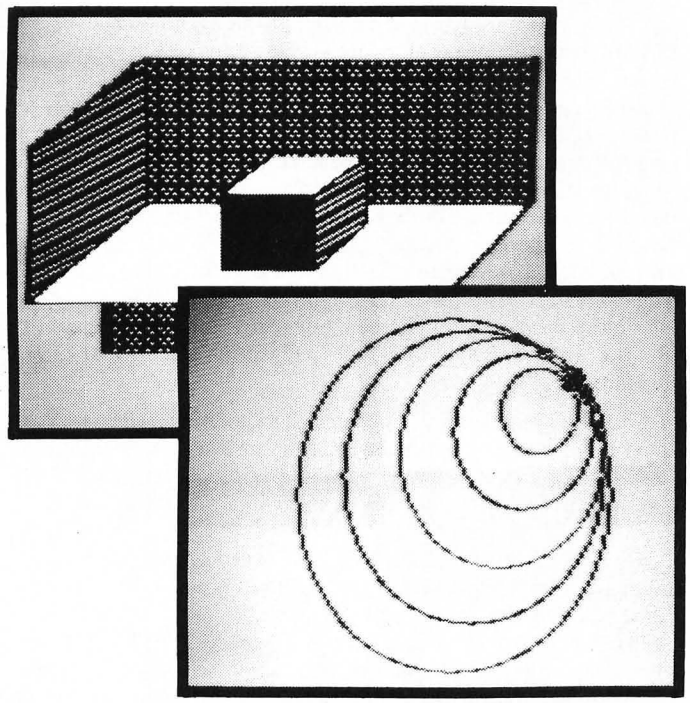
Locating the pen is performed with either of two main *PENTRAK* commands, &TRACK or &PEN. Both return the current location of the pen. TRACK is used on a black or dark screen and provides a cursor, since screen light is required to issue a Pen Hit. PEN is used when writing on a white or light background. Any of a number of options may be elected when the TRACK function is selected. The choice is quite large, so only a summary will be discussed here. When the TRACK function is called, it remains in effect until an Escape mode condition is selected. Other options are: showing crosshairs at the pen location; ignoring extraneous electrical noise which might otherwise cause jumping; selecting which hi-res page will be displayed and worked with; invoking the Screen Lifter function; producing audible tones at significant events; selecting horizontal and vertical motion only; and many, many more.

&PEN is similar to TRACK but differs in that it operates on any of the Apple screens (hi-res, lo-res, or Text) and does not generate a tracking cursor. It is a means of returning the pen location to an Applesoft program. Essentially, PEN waits for a Pen Hit and returns with the current location of the light pen. As with TRACK, any or all options may be selected.

&WRITE is a high resolution screen text writing function, provided to complement meaningful graphics applications. WRITE places text into the hi-res page (1 or 2) by XORing string text at the location specified by the X and Y starting locations of the first string character. Another option, FACEn, allows the selection of multiple character sets such as the fonts provided with the DOS Tool Kit and ANIMATRIX generated character sets. The XOR function can be used with ease to return the original background, since anything XORed with itself is removed from the screen.

&FRAME, likewise, has no connection with light pen operation. It, like WRITE, complements the generation of meaningful graphic applications. FRAME allows rectangular windows on the hi-res screens to be reserved where text, characters, or graphics can be inserted. The original window contents can be stored elsewhere in memory, and when you've finished the text operation, can be retrieved and restored, in effect, closing the window.

Time and space do not allow further description of *PENTRAK'S* commands for generating interactive graphics programs. With some imagineering, you can extrapolate the system's power.



Two examples of Apple pictures drawn with *Gibson Light Pen* standard software.

The Gibson LPS II Light Pen Applications

The *Gibson LPS II Light Pen* systems are directly comparable to graphic tablet systems in thier unique form of graphic interaction between people and the computer. These are unparalleled graphic input devices for creating pictures and images that everyone can appreciate. The *Gibson LPS II Light Pens* have been used effectively for some time with larger computers for alternate menu selection and control systems, computer-aided design and manufacturing (CAD/CAM), design documentation, and process monitoring and control.

The *Gibson LPS II Light Pen* installed in the Apple II approaches a larger computer's capabilities in graphics applications, but is limited by the Apple's graphics resolution, processing speed, and system memory. However, on a smaller scale, each of the functions is viable in less critical, lower cost applications. Indeed, a number of other areas may be more applicable to the personal computer applications, notably musical score composition, gaming graphics, interactive educational tools for children, business graphics, low cost graphic arts, and as seminar and lecture tools.

Application Software

Now that we've covered some of the basics and possible *Gibson LPS II Light Pen* applications, let's review the current state of software applications. The disk containing the *PENTRAK* driver and *CALIBRATE* program also contains about a dozen demonstration programs. Most of these are basic utilities or modules of more comprehensive packages yet to come. Others

continued

are programs which can be used effectively, now, with an adequate number of option sets for graphics production. Also, most of the drawing programs contain options to save and load to/from disk, essentially making a more complete drawing package, although somewhat cumbersome. Here's a brief discussion of some of these modules:

CIRCLES — a basic utility module in which the light pen is used to locate the center and the outside edge of a circle. A color is selected and the program completes the circle. Any number of circles with alternating colors may be drawn.

ETCH and ***UNETCH*** — basic utilities which use a sketch routine. The program also remembers each of the points drawn and, when you're finished drawing, retraces each point, erasing and restoring the original image. This could be a useful routine in applications requiring construction lines.

SKETCH — This is also a basic utility for quasi-freehand sketching but is flexible enough for many stand-alone applications.

GEOMED II — This is a good example of a first generation drawing package which contains a number of drawing options embodied in one program. According to Steve Gibson, they are about to issue an expanded version of this program, to be called *MULTIDRAW* (see side bar). Options contained in this package are:

- Using the light pen to locate reference points. The program has easy steps for drawing points, lines, rectangles (with a fill option), circles, and arcs.
- Drawing in black and white only.
- Mirroring about the vertical and horizontal drawing axes.
- Horizontal or vertical motion only. This is useful for drawing construction, avoiding aliasing (or rastering).
- A zoom mode where the light pen selects the center of the area to be exploded to a 40 x 24 pixel area for further editing.
- Automatic generation of history file of points used for previous constructions. Simply key backward (or forward) to points and use for reference in new construction.
- Saves picture to disk or retrieves previous picture for further development.

This is a relatively easy program to master, even without a manual. Basic instructions are contained in a software help page, listing the options selectable. Within a short time, anyone can begin picture creations.

GRID DRAW — With this basic utility, you are able to draw as with a T-square. Lines are allowed to terminate only on a dot pattern spaced eight pixels apart. The program also demonstrates the screen lifter function, where the help page can be seen by pointing to the margin and "lifting" the image in order to view the help page "below."

Patterned Fill Programs

These are the first programs Gibson Labs has considered significant enough to copyright. They allow a unique method of painting (and repainting) previously drawn pictures and drawings. For example, drawings made with *GEOMED II* or *SKETCH* can be colored or painted with a user-generated palette of an infinite number of colored patterns.

The program is composed of two modules: 1) *PATTERN EDITOR,* where patterns are created or edited, and 2) *PENPAINTER,* where stored images are recalled and painted.

The first module, *PATTERN EDITOR*, is operated solely with the light pen. All operations are either selected by the pen or use the pen in creating the patterns. The techniques used in this program are unique and demonstrate some of the power the system has for this and future applications.

However, *PATTERN EDITOR* is used to create or modify a palette of 91 separate patterns at one time. Each pattern is generated in an 8X16 pixel grid which is repeated edge to edge in order to fill an area, or even a screen. You simply recall the palette of patterns from disk, select which pattern to edit, and proceed to the Edit screen. The Edit Screen has three areas segregated: 1) The menu selection and screen prompt area, 2) The working area, an enlarged 8X16 grid, magnified 10X, where the basic pattern is created or edited, and 3) the pattern viewing area, showing how the merged pattern of 30 grids appear.

You select either point, line, or full grid editing, select a color to edit with and poke in the pattern by pointing the light pen to the working area. As the pattern begins to develop, it is simultaneously shown in the viewing area for immediate appreciation of its overall effect.

When the pattern is complete, it is placed on the palette and other patterns may be edited or created. When editing is finished, the palette may be stored to disk.

The second module, appropriately named *PENPAINTER,* also makes exclusive use of the light pen in selections and program control. When *PENPAINTER* is loaded, the picture to be painted is called by a unique method. A flow diagram appears on the screen, showing data flow from disk, screen and other functions. Selecting the arrow indicating flow from the disk causes the program to prompt for the picture name. The algorithm used in *PENPAINTER* paints in a direction until a black border is encountered. The direction is changed and the procedure repeated until the black bordered area is completely filled. To use *PENPAINTER,* go to the palette, select a pattern, return to the drawing page, point to an area, and watch as the drawing comes to life.

Other programs on the disk include:

MENU, a utility program which allows the user to display a menu of LOCKed files and select which program to run or picture to display with the light pen.

MUSIC, a simple program to draw a rudimentary musical composition on the monitor, hear the melody as it is being composed, and freely edit it with the light pen.

OPART, a psychedelic graphics program demonstrating full screen animation.

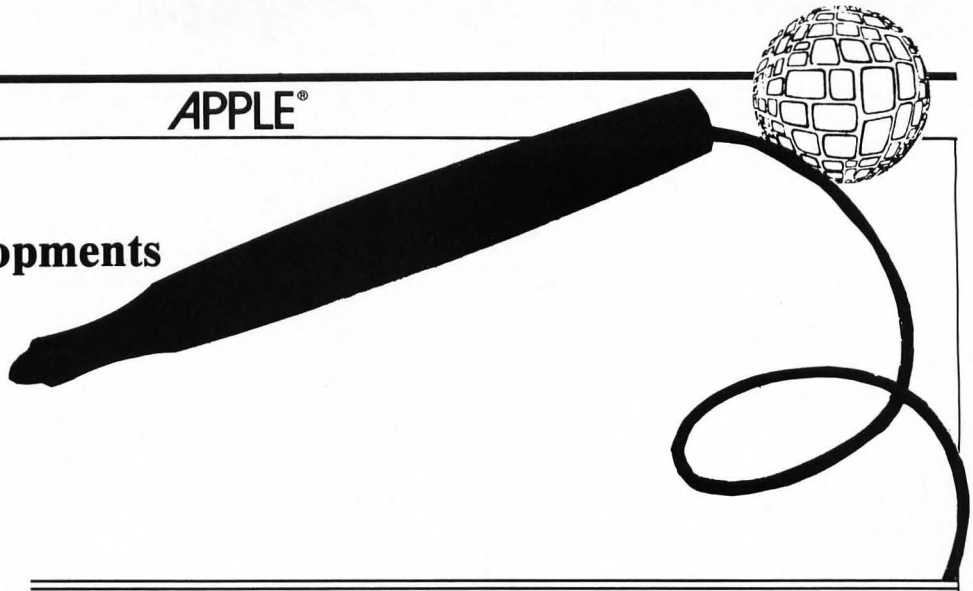
BOXES, an interesting utility which creates 3D boxes with text labelling capability. (We actually used this utility to make personalized gift wrap in a hurry the other day — very effective.)

Conclusion

The *Gibson LPS II Light Pen* system is, indeed, a unique device for the Apple II. What timing — just when I was about to splurge on a graphics tablet. I will be quite anxious to follow the software development as it matures.

For anyone needing a low cost graphics system, the *Gibson LPS II Light Pen* certainly seems to fit the bill. It would compare favorably with any tablet system in command power and, since all operations take place on the screen, it is quite a compact device compared to a tablet. While the software is just now being developed, I believe it has the potential for surpassing tablets in overall applications.

Late Breaking Developments



Just before press time for this issue, SoftSide discovered that many of the projected software improvements described in the preceding review had been implemented by Gibson Labs. We asked Steve Gibson to supply a description of the new software and its capabilities. He provided the following material and most of the graphics you've seen on the previous pages.

New *Gibson Light Pen* Software

Gibson Light Pens require more software support than other computer peripherals. A light pen is a tool, instrument, and end-result, all at once. All of these functions demand a great deal from the software. *Gibson Light Pen* software meets this demand.

- "The Graphics Enjoyer" wants to draw, use color, paint, print pictures onto paper, save images to disk, edit existing images from other sources, and play with the Apple's graphics power. The new software included with the *Gibson Light Pen* will please the "Graphics Enjoyer." The disk contains a collection of programs meant specifically for this user. Ready to run programs like *Sketch, Grid, Draw, Circles, Geomid II, Music, Boxes, Animator, Easyedit, Pattern, Editor,* and *Penpainter* may be used right out of the box with *no* programming.
- "The Graphics Experimenter" is really interested in graphics. Programming in Applesoft is no problem for him, but Machine Language is more than he wants to get into. For the "Graphics Experimenter," the *PENTRAK* driver, an extension to the Applesoft Language, opens the door to experimentation, learning and fun. *PENTRAK* adds *fifty-five* commands including: TRACK, PEN, CLICK, ZOOM, XPLOT, MIRROR, XLINES, LINES, WRITE, FRAME, OFFSET, and many more. Every application program is written in standard Applesoft utilizing the *PENTRAK* extensions...so you also get a complete library of functioning, ready-made examples of light pen interaction programs using *PENTRAK.*
- "The Serious Graphics User" wants to use the light pen and the Apple (perhaps with a graphics printer) to create serious pictures and graphic images. In short, he wants his Apple and light pen to provide sophisticated computer aided design and drafting power. For the "Serious Graphics User" Gibson Laboratories includes *MULTIDRAW.* Written *entirely* in Machine Language, *MULTIDRAW* resembles the software of Apple's newest computer, *LISA®,* in ease of image and symbol manipulation and use of simultaneous, multiple, overlapping windows. Just as VisiCalc® revolutionized business processes, *MULTIDRAW* revolutionizes the way graphic images are created, modified and manipulated with a computer.
- "The Machine Language Programmer" wants to utilize the *Gibson Light Pen* in existing industrial systems, or needs the operating speed only available in Machine Language. For these people, there is a short, simple, direct Machine Language driver for the *Gibson Light Pen* . Written using standard 6502 mnemonics, this Machine Language driver is provided in source, object and listing forms following the return of a special, signed, non-disclosure agreement. Many major software companies have received this driver and are readying products which will be fully *Gibson Light Pen* compatible.

The *Gibson Light Pen* Hardware

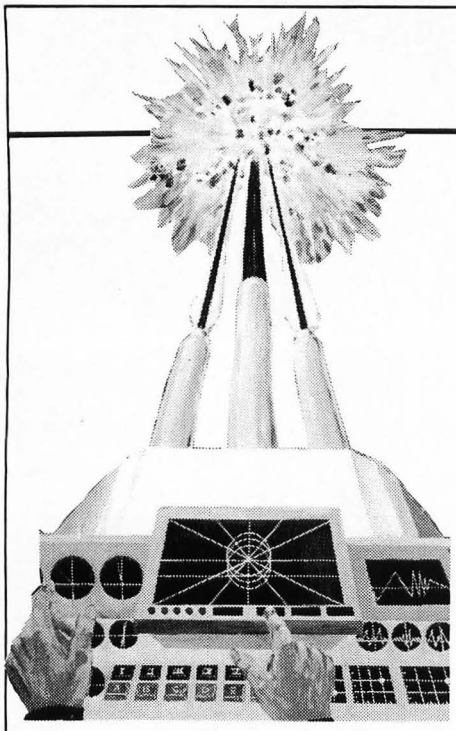
Today's *Gibson Light Pen* hardware is the result of more than a full year of design, followed by many manufacturing and design refinements during the year of sales which followed. Every purchase includes a full six-month warranty.

The Pentrak Graphics Journal

The number of *Gibson Light Pen* users is growing rapidly and many other software companies are readying compatible software. This growth required some form of communication to tie the light pen user community together with Gibson Labs and with the companies offering compatible software products. Published periodically, the *Pentrak Graphics Journal* contains many columns of interest to *Gibson Light Pen* owners: tips and techniques, new graphics product announcements by Gibson Labs and other companies, *Gibson Light Pen* software improvements, listings of additional *Pentrak* application programs, and an ongoing tutorial on the use of the more advanced *PENTRAK* and *MULTIDRAW* features. The *Journal* is available free to all registered owners of the *Gibson Light Pen.*

BOLO

Reviewed by Kenneth S. Close



from Synergistic Software, 830 N. Riverside Dr., Renton, WA 98055. System requirements: 48K Apple® II or II+ with disk drive. Joystick optional. Retail price: $34.95.

The aliens knew your ship was coming and set an ambush. You alone survived their attack. However, you're now trapped inside a gigantic building containing factories that reproduce enemy robot tanks. You find an ancient, but operational, BOLO tank. Your challenge: find the enemy robot factories and destroy them without getting blown up yourself.

So begins *BOLO*, one of the most exciting, emotion-wracking, challenging software games ever to hit the market. Playing this game involves more than just finger dexterity; you find yourself drawn into the story the game represents. It's easy to imagine you're a part of the scenario, and the tension mounts as you attempt to accomplish your goal.

You choose from nine levels of play and five densities on each level. Beginner that you are, you select the easiest level, "1,1". The program generates a unique maze every time, so you wait a few moments while it does this. The screen changes and you're looking at the main display.

You see, from top to bottom on the right third of the screen:

- A place for your score;
- Four remaining tanks (you start with five);
- A clock-like shape whose minute hand points in the same direction as the gun on your tank;
- Four small squares, several of which are green;
- A large square with a small dot on it.

The left two-thirds of the screen displays a small portion of the maze, and your tank is right in the center. The maze that makes up the building is an area 132 times the size of the Apple screen. That's right, you can drive across sixteen screen widths, and it will take you several minutes to complete the journey at the slower speeds. A square with a small dot on the lower right gives you some frame of reference as to where you are in this giant maze.

Finally, you are ready to start. Right handers use the key cluster centered around "L". (The cluster centered around "S" is for left-handers — a nice touch.) Pressing "O" will advance forward speed one level. There are five speed levels, and you'll need much practice before you can safely navigate over speed three. "J" turns 45 degrees clockwise, while "K" turns 45 degrees the other way. "L" stops you, and the "." increases your speed, when in reverse, one level. You'll soon get finger cramps, but that's part of the realism.

Press "O" and the maze scrolls smoothly past you, giving the illusion of movement. You are driving this tank through the maze. You selected density one, so the maze is fairly open, with generous spaces between the maze walls. Later, you can select density four or five and really have some steering challenges.

You move through the maze and get the hang of steering. The controls respond instantly and you can change direction immediately. You crash into a corner as you misjudge the turn. Your next tank is placed at a random place in the maze.

Suddenly, a small, V-shaped enemy robot appears, moving aimlessly, and you steer towards it. When it's lined up in front of your gun, you blast it with bullets fired with the space bar. The robot explodes with a circle of shrapnel, and if you are too close, your tank blows up too.

Finally, the enemy factory appears. It's a white square with a dot in the center, and is partially protected by several walls. Enemy tanks are coming out of the unprotected sides, and they shoot at you if you're anywhere near their line of fire. You jerk forward and try to line up for a shot at the white square. The first bullet destroys a portion of the wall, but not all of it. You have to fire again. You fire rapidly, and much to your dismay, the small explosion from your first bullet blocks your next shots. You have to pause to let the explosion settle.

Your next several shots clear away the wall. The last shot wipes out the dot and the factory blows up amid much noise and bursts of exploding debris. You collect 100 points (200 each on the second level, and so forth). Then, it's off to find the other five factories scattered throughout the maze. The green squares on your information display tell you whether a factory exists right or left, or up or down from your present location.

And so it goes. On level one, the enemy robots are *dumb* and generally won't chase you, although they'll shoot you if you wind up directly in front of them. Your score goes up with your skill, and you'll soon seek greater challenge.

The robots are smarter on level two. Some of them come after you! You find that the openness of density one leaves little room to hide as they come at you from all sides. Soon you drive faster (there are five levels of speed) and try to zoom into position in front of a factory, fire away, and get out before the enemy robots converge on you.

On level three, the enemy robots include a faster model. Slow manuevering, however skillful, won't hack it on level three. A combination of fast driving, and quick stops for shooting, seems to work best.

On level four, fat, oblong, ugly little robots look like rats. They are programmed to zip after your tank at top speed. It's an accomplishment to last long enough to drive your tank into a factory, much less stop to try and shoot it.

This game is worth every penny of the purchase price. It's terribly frustrating when a quick enemy shot gets you, or you inadvertently drive into a wall, and intensely satisfying when you run up a large score. Besides requiring skill and strategy, *BOLO* involves you emotionally. You'll play *BOLO* often and enjoy every minute of it.

Apple® Backpack: Humanized Programming In BASIC

Reviewed by Steve Birchall

by Scot Kamins and Mitchell Waite, BYTE Books. 182 pages, softbound, 1982. Retail price: $14.95.

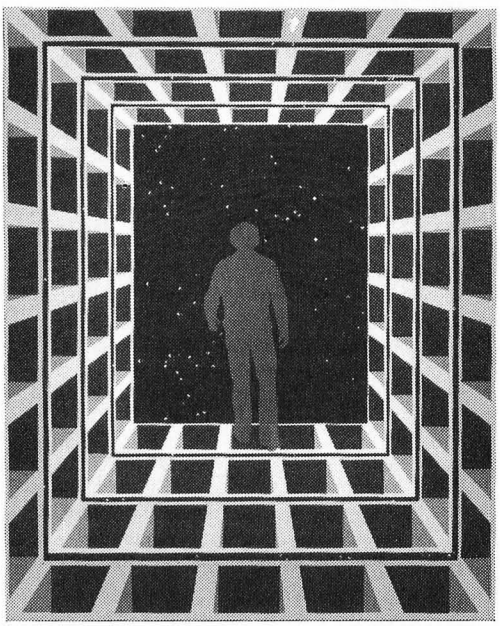
Apple Backpack is a valuable source of information about human-engineered programming. Many home computerists fail to appreciate the value of building this approach into their programming code. Here, in one place, are a multitude of good ideas, and plenty of short routines you will want to use over and over in your programs. Kamins and Waite have organized them beautifully — and have incorporated many of the most attractive ideas into the book.

Written with gentle humor and in a clear style, *Apple Backpack* has many quietly funny cartoons to illustrate major points. The book's graphic design enhances the text. Bold topic headings help you locate ideas, and the sample screen illustrations are outlined in green. A light green background highlights essential pieces of code so you can find them quickly.

The book is a delight to read — quite different from the usual dusty tomes on programming. Paging through, without regard to content, I found myself stopping again and again to look at pages more carefully. You will return to the book many times because you know good information is inside, and you'll have an enjoyable, non-frustrating experience. The book's premise promotes writing programs which allow people to respond in easy, natural ways, and permit quick re-entry in the event of human error.

The first chapter, "Screen Formatting for Clarity," shows how to format text on the screen. You can incorporate various subroutines into your own programs. The chapter has code for centering text, preventing words from splitting at the end of a screen line, right margin justification and lining up decimal points (a Print Using command). The authors discuss how to use these, along with inverse and flashing characters, and physical position, to format your screens attractively and encourage the user to continue. Finally, you learn how to plug it all into your own programs. Face it, if you had these software tools stored on disk, it would eliminate much of the pain of programming, wouldn't it?

The second chapter, "Crashproofing," is the heart of the book, and contains a wealth of ideas. Getting you to respond the way the computer expects you to is the object.



Fiendishly clever BASIC fragments prevent crashing when you type in nothing, too few characters, or too many. Kamins and Waite show how to return to where you were in the program if you make an unacceptable entry. Their understanding of human nature is subtle. For example, they give a three-line routine to let the computer interpret the input "gobble" the same as " gobble" or "gobble " since people frequently enter inadvertent spaces, totally mystifying the computer.

After giving 36 lines of code (about half of it REM's) for crashproofing a one-word input, the authors apologize for the length. However, they point out that you need it only once (as a GOSUB routine) and can use it again and again in a program.

Gentle humor surfaces when Kamins and Waite discuss the problems of exiting from a FOR/NEXT loop prematurely, "known to the cognoscenti as 'fornextus interruptus.' "

Menus are another place where the user can go astray. Making responses one character only (usually numerical), and always treating them as string inputs, are good ways to minimize human error. The more characters you must type in to respond, the bigger the chance for error. Also, the screen must indicate in a clear, unambiguous way what the choices and responses are.

The chapter "Verifications and Validations" advises you in checking your own work. Any program requiring data input should give the user a chance to verify the data's accuracy before going on. This is an essential feature of any good database system, but can be a lifesaver in other situations as well. The solutions range from putting a prompting word or phrase on the screen to giving an example of the appropriate entry form. Dates and telephone numbers are good examples of where things can go awry.

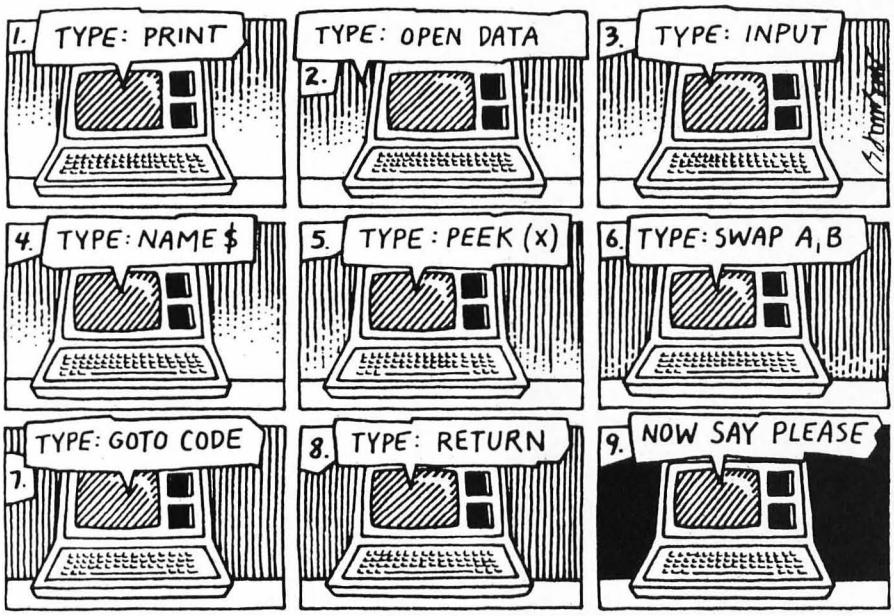
Giving the user an occasional direction or reminder can pave the way for efficient use. Every time he confronts a screen with no indication of what to do next, he must flip through the instructions looking for a series of commands to perform the function he desires. Often, one or two well-chosen words from the programmer can prevent this.

Help menus are a good solution, and many computers now have special function keys which can interrupt a program harmlessly to provide supplementary instructions. Commands should convey information about their function through appropriate mnemonics. That way, you won't need the Help Menu as often. Assigning numbers or letters in order from first to last may seem like a logical way to write a program, but it's a poor way to deal with human responses and ways of thought. Why make the command for "Go on to the next task in your quest" the letter "B" when a "C" for "Continue" would be much more effective? Choose the right names for the items in a menu or set of mnemonics so the user can see the relationship between the command character and its function.

Dates and telephone numbers are examples of data entries which have many acceptable forms. Giving an example of the acceptable format, or providing clarifying punctuation marks, solves most of these problems. You could build in a default area code or zip code to save entry time, if desired.

Always lurking in the background of the book is a gentle, humane sense of humor. In the first chapter, the sample

continued on page 55



Input Requests

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Apple Backpack ***continued***

text they format is about something called "World Power: The Nuclear Proliferation Game." At the bottom of the title screen, you read, "press any key to commence fission..." Later, they help an aunt who needs a mailing list program for her Winter Solstice Cards. On page 47, they end the chapter on crashproofing by saying, "All we can do is protect against the errors we know, and constantly strive to devise more careful, user-proof code. It's either that or go back to CB radios."

The sublimely ridiculous cartoon above is at the beginning of the chapter on displaying program input requests on the screen. (*Apple Backpack,* page 69.) None of this will have you rolling on the floor, but it perks up your spirits, and reinforces important points in the text.

Finally, the authors offer good advice about writing program documentation. They emphasize the importance of stating clearly, at the beginning, what the program does, and what equipment is needed. Having a good table of contents, a reference card, a glossary, and an index all help keep things organized and easy to find.

Demonstrating their virtuosity at humanized programming, Kamins and Waite finish with a complete program and manual for a computerized telephone message storage and retrieval system. If you punch this one in carefully, as you go along, you should acquire most of the book's wisdom. As a byproduct, you'll have a practical office program, easily adaptable for your own use by changing a few labels.

None of the book's contents are mysterious or new information. Eventually, everyone discovers most of it through experience. What is especially useful about *Apple Backpack* is that it brings all this information together in an organized manual you can refer to quickly and easily. In addition, it presents a point of view about programming that is crucial to any successful program. The book stands as an inspiration and an example of how to effectively interface a computer with a human being. This software equivalent of human engineering is not difficult to accomplish, and should be part of the basic (pun intended) education of all who write programs for others.

Computers will become more common — everyone seems to have one or want one. Apple's new *Lisa™* points in the direction of the future. When computers and software become so friendly people can walk up to them and, with the machine's prompting, use them without instruction, the goals of this book will have been accomplished.

MS-Flight Simulator

Reviewed by Jay Marrone

from Microsoft Corp., 10700 Northup Way, Bellevue, WA 98004. System requirements: 64K IBM® PC with one disk drive and color/graphics adapter. Suggested retail price: $49.95.

So you want to be a pilot. You think you're good enough at aerial warfare to outfly the Germans. This is Europe, 1917. The Germans fly the Hanse-Brandenburg D1, the Fokker DR1, the Albatross DII, and the Fokker DVII. And you think you're going to become an ace in the Royal Air Force? I venture to say you've not a chance. But, you've a map of the battleground, and the plane that the Royal Air Force has so kindly lent you is fueled, armed, and ready for take-off. So, good hunting and the best of luck to you. And for heaven's sake, try not to go about cracking up the plane all over the countryside, will you?

That was not a scene from "just another microcomputer game," but one of thirty modes, ten of which are preset, in the *Microsoft Flight Simulator* for the IBM PC. When creating flight modes you may set the season, time of day, surface wind velocity, and wind velocities at three additional elevations. There are turbulence and reliability factors, and even parameters for airspeed, throttle, rudder, ailerons, flaps and altitude you can set to simulate emergency situations. In the British Ace mode, you quickly discover that a pilot must know more than the rudiments of flight to engage in an aerial dogfight. You'll never luck your way through it.

The *Microsoft Flight Simulator* is a real-time program showing a three-dimensional perspective view from the cockpit of an airplane. When the aircraft banks left, so does the horizon. When the aircraft rolls, pitches, and yaws, you'd better have some air-sickness bags handy. The effect is quite realistic.

The visual effects are not the only realistic element. The plane is sufficiently accoutered to meet the minimum Visual Flight Rule and the Instrument Flight Rule specified by the FAA. The program considers thirty-five aircraft characteristics and the flight instruments look and respond as in a real aircraft. Some of the best features of the *Flight Simulator* are the radio-navigational aids. While they don't tell you how to fly, these aids accurately imitate flying conditions, especially at night or in bad weather.

The *MS-Simulator* is modeled after the performance characteristics of a Cessna 182 class aircraft, which the manual states is slightly superior to an advanced WWI fighter. The *Simulator* allows a pilot to practice flying and generally gain familiarity with planes. There is no trick to master, as with some arcade games; the plane will fly as well as the pilot can manipulate the controls.

The program manual is excellent, covering basic flight techniques and providing a glossary of aviation terms and ample reference material for those interested in flight instruction. It also contains aeronautical charts of the New York City, Boston, Seattle, and Los Angeles areas, and Central and Northern Illinois.

The *MS-Flight Simulator* is superior to a real plane in some ways, (the pilot needn't die when the plane crashes) but it isn't perfect. Without a composite monitor, you view the program in black and white. This is unfortunate, because color would help the pilot immensely. In black and white, the view over land is not much different than when flying over water. When the pilot must distinguish the air-land-water interface on the horizon, a gray-scale card had better be nearby.

The pilot won't mind the contradiction between these shades of gray and the manual's description of blue sky and light green ground until the plane skids into a spin and pulling the nose up won't work. The addition of clouds doesn't aid the pilot because, as the plane flies through them, the clouds affect another nuance of gray. Color would aid the pilot in differentiating runways, lakes, and other scenery.

The *Flight Simulator* provides a three-dimensional view, but contains few three-dimensional objects. I know you don't need 3-D objects to fly, only a plane; but, as a novice pilot, I got quite a thrill out of flying around the John Hancock Building in Chicago and buzzing the Space Needle in Seattle. Of course, if you visit Seattle, you must take a trip to Mt. Rainier. Having hiked up Mt. Rainier, I looked forward to flying among the peaks of the Cascade Range. However, it was more like a fly-by, because the mountains, like most everything else, are two-dimensional.

Once the program is in memory, the system will not reboot unless the computer is turned off and then back on. This is aggravating when the program hangs-up before you have finished the flight.

On three occasions, my *Flight Simulator* stopped simulating; on two of the three, the instrument display remained, but the visual element degenerated into a static snowstorm; on the third, the display image froze. I had to turn the system off and then on to continue. After rebooting the system, I attempted to replicate the incident, but to no avail. Unless the time fabric of the *Flight Simulator's* airspace is torn, those were definitely bugs in the program. However, you'll probably reboot again and again, because the *MS-Flight Simulator* is an entertaining program for anyone who ever wanted to pilot an airplane.

adventure game

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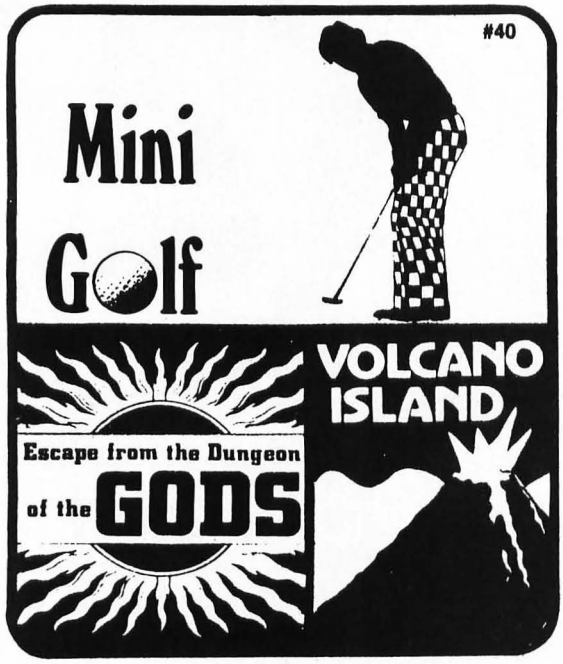

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ATARI®

Making Waves

Oscilloscopes are exciting. Pump a waveform into one, and it draws a picture for you. Magic — a photograph of sound. They are also instructive; ever wonder how a violin and a flute could play the same note and still sound different? The answer becomes apparent on an oscilloscope. When you can see a graphic representation of a waveform at the same time you hear it, the physics of sound comes alive. An intuitive sense of correlation soon follows: you can predict what kind of tone a given waveform will produce.

Unfortunately, oscilloscopes are priced prohibitively, and few of us are crazy enough to shell out two months' pay just to play around with waveforms. That's too bad, because wave forms are fascinating when lifted out of the textbook and demonstrated in real life.

Enter the personal computer, the greatest contribution to self-study since mail-order colleges. With the Atari, it's easy to create a kind of inverse oscilloscope: draw a waveform on the screen, and then hear what it sounds like. If you've never wondered what makes tones sound different, this may sound a little dry, but if you're into sound generation, it's almost as much fun as playing *Centipede.*

Extending The Tonal Range

The variety of waveforms obtainable through Atari BASIC's SOUND command is somewhat limited, for only eight different distortion values are permitted. Dynamic modulation of the distortion parameter can produce further tones, and envelope shaping can radically alter the perception of sound. In general, however, anyone familiar with advanced synthesis equipment is liable to get pretty frustrated with the Atari. Relatively simple functions like sine and ramp waves are absent, as is the workhorse of contemporary synthesis, pulse-width modulation. A judicious POKE can insert high pass filters into two channels, but without resonance control. In short, the BASIC programmer is pretty much trapped into explosions, engines, and square waves.

The Atari was not, however, designed to be a dead-end machine. A special mode in POKEY's repertoire accesses an almost infinite number of waveforms with only one sacrifice: microprocessor time. If the 6502 lends a hand, practically anything becomes possible, from ramp waves to speech synthesis. This mode is called "forced output," and we get it by setting bit four in the Audio Control register of a given channel.

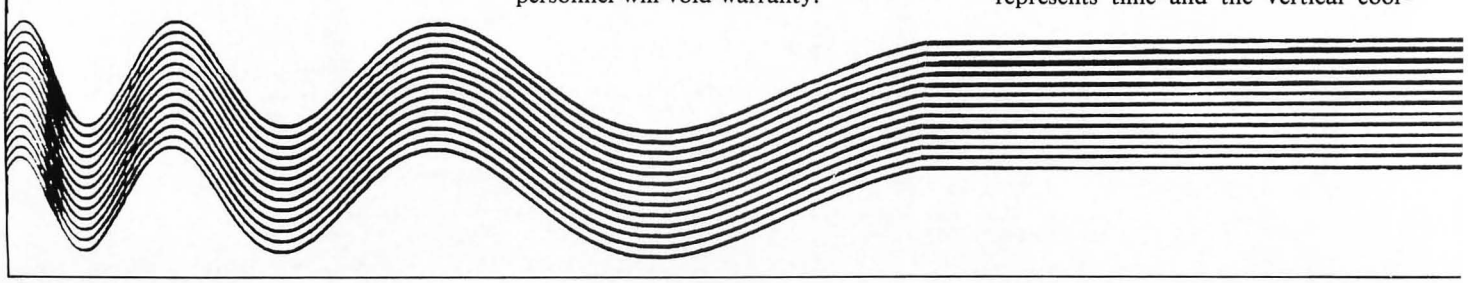
In BASIC, this is the equivalent of using an odd number in the SOUND command's distortion parameter aexp3. Every Atari programmer has probably done this by accident at one time or another, usually while writing a sound routine that uses a FOR-NEXT loop to alter aexp3. The reward for this ingenuity is a sound that works at every second attempt and the rest of the time makes a few pathetic clicks. Unfortunately, that's where most Atari owners' involvement with forced output ends. The Atari manual's explanation of forced output mode is a classic example of the cryptic: "A value of one is used to force output to the speaker using the specified volume." Attempts to envision a sound without tone, but having volume, are doomed to fail; forcing output to the speaker sounds dangerous, if not downright fatal, to the T.V. The only better way to discourage people from experimenting with their computer is the classic "Tampering by unauthorized personnel will void warranty."

Forced output mode doesn't deserve this kind of intimidation. It's just a position control for the speaker cone. When bit four of AUDCX is set, the lower nibble of AUDCX (the volume parameter) determines how far out the speaker is pushed. With four volume control bits, you can place the cone in sixteen different positions. Placing $10 in AUDCX will put the speaker at rest, or storing a $1F will fully extend it.

If this doesn't sound useful, keep in mind how a speaker produces sound. It is, in effect, a paper piston which stirs up the air. When the cone vibrates quickly, we hear the disruption in the air as an audible tone. Normally, we don't concern ourselves with the actual mechanics of jiggling the speaker: we specify a pitch and let some inner demon (POKEY) handle the details. You should realize, however, that POKEY does exactly what we're about to do and nothing more. The only advantage to having the 6502 do the work is that it's smarter than POKEY and can create a greater variety of waveforms.

The key element to producing sound is motion. If the speaker is held at one particular position, it will not push any air because it's not traveling — no sound. A corollary to this is that moving a speaker from position two to three is no different from moving a speaker from eight to nine. They both travel the same distance and will thus push the same volume of air. The amplitude (volume) of the wave at any point depends upon the distance traveled by the cone, and these different amplitudes distinguish waveforms from each other.

If you find this hard to visualize, relate it to the waveform displayed on an oscilloscope. The wave shown is merely a graph. The horizontal coordinate represents time and the vertical coor-



...with the Atari®

by Bill Williams

dinate represents amplitude (volume). Because amplitude is a function of the speaker cone's travel, it also can be thought of as representing the speaker's position.

The waveform describes the speaker's dance through a period of time. Different waveforms are just different patterns of cone movement. The more positions we have, the more patterns we can create. Also, we can more accurately describe a specific shape: we have greater harmonic resolution. This is analogous to drawing a circle on both low and high resolution screens. The higher the resolution, the better the circle will look. In digital sound, the higher the resolution, the more "realistic" the sound seems to the ear.

How good is the Atari's four bit resolution? Well, the Electronic Industries Association of Japan, in attempting to set standards for the infant digital sound industry, has recommended a *fourteen* bit word, so don't expect super high fidelity out of your computer! (Of course, if you run the sound through the crummy speaker in your TV, you don't deserve more than four bits anyway.)

Wavelength

Pitch is determined by how long it takes for the waveform to repeat itself. When we speak of a 60Hz tone, we are saying that the waveform repeats 60 times each second. Obviously, as the waveform gets longer, it will take longer to reach the end, so the frequency will be lower. This creates an interesting problem. As the waveform becomes more complex (a greater number of steps), the lower the maximum frequency will be. This prevents comparing waveforms of differing length without the subjective interference of changing pitch. The only way to compensate for this is to insert a delay loop which is inversely proportional to the wavelength between each step. This works, but lowers all waveforms to the pitch of the longest waveform, which, in practice, is a real drag. The demo program blithely ignores this problem. Instead, it inserts something much more usable: a variable delay loop controlled by the joystick so the user may hear the waveform played across a wide range of frequencies. (If you want to try wavelength compensation, remember that you already have the length of the waveform stored in the cursor horizontal position CX. You'll have to count machine cycles, though, to get each loop iteration the same.)

The Demo

Program Listing 1 is the BASIC demo program. Just type it in and run it to play around with waveforms on your Atari. The BASIC program consists of a crude editor and a chaining routine to set up pointers for a Machine Language subroutine that is contained in data statements. It is difficult to understand what the data statements do without the assembler source code, so we provided it in Program Listing 2, for your convenience.

The source code is spiced liberally with comments and is pretty straightforward. CIO routines take care of the screen display. The demo maintains a table of 256 steps and displays it in chart form. A crude editor allows entry of waveform data through a joystick plugged into controller port one. You can change a portion of the waveform by moving the (invisible) cursor to that section; as the cursor moves, the steps are redrawn to the current cursor height. Pressing the START button on the console will clear the screen and zero out the waveform table.

When you press the joystick trigger, the screen will disappear and the waveform, from the left edge of the screen to the current cursor position, will play. Disrupting the display is regrettable but necessary — the DMA required for screen generation would otherwise distort the waveform. Note, too, that the joystick is read directly through Port A rather than through the OS shadow register because the VBLANK routine that copies data into the shadow registers has also been disabled. Moving the joystick up or down will change the pitch accordingly. To return to the waveform editor, release the joystick trigger.

The demo was written on Atari's Macro Assembler. To assemble the source with the Assembler/Editor cartridge, make the following changes:

DB should be .BYTE
DS should be *=+1
ORG should be *=
END INIT should be .END

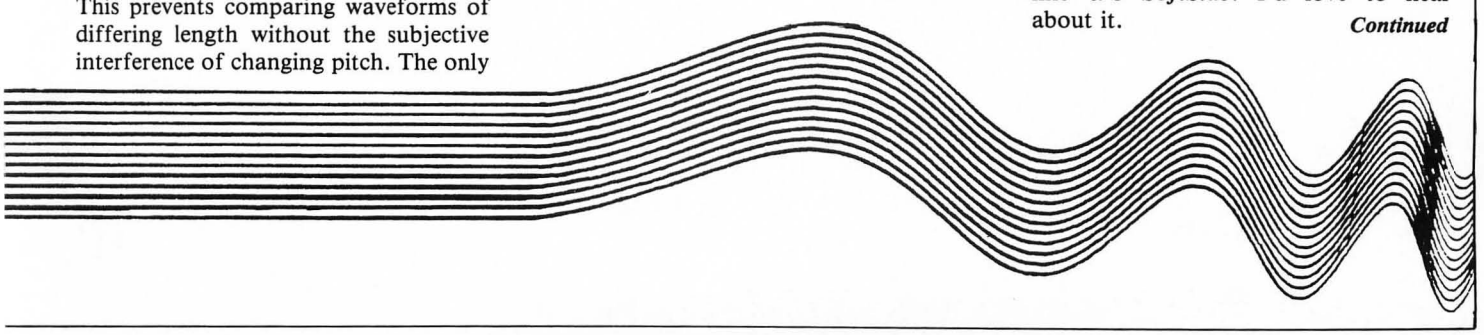
The run address should be set at INIT's address (hex 3000 in the example).

Suggested Improvements

The editor could be improved. It would be nice to have a visible cursor using player-missile registers, so you could pass over a portion of the waveform without disturbing it. Expanding the buffer past 256 bytes is easy, but will require a different method of display. A scrolling screen might work.

To use the demo as a sound development tool will require provisions for dumping the waveform data (stored in WAVES) to a printer/disk. The wavelength compensation trick would be a nice option, too. If you come up with something exciting, please drop me a line c/o *SoftSide*. I'd love to hear about it.

Continued



Making Waves *continued*

Program Listing 1

```
60 GOSUB 2000
70 CONSOL=53279:INCY=500:DECY=520:INCX
=540:DECX=560:LINES=600
80 GRAPHICS 24
90 SETCOLOR 2,0,0:SETCOLOR 1,0,10:SETC
OLOR 4,12,6
100 WAVE$(1)=CHR$(16):WAVE$(257)=CHR$(
16):WAVE$(2,256)=WAVE$:CX=1
200 IF STRIG(0)=1 THEN 220
210 Q=USR(ADR(CODE$)+1,ADR(WAVE$),CX-1
)
220 POKE 53279,8:A=PEEK(53279)
230 IF A=6 THEN 80
240 S=STICK(0)
250 IF S=15 THEN 330
260 IF S=10 OR S=14 OR S=6 THEN GOSUB
INCY
270 IF S=5 OR S=13 OR S=9 THEN GOSUB D
ECY
280 IF S=6 OR S=7 OR S=5 THEN GOSUB IN
CX
290 IF S=10 OR S=11 OR S=9 THEN GOSUB
DECX
300 COLOR 0:GOSUB LINES
310 WAVE$(CX,CX)=CHR$(CY+16)
320 COLOR 1:GOSUB LINES
330 GOTO 200
500 CY=CY+1:IF CY>15 THEN CY=0
510 RETURN
520 CY=CY-1:IF CY<0 THEN CY=15
530 RETURN
540 IF CX<256 THEN CX=CX+1
550 RETURN
560 COLOR 0
570 GOSUB LINES
580 IF CX>1 THEN CX=CX-1
590 RETURN
600 PLOT CX+32,190
610 DRAWTO CX+32,190-(ASC(WAVE$(CX,CX)
)-16)*12
620 RETURN
1000 DATA 104,104,133,204,104,133,203,
104,104,133,205,169,0,141,14,212,141,0
,212
1010 DATA 160,0,173,0,211,201,255,240,
22,198,207,208,18,166,206,134,207,201,
253
1020 DATA 240,8,201,254,208,6,230,206,
176,2,198,206,173,16,208,208,17,177,20
3
1030 DATA 141,1,210,166,206,232,208,25
3,200,196,205,208,207,240,203,169,255,
141,14,212,169,247,141,14,210,96
2000 DIM CODE$(1),CODE(16),WAVE$(257)
2010 FOR LOC=ADR(CODE$)+1 TO ADR(CODE$
)+83
2020 READ BYTE
2030 POKE LOC,BYTE
2040 NEXT LOC
2050 RETURN
```

LINES	SWAT CODE	LENGTH
60 - 260	EA	477
270 - 540	NZ	312
550 - 1030	OV	469
2000 - 2050	SH	100

Program Listing 2

```
                0100 * WAVEGEN CODE IS RELOCATABLE.
                0110 *
                0120 * OS SYSTEM EQUATES.
                0130 *
D400-           0140 DMA      .EQ $D400
D40E-           0150 VBI      .EQ $D40E
D20E-           0160 IRQ      .EQ $D20E
D300-           0170 PORTA    .EQ $D300
D010-           0180 TRIG     .EQ $D010
D201-           0190 AUDC1    .EQ $D201
                0200 *
00CB-           0210 WAVE     .EQ $CB
00CD-           0220 WEND     .EQ $CD
00CE-           0230 PITCH    .EQ $CE
00CF-           0240 WAIT     .EQ $CF
                0250 *
                0260          .OR $4000
                0270 *
                0280 * REMOVE & STORE USR ARGUMENTS.
                0290 *
4000- 68        0300 START    PLA
4001- 68        0310          PLA
4002- 85 CC     0320          STA WAVE+1
4004- 68        0330          PLA
4005- 85 CB     0340          STA WAVE
4007- 68        0350          PLA
4008- 68        0360          PLA
4009- 85 CD     0370          STA WEND
                0380 *
                0390 * DISABLE INTERRUPTS.
                0400 *
400B- A9 00     0410          LDA #$00
400D- 8D 0E D4  0420          STA VBI
4010- 8D 0E D2  0430          STA IRQ
4013- 8D 00 D4  0440          STA DMA
                0450 *
                0460 * CHECK STICK FOR PITCH CHANGE.
                0470 *
4016- A0 00     0480 DOWAVE   LDY #$00
4018- AD 00 D3  0490 CHKSTK   LDA PORTA
                0500 *
                0510 * IS STICK STRAIGHT UP?
                0520 *
401B- C9 FF     0530          CMP #$FF
401D- F0 16     0540          BEQ CHKBUT
                0550 *
                0560 * IF NOT, WAIT A WHILE.
                0570 *
401F- C6 CF     0580          DEC WAIT
4021- D0 12     0590          BNE CHKBUT
```

GRAPHICS 8 Writing

by Sol Guber

The Atari® computer features a multiplicity of display modes, which makes for great versatility. For instance, the Atari can display its normal text characters right-side-up, sideways, and even upside-down, through the auspices of graphics mode 8 (high-resolution). Because of the way the Atari generates screen displays, you can produce results with just a little memory and virtually painless programming.

The Atari writes on the screen with both the screen table and the shape table. With these two tables, you can write letters easily in GRAPHICS 8 mode.

Before describing the graphics procedure, I will explain the internal representation of the letters. Each letter is stored in the ROM as an eight-byte representation in binary that shows the shape of the letter. It is stored starting at 57344 decimal, $E000 hexadecimal, and the exact spot is the letter's ATASCII code times eight, plus the first location. The coding is in binary form and the computer translates into decimal when the PEEK command is called. Figure 1 shows the representation of the letter T. All the other letters are represented in a similar fashion. When the OS wants to print a letter, it looks up the letter in the shape table and puts it on the screen.

The screen table is found at about location 40000. You can determine the exact position by reading the high and low address pointer at locations 88 and 89 (PEEK(88) + PEEK(89)*256)). The screen table's exact beginning location varies depending on the graphics mode, from 40560 in mode three to 33104 in mode eight. The end of the screen table is always 40800.

In GRAPHICS 0, the data in the screen table determines the letter in the shape table. This is also true in GRAPHICS 1 and GRAPHICS 2, but the size of the letter will vary in these modes. Thus, if the number 54 is POKEd to location 40589, the letter M is placed on the screen in all three modes, but in GRAPHICS 1, the letter will be twice as *long,* and in GRAPHICS 2, the letter will be twice the *size.* An interesting thing occurs when you use several of the other modes. In the other graphics mode, the data generates a color on the screen directly. In GRAPHICS 3, the first two bits in the byte will be the color, the next two will be the intensity, the next two will be the color, and the final two will be the intensity again. In GRAPHICS 6, the color and intensity will alternate bit by bit so that fewer colors can be generated. In GRAPHICS 8 mode, the byte is examined bit by bit, and a one in the bit generates a color.

To write in GRAPHICS 8, you must put a binary number in the location on the screen which will light the proper pixels. If the proper number is put into the right location, the letter can be shaped as desired. The program listing has three subroutines that will print either vertically, horizontally, or upside down depending on the flag.

The program documentation explains how *Graphics 8 Writing* functions.

Figure 1.

Decimal	Binary	Pictoral
0	00000000	
126	01111110	XXXXXX
24	00011000	XX
24	00011000	XX
24	00011000	XX
24	00011000	XX
24	00011000	XX
24	00011000	XX

Figure 2.

Decimal	Binary	Binary	Decimal
00	00000000	00000000	00
126	01111110	01000000	64
24	00011000	01000000	64
24	00011000	01111111	127
24	00011000	01111111	127
24	00011000	01000000	64
24	00011000	01000000	64
24	00011000	00000000	00

Initialize several variables.

```
10000 C0=0:C1=1:C2=2:C5=5:C6=6:C7=7:C8
=8:C9=9:C10=10:C14=14:C30=30:C32=32:C3
4=34:C40=40
10010 C79=79:C127=127:C308=308:C309=30
9
10020 DIM A$(C40),B$(C30),C$(C40),O$(C
1),S(C8):GRAPHICS C0
```

Input the user's name.

```
10030 ? CHR$(125);"HI! I AM YOUR HOME
COMPUTER.";? "PLEASE TYPE IN YOUR NAME
 AND PRESS    RETURN";:INPUT B$
10040 IF B$="" THEN 10030
```

Draw graphic background.

```
10050 A$="YOUR NAME IS ":GRAPHICS C8
10060 COLOR C1:FOR Y=C1 TO C8:PLOT C5,
Y*C10-C1:DRAWTO C308,Y*C10-C1:NEXT Y
10070 PLOT C5,C9:DRAWTO C5,C79:PLOT C6
,C9:DRAWTO C6,C79:PLOT C308,C9:DRAWTO
C308,C79:PLOT C309,C9:DRAWTO C309,C79
```

Initialize some variables and print a message. X is the horizontal position and can vary from zero to 39. Y is the vertical position and can vary from zero to 192. FLG tells which direction the letters are to be printed. FLG = 1 is vertical, FLG = 2 is upside down, and FLG = 3 is sideways.

```
10080 I1=PEEK(88)+256*PEEK(89)
10090 X=C1:Y=C10:FLG=C1:GOSUB 10500
```

Print the name upside down in the same row as the message.

```
10100 C$=A$:A$=B$:X=C14:FLG=C2:GOSUB 1
0500
```

Print out several messages correctly.

```
10110 A$="THAT DOES NOT LOOK RIGHT"
10120 X=C1:Y=20:FLG=C1:GOSUB 10500
10130 A$="LET ME TRY AGAIN"
10140 Y=C30:GOSUB 10500
```

Print out the name upside down.

```
10150 A$=C$:Y=C40:GOSUB 10500
10160 A$=B$:X=C14:FLG=C1+C2:GOSUB 1050
0
```

Print out several more messages and the name correctly.

```
10170 A$="THIS IS MORE DIFFICULT THAN
I THOUGHT"
10180 X=C1:Y=50:FLG=C1:GOSUB 10500
10190 A$=C$:A$(LEN(A$)+C1)=B$
10200 X=C1:Y=60:GOSUB 10500
10210 A$="THERE! AND YOU THOUGHT I WAS
 DUMB!"
10220 Y=70:GOSUB 10500
```

continued

GRAPHICS 8 Writing *continued*

Prompt user to restart the demonstration.

```
10230 ? "TYPE ";CHR$(C34);"RUN";CHR$(C
34);" FOR ANOTHER DEMONSTRATION"
10240 END
```

Determine the exact position of the screen input.

```
10500 I2=I1+Y*C40+X
```

Set a string variable to the letter that is put on the screen.

```
10510 FOR Z=C1 TO LEN(A$):O$=A$(Z,Z)
```

Send a variable to a subroutine that determines the letter's position in the character shape table.

```
10520 GOSUB 10600
```

Determine the start of the shape table for that letter in memory.

```
10530 I3=57344+XX*C8
```

Determine how the letter is to be printed.

```
10540 ON FLG GOSUB 10700,10800,10900
```

Loop to print the entire message.

```
10550 I2=I2+C1:NEXT Z
10560 RETURN
```

Determine the ATASCII values of each letter with the decoding technique found in the Atari manual.

```
10600 XX=ASC(O$):IF XX>C127 THEN XX=XX
-C127-C1
10610 IF XX>31 AND XX<96 THEN XX=XX-C3
2:RETURN
10620 IF XX<C32 THEN XX=XX+64
10630 RETURN
```

Write the letter on the screen. The value at each spot in the shape table is poked to a specified spot on the screen. Each line of the screen has space for 40 letters. Each new binary byte is forty bytes away from the previous byte so that the letter will line up correctly.

```
10700 FOR U=C0 TO C7
10710 POKE I2+U*C40,PEEK(I3+U)
10720 NEXT U
10730 RETURN
```

Write a letter on the screen upside down. This is similar to the routine above, except that in the letter shape table search, the bottom of the letter (I3 + 7) is found first and put into screen memory. The next to last part of the letter (I3 + 6) follows, and so forth, so that the letter is put into the screen table upside down.

```
10800 FOR U=C0 TO C7
10810 POKE I2+U*C40,PEEK(I3+C8-C1-U)
10820 NEXT U
10830 RETURN
```

This subroutine is the most complex. Figure 2 contains the Figure 1 data and shows how the shape table must be modified to put a letter on its side. The first bit of every byte must be summed together in its binary form, followed by the second bit, the third bit, and so on. Every bit in the first line of the shape table is put into each of eight other variables "S" according to the binary number there.

Clear array "S".

```
10900 FOR U=C0 TO C7
10910 S(U)=C0
10920 NEXT U
```

Determine the line number in the shape table for the desired character.

```
10930 N=128:FOR U=C0 TO C7
10940 AB=PEEK(I3+U):FOR KK=C0 TO C7
```

Determine if the bit is one or zero, and if it is one, add its binary number to "S".

```
10950 IF AB/C2<>INT(AB/C2) THEN S(KK)=
S(KK)+N
```

Remove the leftmost bit and increment the counter.

```
10960 AB=INT(AB/C2):NEXT KK
```

Halve the binary value and increment the shape table counter for the next line.

```
10970 N=N/C2:NEXT U
```

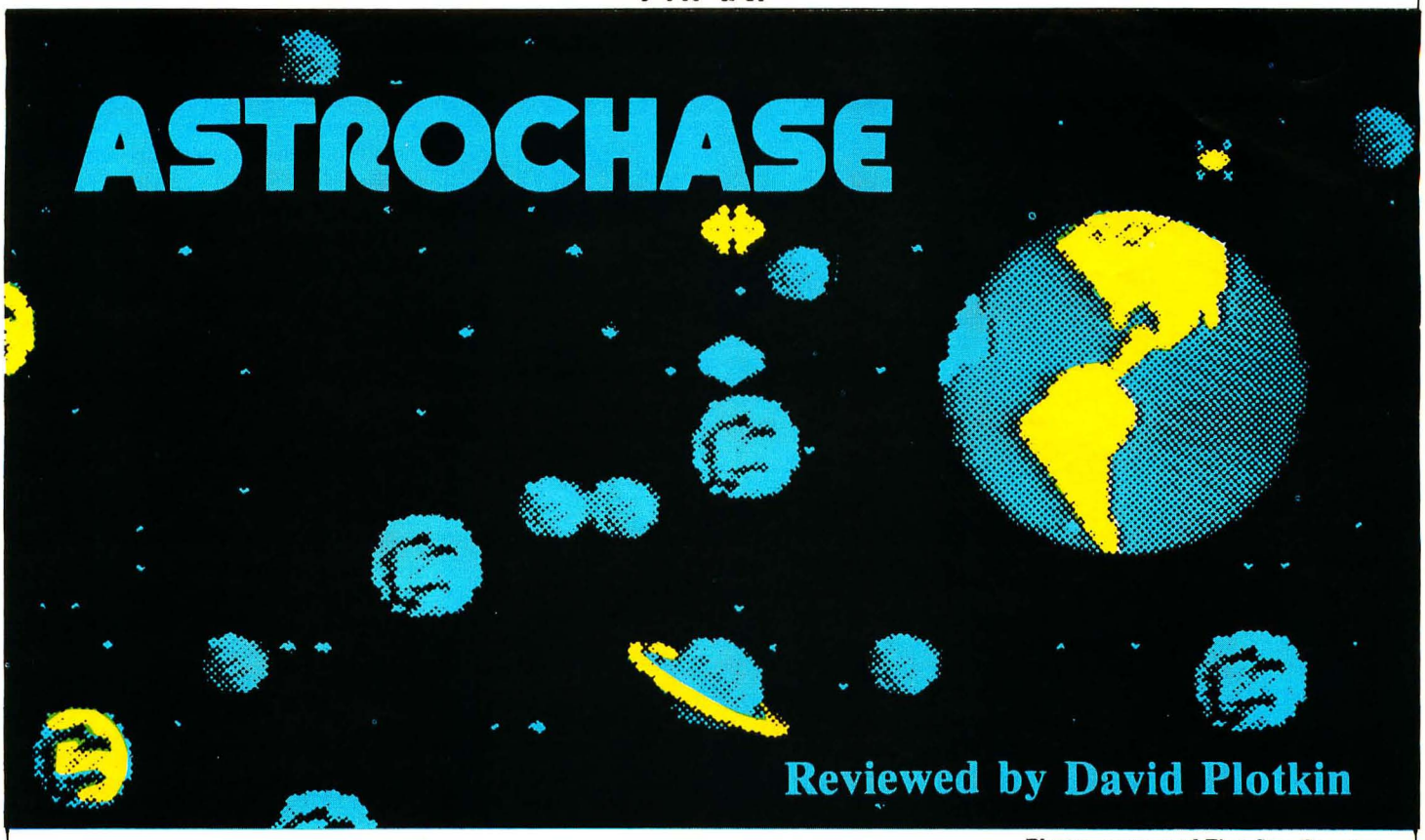
Put the values in array "S" onto the screen.

```
10980 FOR U=C0 TO C7
10990 POKE I2+U*C40,S(U)
10992 NEXT U
10994 RETURN
```

For ATARI® **GRAPHIC 8 Writing**

LINES	SWAT CODE	LENGTH
10000 - 10080	KZ	529
10090 - 10200	VD	380
10210 - 10600	TD	285
10610 - 10900	KD	164
10910 - 10994	NC	167

ASTROCHASE



Reviewed by David Plotkin

by First Star Software. System requirements: Atari® 400/800 with 32K (disk or cassette). Retail Price: $29.95.

AstroChase, the first release from Fernando Herrera's First Star Software, demonstrates the most outstanding graphics and technically flawless execution this reviewer has ever seen.

Fernando Herrera, you may remember, was the winner of the first *Star Award* given by Atari for programming excellence in submissions to the Atari Program Exchange (APX). The prize money ($25,000) helped start the new software company and accounts for its name. Because of Atari's prodigious advertising and numerous interviews, Fernando's story has become well known. The winning program (*My First Alphabet*) that Fernando developed to aid his son, Steve, achieve better eyesight has become part of the regular Atari program line-up, and Mr. Herrera has a new career.

In *AstroChase*, you battle to save the earth from "Megamines" launched by vengeful aliens. Eight different kinds of alien vessels are intent on destroying your joystick-controlled saucer (you start with three), and preventing you from destroying the Megamines moving relentlessly toward earth.

The battlefield is a stunning multicolor, multiscreen universe. Planets are depicted in high resolution graphics, while stars are little "plus" signs scattered across the screen. The detailed rendition of earth is in the center of approximately ten full screens of the galaxy. As you move your saucer, the universe scrolls smoothly in the desired direction. Each round (or "chase") starts with your saucer alongside Earth, and sixteen Megamines inbound from the far reaches of space. Each saucer starts with 1000 units of energy. Energy drops as you fire at the aliens, turn on your shields (by going to one of the shield depots), run into planets or stars, or bounce off the invisible (ulp!) force shield which surrounds the earth. You can recharge your energy by running over the energy generators located at the four corners of the shield.

Each new Chase contains a new mixture of alien vessel types. Some are fast; others are slow. Some only ram your saucer, some fire at you, and some pass right through planets. The aliens which pass through planets are particularly devilish, since they are hidden while inside the planets. The most important thing to remember is that the alien vessels are secondary — the primary goal is to keep the Megamines away from the earth, which shatters spectacularly when it's destroyed. Should this disaster occur, the game is over.

You must continuously patrol the area around the earth. If you move off to recharge energy or get some shields, you risk earth's destruction while you are occupied elsewhere. Since saucers are relatively plentiful, (you get two new saucers at the beginning of each Chase) don't worry too much about shields or energy, but go after the Megamines. Incidentally, the mines are extremely small and very hard to hit as they move.

Photos courtesy of First Star Software.

To obliterate mines and defend against enemy attacks, your saucers contain a multi-shot laser. You can have three or four (who can count in the heat of battle?) laser shots on the screen at once. To fire, hold down the fire button and push the stick in the desired direction. Your saucer continues in its current direction while you are firing, unless it encounters a planet or star, in which case it rebounds like a billiard ball. The splitting of firing and propulsion functions, somewhat reminiscent of *Attack at Ep-Cyg 4,* is copyrighted by First Star Software as "Single Thrust Propulsion." This feature is not as useful in the *AstroChase* scenario as it might be in others. Because its space is so crowded, you must constantly change directions anyway or risk bouncing off a planet into an attacker. Stars are especially difficult to spot; they are small and easy to miss when things really get moving. (I've lost many a saucer because an unnoticed star blocked my saucer's escape route.)

continued

ASTROCHASE continued

With more experience, you begin to watch for stars as carefully as enemy vessels!

Although the theme of *AstroChase* is somewhat hackneyed, the spectacular graphics make you forget that this is just one more space shoot-em-up. Its playability suffers slightly from the fact that all is over when earth is destroyed — perhaps "There is no second chance" would be a better slogan than "There is no escape."

The graphic expertise of Fernando Herrera shines in the remarkable animated sequences (there are eight of them) which occur near the end of every four rounds. These full screen graphic masterpieces are unmatched anywhere in Atari software. The backround is an extremely high resolution (Graphics 7.5) multicolor spaceport. I'm not going to spoil your fun by describing the sequence, but it is well executed and humorous. Thanks for a really entertaining program, Fernando. And thanks to your son for getting you started on this new career!

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* * * * * * * *

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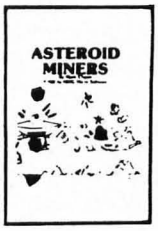
* * * * * * * *



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EXPLORING THE ATARI® FRONTIER

GTIA Part II: The Interrupted Color

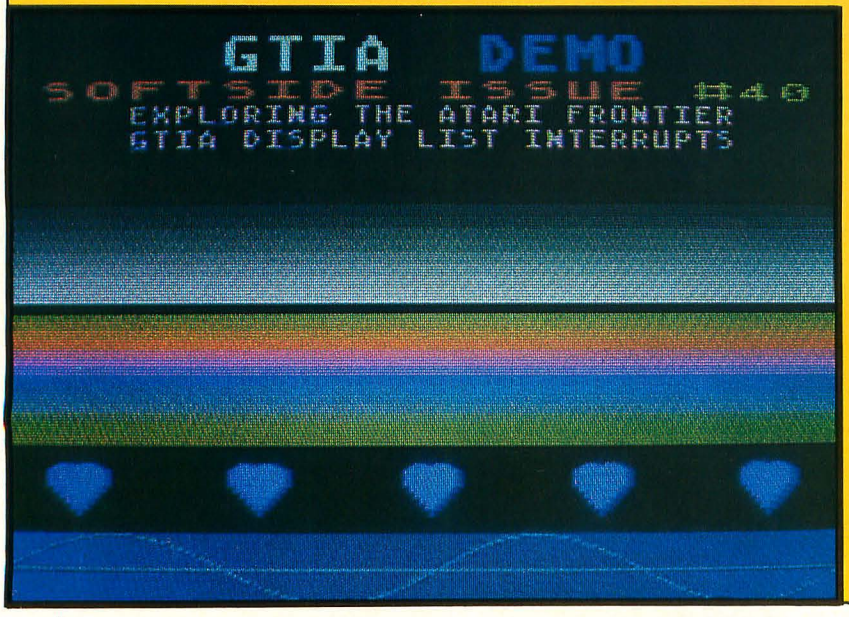
by Alan J. Zett

Editor's note: Unless you have read the issue #35 installment of "Exploring the Atari Frontier," the information presented here will be somewhat confusing. In addition, I'm assuming you have read all the past installments listed below:

No.	SoftSide	Title
#1	May 1982	ANTIC and the Display List: Part 1
#2	Issue #31	ANTIC and the Display List: Part 2
#3	Issue #34	ANTIC and the Display List: Part 3
#4	Issue #35	Display List Interrupts
#5	Issue #39	GTIA Part 1: A Brilliant Idea

In issue #39, we talked about the new and exciting features of Atari's GTIA upgrade package. We showed that GTIA produces sophisticated and colorful displays straight from BASIC. In fact, BASIC tradeoffs and lack of programmer imagination cause GTIA's only limitations. You cannot overcome the latter (without a lot of effort), but you can defeat the former by programming in Machine Language which enhances the operation of BASIC in many ways. Routines can range from a simple USR call, to driver programs that enable features built into the Atari, but not normally available from BASIC. ANTIC falls into the latter category. Its simple instructions work with GTIA (or CTIA) to create all the standard BASIC screen displays commonly known as GRAPHICS 0-8. It also has many subfeatures unnecessary for most BASIC applications. ANTIC's most interesting feature is a topic all too familiar to old *Frontier* readers — Display List Interrupts (DLIs). The DLI

Photo 1. Answers the question, "Can you mix GTIA modes with the normal ones?"



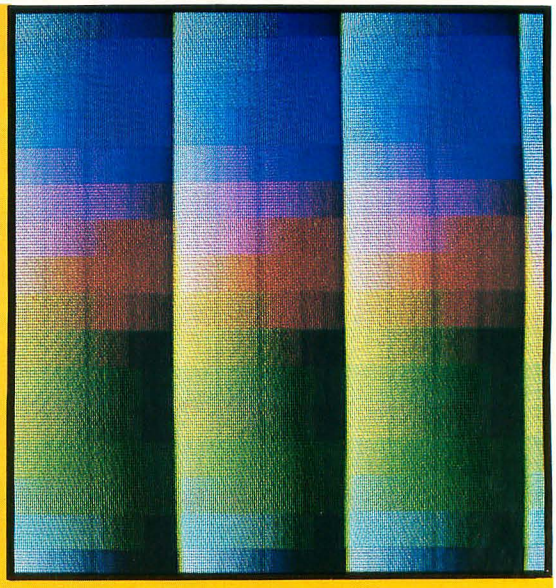


Photo 2. GTIA demo shows you more color than you can ever use — 256 colors.

allows you to change the GTIA display while the screen is being drawn. This creates some truly colorful displays.

Subtle Difference

The display list of any GTIA graphics mode may confuse you at first. To familiarize yourself with the display lists for GRAPHICS 9 through 11, you must first look at GRAPHICS 8. The ANTIC code for a GRAPHICS 8 mode line is 15 decimal (0F hex). You can be sure that when a 15 decimal appears in the display list, it will be a GRAPHICS 8 mode line. Or can you? If you look at the GRAPHICS 9 display list, you find a GRAPHICS 8 mode line! In fact, *all* of the new GTIA graphics modes consist of GRAPHICS 8 mode lines. The reason is simple. The values from zero to 255 already have definitions in the ANTIC language. Since there was no room to add more instructions for three new graphics modes, an existing mode was chosen to represent any one of four distinct graphics modes. That answers the question of *why,* but *how* can one common graphics mode be four unique graphics modes at the same time?

Searching For Clues

Look at Table 1. We will use some of these locations to solve the mystery of GTIA. The first significant location in the table is DINDEX. The Operating System (OS) uses this location to store the current screen graphics mode. BASIC also uses the location to calculate the position of data sent to the screen. For example, when DINDEX is set to zero, BASIC assumes a screen of 40 by 24 text characters. If DINDEX is set to four, BASIC assumes a screen of 80 by 40 color graphics pixels.

If we now execute a GRAPHICS 8 statement, logically DINDEX should contain an eight. If we try GRAPHICS 9, DINDEX contains a nine. The logical conclusion is that the only difference between a GRAPHICS 8 screen and a GRAPHICS 9 screen is that DINDEX reflects the actual GRAPHICS mode used. This conclusion is wrong.

ANTIC and GTIA must work together. Neither can accomplish much when operating separately. Moreover, they must communicate quickly because of the amount of work to be done while the screen is being drawn. To achieve such a high information transfer rate, you must store the information inside the chips themselves. To facilitate direct input to the chips, certain memory addresses are hardwired to the chip's storage registers. These locations are positioned high up in RAM, and are commonly referred to by Atari as hardware registers, to distinguish them from the temporary registers in RAM known as shadow registers.

Table 1: Important memory locations.

Dec	Hex	Name	Description
00087	0057	DINDEX	Screen graphics mode index.
00512	0200	VDSLST	LSB of DLI jump vector.
00513	0201	VDSLST	MSB of DLI jump vector.
00559	022F	SDMCTL	DMA control register (shadow).
00560	0230	SDLSTL	LSB of display list memory location.
00561	0231	SDLSTH	MSB of display list memory location.
00623	026F	GPRIOR	Screen priority register (shadow).
00704	02C0	PCOLR0	Player color register 0 (shadow).
00705	02C1	PCOLR1	Player color register 1 (shadow).
00706	02C2	PCOLR2	Player color register 2 (shadow).
00707	02C3	PCOLR3	Player color register 3 (shadow).
00708	02C4	COLOR0	Color register 0 (shadow).
00709	02C5	COLOR1	Color register 1 (shadow).
00710	02C6	COLOR2	Color register 2 (shadow).
00711	02C7	COLOR3	Color register 3 (shadow).
00712	02C8	COLOR4	Color register 4 (shadow).
53266	D012	COLPM0	Player color register 0 (hardware).
53267	D013	COLPM1	Player color register 1 (hardware).
53268	D014	COLPM2	Player color register 2 (hardware).
53269	D015	COLPM3	Player color register 3 (hardware).
53270	D016	COLPF0	Color register 0 (hardware).
53271	D017	COLPF1	Color register 1 (hardware).
53272	D018	COLPF2	Color register 2 (hardware).
53273	D019	COLPF3	Color register 3 (hardware).
53274	D01A	COLBK	Color register 4 (hardware).
53275	D01B	PRIOR	Screen priority register (hardware).
54280	D40A	WSYNC	Wait for vertical sync.
54286	D40E	NMIEN	Non maskable interrupt enable.

Table 2: GTIA graphic mode data.

Mode	Resolution	Memory	GPRIOR	DINDEX
8	320 x 160	6560	0	8
9	80 x 192	7680	64	9
10	80 x 192	7680	128	10
11	80 x 192	7680	192	11
24	320 x 192	7680	0	8

A certain magical union exists between the shadow and hardware registers. The data stored in shadow registers is written periodically to the hardware registers during the Vertical Blank Interrupt (VBI). In this way, ANTIC and GTIA are constantly updated on changes occurring in the operating environment. For example: Location COLOR4 (see Table 1) contains the current screen background color. Let's say a value of 144 is held there. From BASIC, a statement such as SETCOLOR 4,0,4 is executed and the computed color value of four is placed into COLOR4. (see issue #39 for a discussion of POKE vs SETCOLOR). The hardware still thinks the background color is 144. During the VBI, the OS takes the value in COLOR4 and puts it into the hardware register COLBK. The result changes the background color. Why go through all that when you could have put the color value directly into the hardware register? If you were to do that, you would lose an enormous amount of flexibility.

Look at DLIs, for example: their function mandates the use of this feature. VBIs occur between each screen, but DLIs can be set for almost every line of the screen. When a DLI places a new color value into the hardware register, the effect is immediate. From that screen line downward, the color changes. At the end of the screen, the VBI occurs and restores the color value contained in the shadow memory. By using many DLIs you can change every color on the screen as it is drawn.

Getting back to DINDEX — here is a memory location just for the benefit of the OS for screen formatting. It is not a shadow register, so the information it contains is useless to ANTIC. It is apparent that something else controls the "GTIA effect." After examining all the clues, I deduced that either DINDEX really was a shadow register and I would have to

continued

Atari Frontier *continued*

Figure 1: Display List for Demo 1.

Byte#	Value	Mode type
1	112	Blank
2	112	Blank
3	112	Blank
4	79	Graphics 8 w/LMS option
5	nn	LSB of screen memory
6	nn	MSB of screen memory
7	15	Graphics 8
.	.	.
.	.	.
.	.	.
27	15	Graphics 8
28	143	Graphics 8 w/DLI option
29	15	Graphics 8
.	.	.
.	.	.
.	.	.
51	15	Graphics 8
52	143	Graphics 8 w/DLI option
53	15	Graphics 8
.	.	.
.	.	.
.	.	.
75	15	Graphics 8
76	143	Graphics 8 w/DLI option
77	15	Graphics 8
.	.	.
.	.	.
.	.	.
99	15	Graphics 8
100	207	Graphics 8 w/LMS & DLI options
101	nn	LSB of screen memory
102	nn	MSB of screen memory
103	15	Graphics 8
.	.	.
.	.	.
.	.	.
125	15	Graphics 8
126	143	Graphics 8 w/DLI option
127	q5	Graphics 8
.	.	.
.	.	.
.	.	.
149	15	Graphics 8
150	143	Graphics 8 w/DLI option
151	15	Graphics 8
.	.	.
.	.	.
.	.	.
173	15	Graphics 8
174	143	Graphics 8 w/DLI option
175	15	Graphics 8
.	.	.
.	.	.
.	.	.
199	15	Graphics 8
200	65	Jump w/WVB option
201	nn	LSB of DL in memory
202	nn	MSB of DL in memory

Program Listing 1A

```
100 GRAPHICS 11:POKE 712,0:POKE 559,0
110 DL=PEEK(560)+PEEK(561)*256+4
120 FOR X=0 TO 79:COLOR INT(X/5)
130 PLOT X,0:DRAWTO X,191:NEXT X
140 COLOR 0:FOR X=0 TO 15:PLOT X*5,0
150 DRAWTO X*5,191:NEXT X
160 FOR X=0 TO 7:FOR Y=20 TO 23
170 PLOT 0,X*24+Y:DRAWTO 79.X*24+Y
180 NEXT Y:NEXT X
190 FOR X=23 TO 71 STEP 24
200 POKE DL+X,143:NEXT X
210 FOR X=121 TO 190 STEP 24
220 POKE DL+X,143:NEXT X
230 POKE 512,128:POKE 513,6:M=1663
240 M=M+1:READ D:IF D=999 THEN 260
250 POKE M,D:GOTO 240
260 POKE DL+95,207:POKE 54286,192
270 POKE 559,34:GOTO 270
300 DATA 216,72,173,153,6,24,105,2
310 DATA 141,10,212,141,26,208,201
320 DATA 14,208,2,169,0,141,153,6
330 DATA 104,64,0,999
```

Program Listing 1B

```
                1000        .OR $0680
                1010        .TA $4000
                1020 *
                1030 * DEFINE SYSTEM EQUATES
                1040 *
D40A-           1050 WSYNC  .EQ $D40A  ;WAIT VERTICAL SYNC REGISTER.
D01A-           1060 COLBK  .EQ $D01A  ;GTIA BACKGROUND COLOR REGISTER.
                1070 *
                1080 * START OF GTIA HANDLER
                1090 *
0680- D8        1100 START  CLD        ;CLEAR THE DECIMAL MODE.
0681- 48        1110        PHA        ;SAVE THE 'A' REGISTER ON STACK.
0682- AD 99 06  1120        LDA STORE  ;GET COLOR VALUE INTO THE
0685- 18        1130        CLC        ; A REGISTER, CLEAR THE
0686- 69 02     1140        ADC #$02   ; CARRY FLAG AND ADD TWO.
0688- 8D 0A D4  1150        STA WSYNC  ;WAIT FOR VERTICAL SYNC.
068B- 8D 1A D0  1160        STA COLBK  ;CHANGE BACKGROUND COLOR.
068E- C9 0E     1170        CMP #$0E   ;TEST FOR LAST LEGAL COLOR.
0690- D0 02     1180        BNE OUT    ;SKIP IF SO.
0692- A9 00     1190        LDA #$00   ;RESET COLOR REGISTER POINTER
0694- 8D 99 06  1200 OUT    STA STORE  ;AND SAVE FOR NEXT DLI.
0697- 68        1210        PLA        ;RESTORE THE 'A' REGISTER.
0698- 40        1220        RTI        ;RETURN FROM INTERRUPT.
                1230 *
                1240 * COLOR POINTER
                1250 *
0699- 00        1260 STORE  .HS 00
```

Program Listing 2A

```
100 GRAPHICS 24:POKE 712,0:POKE 559,0
110 DL=PEEK(560)+PEEK(561)*256+4
120 POKE DL-1,71:POKE DL+2,134
130 POKE DL+3,2:POKE DL+4,130
140 FOR X=5 TO 95:POKE DL+X,15:NEXT X:
FOR X=98 TO 158:POKE DL+X,15:NEXT X:PO
KE DL+95,79:POKE DL+159,65:M=1663
150 POKE DL+160,PEEK(560):POKE DL+161,
PEEK(561):POKE DL+55,143:POKE DL+106,1
43:POKE DL+108,143:POKE DL+132,143
160 M=M+1:READ D:IF D=999 THEN 500
170 POKE M,D:GOTO 160
300 DATA 216,72,138,72,174,195,6,189
310 DATA 183,6,201,0,208,12,189,189
320 DATA 6,141,10,212,141,24,208,76
330 DATA 163,6,189,189,6,141,10,212
340 DATA 141,26,208,189,183,6,141,27
350 DATA 208,232,224,6,208,2,162,0
360 DATA 142,195,6,104,170,104,64
400 DATA 0,64,192,192,0,0
410 DATA 0,0,8,0,0,148,0,999
500 POKE 512,128:POKE 513,6
510 POKE 54286,192:POKE 559,34
520 POKE 87,0:POSITION 0,0:? "     gti
a  DEMO"," softside issue #40":? "
EXPLORING THE ATARI FRONTIER"
530 POKE 752,1:? "    GTIA DISPLAY LIS
T INTERRUPTS":POKE 87,9:FOR Y=3 TO 52:
COLOR INT(Y/4):PLOT 0,Y:DRAWTO 79,Y
540 NEXT Y:POKE 87,11:FOR Y=53 TO 102:
COLOR INT((Y-53)/3):PLOT 0,Y:DRAWTO 79
,Y:NEXT Y
550 POKE 87,8:Y=99:A=0:FOR X=15 TO 319
 STEP 64:GOSUB 580:NEXT X
560 COLOR 1:PLOT 0,143:DRAWTO 319,143:
FOR X=0 TO 315:PLOT X+2,-SIN(X/25)*12+
143:NEXT X
570 GOTO 570
580 COLOR 1:FOR ZA=0 TO 10:FOR AZ=0 TO
 ZA STEP 2:PLOT X+15+AZ,Y-ZA+25:PLOT X
+15-AZ,Y-ZA+25:NEXT AZ:NEXT ZA
590 FOR ZA=11 TO 15:FOR AZ=0 TO 10 STE
P 2:PLOT X+15+AZ,Y-ZA+25:PLOT X+15-AZ,
Y-ZA+25:NEXT AZ:NEXT ZA
600 Z=-2:FOR ZA=16 TO 18:Z=Z+2:FOR AZ=
Z TO 8-Z STEP 2:PLOT X+15+AZ,Y-ZA+25:P
LOT X+15-AZ,Y-ZA+25:NEXT AZ:NEXT ZA
610 RETURN
```

Program Listing 2B

```
                1000        .OR $0680
                1010        .TA $4000
                1020 *
                1030 * DEFINE SYSTEM EQUATES
                1040 *
D01B-           1050 PRIOR  .EQ $D01B   ;GTIA MODE ENABLE REGISTER.
D40A-           1060 WSYNC  .EQ $D40A   ;WAIT VERTICAL SYNC REGISTER.
D018-           1070 COLPF2 .EQ $D018   ;CTIA BACKGROUND COLOR REGISTER.
D01A-           1080 COLBK  .EQ $D01A   ;GTIA BACKGROUND COLOR REGISTER.
                1090 *
                1100 * START OF GTIA HANDLER
                1110 *
0680- D8        1120 START  CLD         ;CLEAR THE DECIMAL MODE.
0681- 48        1130        PHA         ;SAVE THE 'A' REGISTER ON STACK.
0682- 8A        1140        TXA         ;TRANSFER 'X' TO 'A' AND
0683- 48        1150        PHA         ; AND SAVE IT ON THE STACK ALSO.
0684- AE C3 06  1160        LDX STORE   ;GET COLOR TABLE OFFSET POINTER.
0687- BD B7 06  1170        LDA MODE,X  ;GET CTIA/GTIA STATUS MODE.
068A- C9 00     1180        CMP #$00    ;CHECK FOR CTIA MODE.
068C- D0 0C     1190        BNE GTIA    ;GO TO GTIA ROUTINE IF NOT.
068E- BD BD 06  1200 CTIA   LDA COLOR,X ;GET COLOR TO REPLACE.
0691- 8D 0A D4  1210        STA WSYNC   ;WAIT FOR VERTICAL SYNC.
0694- 8D 18 D0  1220        STA COLPF2  ;STORE NEW COLOR IN REGISTER.
0697- 4C A3 06  1230        JMP CHECK   ;JUMP TO CHECK ROUTINE.
069A- BD BD 06  1240 GTIA   LDA COLOR,X ;GET COLOR TO REPLACE.
069D- 8D 0A D4  1250        STA WSYNC   ;WAIT FOR VERTICAL SYNC.
06A0- 8D 1A D0  1260        STA COLBK   ;STORE NEW COLOR IN REGISTER.
06A3- BD B7 06  1270 CHECK  LDA MODE,X  ;GET CTIA/GTIA MODE STATUS.
06A6- 8D 1B D0  1280        STA PRIOR   ;STORE IT INTO THE REGISTER.
06A9- E8        1290        INX         ;BUMP COLOR TABLE POINTER.
06AA- E0 06     1300        CPX #$06    ;CHECK FOR END OF TABLE.
06AC- D0 02     1310        BNE OUT     ;IF NOT, JUMP OUT.
06AE- A2 00     1320        LDX #$00    ;RESTORE COLOR TABLE POINTER.
06B0- 8E C3 06  1330 OUT    STX STORE   ;SAVE CURRENT POINTER FOR
06B3- 68        1340        PLA         ; NEXT DLI, GET AND RESTORE
06B4- AA        1350        TAX         ; THE 'X' REGISTER FROM THE
06B5- 68        1360        PLA         ; STACK, RESTORE THE 'A'
06B6- 40        1370        RTI         ; REGISTER AND EXIT.
                1380 *
                1390 * DLI COLOR TABLE AND POINTER
                1400 *
06B7- 00 40 C0
06BA- C0 00 00 1410 MODE    .HS 0040C0C00000
06BD- 00 00 08
06C0- 00 00 94 1420 COLOR   .HS 000008000094
06C3- 00        1430 STORE  .HS 00
```

find its corresponding hardware register, or that GTIA worked by magic, and I should call Atari to find out how and why. After exhausting the first possibility, I tried the second. A helpful genius at Atari gave me the information I needed, but the answer surprised me.

Player/Missile Connection

The answer to how ANTIC discriminates between GRAPHICS 8 and the new GTIA modes is found in a register used primarily for Player/Missile (PM) graphics manipulation. The twin pair of locations known as GPRIOR and PRIOR (see Table 1) is the source of the GTIA's actions. In a CTIA graphics mode (zero to eight), the two most significant bits (bits six and seven) of these registers are set to zero. Whenever a GTIA graphics mode is selected, however, bits six and seven are set to another state. *continued*

Atari Frontier *continued*

Table 2 compares all the BASIC graphic modes using ANTIC mode line fifteen. The only apparent difference in GRAPHICS 9-11 and 24 is pixel size. GRAPHICS 8 takes less memory only because it has a text window at the bottom. The values listed in Table 2 for GPRIOR equate as follows: GRAPHICS 8 and 24, bits six and seven equal zero; GRAPHICS 9, bit six equals one and bit seven equals zero; GRAPHICS 10, bit six equals zero and bit seven equals one; GRAPHICS 11, bits six and seven equal one. GPRIOR is the shadow register located in RAM. Writing a value here sets the default GTIA graphics mode for the entire screen. PRIOR is the hardware counterpart, which you can change with a DLI to modify the screen as it is drawn.

Figure 2: Display List for Demo 2.

Byte#	Value	Mode type
1	112	Blank
2	112	Blank
3	112	Blank
4	71	Graphics 2 w/LMS option
5	nn	LSB of screen memory
6	nn	MSB of screen memory
7	134	Graphics 1 w/DLI option
8	2	Graphics 0
9	130	Graphics 0 w/DLI option
10	15	Graphics 8
.	.	.
.	.	.
.	.	.
59	15	Graphics 8
60	143	Graphics 8 w/DLI option
61	15	Graphics 8
.	.	.
.	.	.
.	.	.
99	15	Graphics 8
100	79	Graphics 8 w/LMS option
101	nn	LSB of screen memory
102	nn	MSB of screen memory
103	15	Graphics 8
.	.	.
.	.	.
.	.	.
110	15	Graphics 8
111	143	Graphics 8 w/DLI option
112	15	Graphics 8
113	143	Graphics 8 w/DLI option
114	15	Graphics 8
.	.	.
.	.	.
.	.	.
137	15	Graphics 8
138	143	Graphics 8 w/DLI option
139	15	Graphics 8
.	.	.
.	.	.
.	.	.
163	15	Graphics 8
164	65	Jump w/WVB option
165	nn	LSB of DL in memory
166	nn	MSB of DL in memory

ANTIC is totally innocent in the GTIA conspiracy. To ANTIC, graphics modes eight to eleven are identical. In an indirect way, DINDEX is responsible for how ANTIC and GTIA coordinate their operations. When the OS finds a GTIA mode value (nine to eleven) stored in DINDEX, it modifies data going to the screen in a special way. By shifting and transforming bits, the OS puts a special interpretation of screen data into memory for GTIA's benefit. GTIA takes an ANTIC mode fifteen and alters its appearance to form the new graphics mode displays. GTIA works on data received from ANTIC, and actually modifies its appearance. It thinks that all data coming to it while GPRIOR/PRIOR are selected is a new form of text display. To prove this, try the following test. Set up a normal GRAPHICS 0 screen (i.e. type GRAPHICS 0). Now POKE GPRIOR (623 decimal) with the values in Table 2. With GRAPHICS 8, the display is normal. However, when the values of GRAPHICS 9-11 are POKEd, the screen reverts to GTIA color graphics! Try executing normal commands like LIST, PRINT, and so on. Now we know how to get a GTIA mode, but how can we use this information with DLIs? This is where the excitement really begins.

Frontier Take-A-Part

This time, I have three different demos which require some explanation. Refer now to Program Listing 1a, Program Listing 1b, and Figure 1. Program Listing 1a is the BASIC program to create the demo; Program Listing 1b is the Machine Language DLI routine, and Figure 1 is the modified display list. The first demo is called *Palette*, and displays all 128 standard Atari colors.

In Figure 1 you will notice several DLI instructions. These correspond to the changes of color down the screen. The PEEKs and POKEs contained in Program Listing 1a are all defined in Table 1, and should be fairly familiar. The DLI routines are tricky, however. We'll take them one at a time.

The listings show us a few interesting things. Program Listing 1a uses GRAPHICS 11 as a base. Stepping the luminance levels progressively down the screen will display all 128 colors. The DLI routine holds in memory a temporary value that is incremented by two every time a DLI occurs, and puts this value in the location that controls luminance levels in GRAPHICS 11. Program Listing 1b shows us a few EQuates for WSYNC and COLBK. The first actual 6502 instruction we confront is a CLD (Clear Decimal Mode). This is a new instruction in our DLI routines, because previous DLI examples have not needed it. What it does and why are another story in themselves, but to make a long story short: Atari constantly pops in and out of the 6502 decimal mode. When the DLI occurs, you can't tell what mode you are in. Since this is the first time a DLI routine has used an ADC instruction,this is the first time CLD was needed.

The rest of this DLI routine is fairly straight forward. The decimal mode is cleared, the luminance value retrieved and incremented by two, WSYNC is activated to allow proper timing for the STA instruction that follows, a quick comparison is made to the limit for luminance value allowed, and the adjusted value is saved for later. The registers used were saved on the stack and removed after the routine was finished. I realize this is a very brief explanation of its function. If you are still confused, reread the previous installments.

Program Listing 2a, Program Listing 2b, Figure 2, and Photo 1 refer to the next demo which I wrote to answer the theoretical question: "Can you mix (GTIA modes) with the normal ones?" Yes you can, but it's much harder than I thought.

continued on page 74

SoftSide ADVENTURE SERIES

Issue 40 Adventure:
Volcano Island

Shipwrecked on a hostile tropical island, you must get a message to someone before the island's volcano explodes, and without offending the natives!

Here are the encrypted hints for **It's About Time,** the Adventure in Issue 39. (See Adventure instructions in **SoftSide Selections** for decryption directions.)

Hint 1 FHV TREV RMHGVZW LU WILK DSVM WVZORMT DRGS GIZWVIH.

Hint 2 GSV XZEVNZM KVWWOVI ORPVH ILXPH.

Hint 3 GSV GFIPVB ORPVH XLIM.

Hint 4 SZGXS GSV KGVILWZXGBO VTT RM GSV SLG WVHVIG.

Hint 5 IVOVZHV GSV YZYB KGVILWZXGBO RM GSV HGLMV ZTV XZEV GL TVG GSV ZIILDSVZW.

Hint 6 MVEVI YFB GSV ZCV LI NRIILI.

Hint 7 YFBRMT GSV ILKV DROO TVG BLF BLFI XZY UZIV.

Hint 8 GSV GRTVI RHM'G ULMW LU PMREVH.

Hint 9 GL ZTV GSV DRMV WILK RG RM GSV KIV SRHGLIRX XZEV ZMW TVG RG RM GSV UZI UFGFIV.

Atari Frontier *continued*

Program Listing 3A

```
100 GRAPHICS 9:POKE 712,0:POKE 559,0
110 DL=PEEK(560)+PEEK(561)*256+4
120 FOR X=0 TO 79:COLOR X
130 PLOT X,0:DRAWTO X,191:NEXT X
140 FOR X=11 TO 83 STEP 12
150 POKE DL+X,143:NEXT X
160 FOR X=109 TO 190 STEP 12
170 POKE DL+X,143:NEXT X
180 POKE 512,128:POKE 513,6:M=1663
190 M=M+1:READ D:IF D=999 THEN 210
200 POKE M,D:GOTO 190
210 POKE DL+95,207:POKE 54286,192
220 POKE 559,34:GOTO 220
300 DATA 216,72,173,153,6,141,10,212
310 DATA 24,105,16,141,26,208,201,240
320 DATA 208,2,169,0,141,153,6,104
330 DATA 64,0,999
```

Program Listing 3B

```
                1000        .OR $0680
                1010        .TA $4000
                1020 *
                1030 * DEFINE SYSTEM EQUATES
                1040 *
D40A-           1050 WSYNC  .EQ $D40A  ;WAIT VERTICAL SYNC REGISTER.
D01A-           1060 COLBK  .EQ $D01A  ;GTIA BACKGROUND COLOR REGISTER.
                1070 *
                1080 * START OF GTIA HANDLER
                1090 *
0680- D8        1100 START  CLD        ;CLEAR THE DECIMAL MODE.
0681- 48        1110        PHA        ;SAVE THE 'A' REGISTER ON STACK.
0682- AD 99 06  1120        LDA STORE  ;GET COLOR VALUE INTO THE
0685- 18        1130        CLC        ; 'A' REGISTER, CLEAR THE
0686- 69 10     1140        ADC #$10   ; CARRY FLAG AND ADD TEN.
0688- 8D 0A D4  1150        STA WSYNC  ;WAIT FOR VERTICAL SYNC.
068B- 8D 1A D0  1160        STA COLBK  ;CHANGE BACKGROUND COLOR.
068E- C9 F0     1170        CMP #$F0   ;TEST FOR LAST LEGAL COLOR.
0690- D0 02     1180        BNE OUT    ;SKIP IF SO.
0692- A9 00     1190        LDA #$00   ;RESET COLOR REGISTER POINTER.
0694- 8D 99 06  1200 OUT    STA STORE  ;SAVE FOR NEXT DLI.
0697- 68        1210        PLA        ;RESTORE THE 'A' REGISTER.
0698- 40        1220        RTI        ;RETURN FROM INTERRUPT.
                1230 *
                1240 * COLOR POINTER
                1250 *
0699- 00        1260 STORE  .HS 00
```

Program Listing 2a creates a mixed display of GRAPHICS 0, 1, 2, 8, 9, and 11. Table 1 explains the many POKES. The DLI routine again needs explanation. This time we need a routine to put a table of colors in the correct locations as each DLI is processed. A pointer indicates the current table entry. Another table tells GTIA when ANTIC mode fifteen means something other than GRAPHICS 8. The simplest way is to place into the table the correct bit values for the graphics mode being displayed, and then POKE these values into PRIOR.

Starting with the EQuates, we find a list of standard names found in Table 1. Then comes the mandatory CLD instruction and a general SAVE of all registers used. The table offset pointer is retrieved and the GTIA mode status is checked. If the mode is GTIA, processing branches to a special GTIA handler routine; otherwise the routine falls through to a CTIA processing routine. In either case, the color is stuffed into the corresponding color register for the associated CTIA/GTIA mode and a branch to a check routine is executed. This routine only determines when the table pointer should wrap around and then saves the pointer for the next DLI. It looks easy, but discovering how to do it for the first time is difficult. I recommend that you look at Program Listing 2a.

The routines to draw the display provide intrigue for the curious. Pay particular attention to the POKEs in relation to where the information is placed. See if you can discover what goes on using the tables, listings, and figures. It pays to experiment here. This entire installment was researched and prepared by trial and error. I had no idea how GTIA worked or how it could be used with DLIs. Experimenting worked for me; why not try it yourself?

The Home Stretch

CTIA owners will find Program Listing 3a, Program Listing 3b, and Figure 3 of particular interest. For those who still haven't upgraded to GTIA, we provide Photo 2. It's true that any CTIA machine can display 128 colors, but only a GTIA displays 256. This demo proves you really can get more colors than you would ever need in a program. Visually, it appears to be three columns of sixteen colored disks. Note the shading effect, as if a light were shining on the columns. The effect was created using GRAPHICS 9 to make three columns of increasing luminance, and DLIs to alternate the colors down the screen.

The DLI routine for this example is similar to the routine in the first demo. The main difference is that we increment the pointer by 10 hex (16 decimal) so that the color is incremented and the luminance is unchanged.

Look through the listing and the figures until everything is clear. A few POKEs in the listings will come in handy when you write your own programs. One not listed, but of great importance, is POKE 54286,64. This POKE turns off the DLI effect.

Whenever the DLI is enabled, system time is at a premium, and timing conflicts might occur. When these arise, the DLI always gets last priority. The OS key click routine interferes with the DLI, making the display jitter slightly when you press a key during an INPUT or GET. The effect is insignificant, and you can overcome it by PEEKing the keyboard or using joystick input. The only major problem occurs during external peripheral I/O. When you output to the printer, save to disk, or even load a program from cassette, the DLI suffers. This is a good time to use POKE 54286,64. By turning off the interrupts, you can preserve the current state of your display list and re-enable it afterwards by POKEing 54286 with 192. Depending on the complexity of your display, you may optionally choose to disable the screen display, as well. If you try Program Listing 2 without DLIs enabled, you may cringe. Just POKE 559,0. This shuts off the display so you can't see the mess left by a disabled DLI. To get the screen back, POKE

559,34. This location is for PM graphics and the value of 34 assumes that PMs are not used.

Kudos

I want to thank Dave Welch of Atari Inc., who helped me so much with this column. It's nice to know that Atari provides people like Dave to assist in the development of outside software, or in this case, a column.

A New Leaf

The words DLI and ANTIC will never appear in *Frontier* again. I promise. We've turned the final page of the final chapter of ANTIC and the display list. We will take a poll and the topic with the most votes will be our next feature series. Until then, have fun *Exploring The Atari Frontier!*

Figure 3: Display List for Demo 3.

Byte#	Value	Mode type
1	112	Blank
2	112	Blank
3	112	Blank
4	79	Graphics 8 w/LMS option
5	nn	LSB of screen memory
6	nn	MSB of screen memory
7	15	Graphics 8
.	.	.
.	.	.
.	.	.
15	15	Graphics 8
16	143	Graphics 8 w/DLI option
17	15	Graphics 8
.	.	.
.	.	.
.	.	.
27	15	Graphics 8
28	143	Graphics 8 w/DLI option
29	15	Graphics 8
.	.	.
.	.	.
.	.	.
39	15	Graphics 8
40	143	Graphics 8 w/DLI option
41	15	Graphics 8
.	.	.
.	.	.
.	.	.
51	15	Graphics 8
52	143	Graphics 8 w/DLI option
53	15	Graphics 8
.	.	.
.	.	.
.	.	.
63	15	Graphics 8
64	143	Graphics 8 w/DLI option
65	15	Graphics 8
.	.	.
.	.	.
.	.	.
75	15	Graphics 8
76	143	Graphics 8 w/DLI option
77	15	Graphics 8
.	.	.
.	.	.
.	.	.
87	15	Graphics 8
88	143	Graphics 8 w/DLI option
89	15	Graphics 8
.	.	.
.	.	.
.	.	.
99	15	Graphics 8
100	207	Graphics 8 w/LMS & DLI options
101	nn	LSB of screen memory
102	nn	MSB of screen memory
103	15	Graphics 8
.	.	.
.	.	.
.	.	.
113	15	Graphics 8
114	143	Graphics 8 w/DLI option
115	15	Graphics 8
.	.	.
.	.	.
.	.	.
125	15	Graphics 8
126	143	Graphics 8 w/DLI option
127	15	Graphics 8
.	.	.
.	.	.
.	.	.
137	15	Graphics 8
138	143	Graphics 8 w/DLI option
139	15	Graphics 8
.	.	.
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149	15	Graphics 8
150	143	Graphics 8 w/DLI option
151	15	Graphics 8
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161	15	Graphics 8
162	143	Graphics 8 w/DLI option
163	15	Graphics 8
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173	15	Graphics 8
174	143	Graphics 8 w/DLI option
175	15	Graphics 8
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185	15	Graphics 8
186	143	Graphics 8 w/DLI option
187	15	Graphics 8
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.	.	.
197	15	Graphics 8
198	143	Graphics 8 w/DLI option
199	15	Graphics 8
200	65	Jump w/WVB option
201	nn	LSB of DL in memory
202	nn	MSB of DL in memory

Protector II

Reviewed by David Plotkin

from Synapse Software, 5327 Jacuzzi Street, Suite I, Richmond, CA 94804. System requirements: 32K (disk or cartridge) Atari® 400/800/1200. Retail price: $44.95 (ROM Cartridge).

The new *Protector II,* from Synapse Software, outstrips the original *Protector* in both graphics and playability. At the higher skill levels, *Protector II* plays as fast and furiously as the arcade game *Defender.*

Protector II is a goal-oriented game. Your mission is to rescue eighteen people with your joystick-controlled needlefighter, and transport them over a hostile landscape and a volcano, to the "City of New Hope." Once you've moved all the people, the volcano erupts, sending a flow of lava toward the "City of New Hope." You must then move the people over another hostile landscape (and through a meteor storm at the higher levels) to a fortress where they will be safe.

Protector II has six skill levels, with options for three or five ships. You get an extra ship every 10,000 points. The screen display keeps track of your needlefighter's fuel, (you refuel by returning to base), the number of people left, the number of people moved safely to the fortress, and the score. The game is over once all eighteen are either rescued or dead, or when you run out of rescue ships. *Protector II* is definitely a game of strategy as well as action — you aren't going to rescue many people until you know the game well.

As the game starts, your needlefighter is docked, awaiting your command. You must first navigate past the base's ground defenses to the city under attack. These defenses, located around the base and throughout the rural landscape, consist of various missile and mine launchers. They fire at random, and you must avoid their projectiles, or destroy them with the needlefighter's forward-firing laser. The launchers periodically turn red. Then you can destroy them. Since these "defenses" are no hazard to the attacking aliens but are a tremendous hazard to your needlefighter, try to destroy as many as possible.

Arriving at the besieged city, you find the citizens anxiously waving to catch your attention. The source of their anxiety is clear: an alien saucer is "beaming up" citizens one at a time, travelling to the volcano and dropping them in! You must maneuver your needlefighter over a waving citizen, who stops waving to indicate he's grabbed your tail hook, then lift-off toward the "City of New Hope."

Unlike the old *Protector*, you can fly through buildings but not through mountains. The needlefighter is a lively, extremely maneuverable little craft, which gains speed as you hold the joystick in the direction you want to travel. Be careful not to hit the person you are trying to grab, and not to run your passenger into any attacking aliens or the ground, because you'll lose him. You can fly through the buildings with a person hanging on, but if you pass too close to a building terrace or roof, the person will let go and you'll have to go back and get him.

Besides the ground defenses, you must avoid various other hazards. Hitting the alien saucer or its transporter beam causes the needlefighter to crash. The alien saucer also releases various weapons. The needlefighter's laser can destroy these with a dead-center hit. The most diabolical of the alien weapons is a "pulse-tracker." These little nasties follow you, blinking on and off. They have a habit of moving in front of a person, so you risk hitting the person when firing at the pulse-tracker.

You can stop the alien saucer temporarily by shooting it with your laser, but then it moves faster. The only way to rescue someone, after the alien saucer has grabbed him/her, is to hook the person in midair as the saucer drops him/her into the volcano. This is extremely dangerous because the volcano erupts into the air periodically, and getting caught in the blast destroys the needlefighter.

Once you move all the people into the "City of New Hope," the volcano erupts and the shield blocking entry to the fortress drops. Now you must hook the remaining souls, one by one, and dash across a field of skyward-pointing lasers (and through a meteor storm at the high levels) into the fortress, and drop off your passenger. It takes some pretty fancy flying to enter the fortress. Time is of the essence, too, because the volcanic lava is quickly destroying the "City of New Hope."

Protector II showcases the Atari's abilities quite nicely. The landscape and defenses are done in high resolution graphics, and the needlefighter's tail-flame flickers as it flies over a smoothly scrolling landscape that covers about ten screens. The erupting volcano is not as well implemented, but is still impressive.

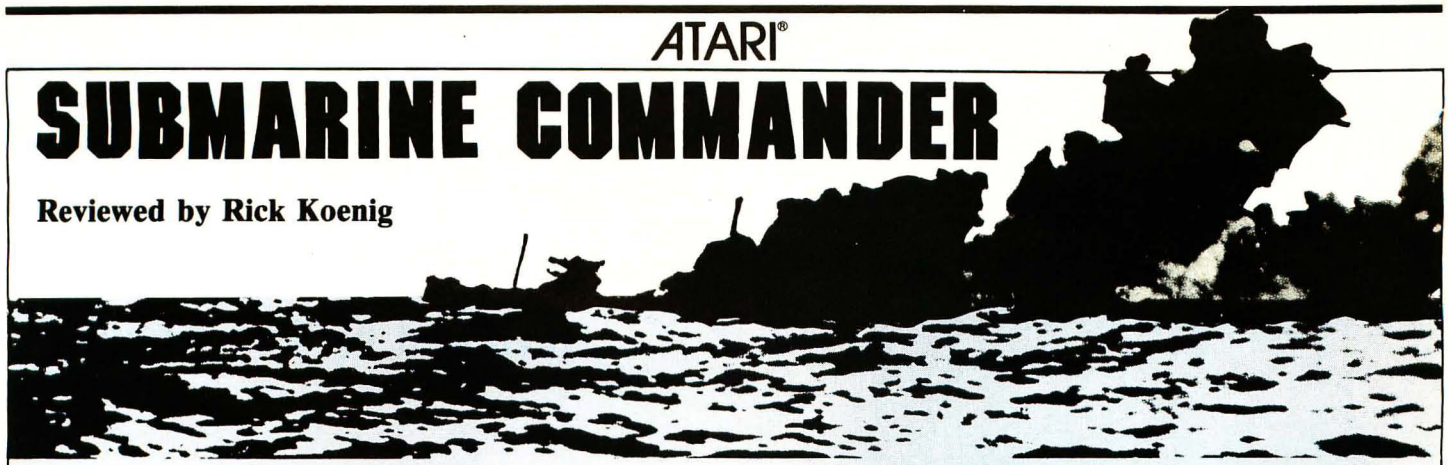
This game is also appealing at a gut level. The little men and women wave pathetically, and you feel true remorse when one of them "gets it." You resolve to try harder and be more careful — you forget that this is a game. You are the *protector,* and if one of your charges dies, it's your fault.

Protector II is intensely playable, but it's not for everyone. It can be very frustrating until you learn the game. You can't just play shoot-em-up and expect to earn decent scores. You have to think and plan, and get to know the game. *Protector II* is a real challenge on level six (I've never rescued anyone) because you are up to your eyeballs in aliens. You have to shoot fast, but you get few points. If you didn't like the old *Protector* because of the rescue scenario, or if you dislike the idea that the game is built around moving little people from one place to another, this game is not for you. If you like strategy and fast action built around a purpose, however, you'll like *Protector II.*

ATARI®

SUBMARINE COMMANDER

Reviewed by Rick Koenig



by D. Lock (Thorn EMI Video Programming Ent., 1370 Avenue of the Americas, New York, NY 10019). System requirements: 16K Atari® 400/800/1200 with one joystick. Retail price: $49.95.

The scene: You are the commanding officer of a submarine on combat patrol in the Mediterranean. You are operating independently, searching for an enemy convoy reported in the area. While on the surface, charging your batteries, a lookout suddenly reports a ship on the horizon. You sound the alarm for Battle Stations, and order the ship to dive immediately to periscope depth. Sonar reports a contact, and you alter course to port, closing on the target. Is it an enemy tanker, or a destroyer out to end your mission and your career?

Thorn EMI's *Submarine Commander* is for anyone who ever wanted a chance to command a submarine in combat. It is far more detailed and challenging than most submarine games, which provide only a periscope-view and are merely adaptations of a "shooting gallery." This game has much more depth (no pun intended) and room for planning your attacks, strategically and tactically.

The game is a ROM cartridge (not as rugged as Atari-made cartridges), and uses a joystick and the keyboard. It comes with a brief, but thorough, instruction booklet. The higher skill levels (there are nine) are quite challenging, and you will not easily master this game.

The basic status information available on all displays includes: an indicator showing the position of the diving planes and rudder, a compass indicating the current course, the number of torpedoes left, the amount of diesel fuel remaining, the battery charge, the speed in knots, a depth gauge, a display showing the depth beneath the keel, a clock, and an air supply gauge. Damage indicators show the effect of depth charges or surface hits on your hull, instruments, control surfaces, and engines, each on a scale of zero to nine.

You select the three primary displays with a single key. The map (M) is a reasonably good depiction of the Mediterranean Sea, showing the locations of the sub and the convoys. The commander must set a course and speed to intercept the convoys as they move along randomly-chosen courses.

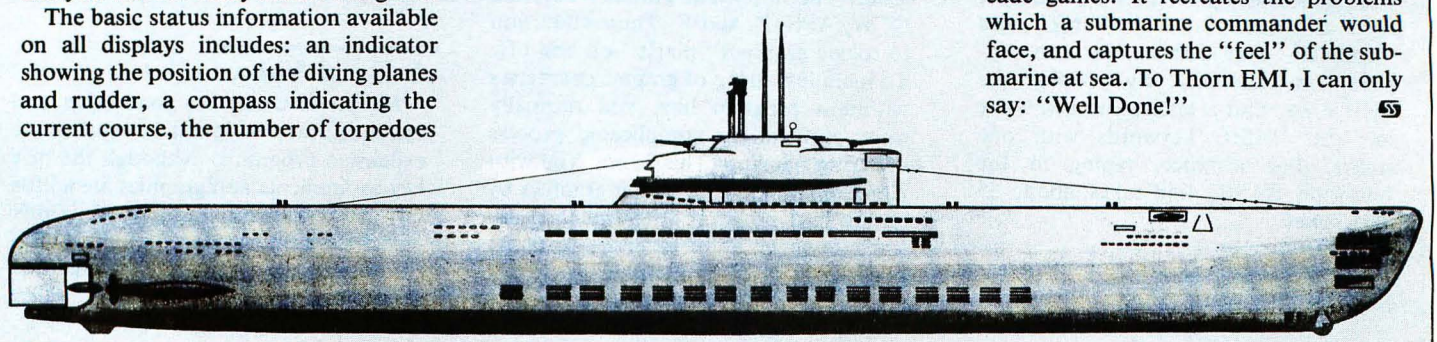
The sonar display (S) gives the approximate range and bearing of enemy ships within its range, and sonar contact is not automatic. This display includes a hydrophone chart that can find ships outside the range of sonar.

The periscope display (P) is excellent. You can use the periscope only above 50 feet, and occasional clouds float by in the sky, enhancing the effect. There are four types of ships, and at long ranges, it is hard to tell whether you are approaching a freighter or a destroyer. As you close on the target, the profile of the ship gets larger and clearer. Lining up a good torpedo shot on a moving ship isn't easy. If you get a hit, however, it will show as an explosion or splash against the hull (another nice touch), and you can watch the ship go down.

The game makes good use of sound as well as graphics. Changing the engine speed will generate an engine sound. The sonar "pings" fade gradually, with a distinct "pip" when a contact is found, and the torpedoes "whoosh" toward their mark. The gunnery and depth charge attacks are unnerving, as you practically feel the jolt of the explosions (the display jiggles with each impact). As soon as the submarine comes within range of a convoy, a General Quarters alarm sounds. The game's designers obviously wanted to give the most realistic effects possible, both visually and aurally, and in this respect, they were highly successful.

Other keys allow you to crash-dive, blow ballast tanks, neutralize bouyancy, pause and abort. The game ends when you sink all convoys, or if you exhaust your air while submerged, run out of fuel, or sustain enough hull damage to meet Davy Jones. Your score is a function of tonnage sunk, the amount of damage sustained, fuel used, time, and torpedoes expended.

This game excels in overall design and in the integration of the many related functions. It features good graphics and superior sound effects. With a few minor concessions to playability, this game is one of the finest real-time simulations I have ever seen. To be a successful commander, you must exercise far more thought and planning than the run-and-shoot tactics common to arcade games. It recreates the problems which a submarine commander would face, and captures the "feel" of the submarine at sea. To Thorn EMI, I can only say: "Well Done!"



Key Commander

Reviewed by Tim Knight

from Interpro Corporation, P.O. Box 4211, Manchester, NH 03108. System Requirements: TRS-80® Model I or III with 16K RAM. Suggested retail price: $29.95 (cassette); $34.95 (disk). The disk version includes some sample definition tables.

Jake Commander, one of the best known programmers in the microcomputer industry, has created a program called *Key Commander* for the TRS-80 Models I and III.

One of the most helpful features of *Key Commander* is its ability to relocate itself in memory. In addition, it modifies and protects itself and other programs in memory to prevent conflicts between programs and works with most DOS's. This typifies the professional work of Jake Commander. Not many programs are as "considerate" as this one.

A Powerful Program

Key Commander is a utility that makes keyboard use easier. Typing in common BASIC keywords and packing strings in program lines can be tedious, and *Key Commander* eliminates such tasks.

With Microsoft Level III BASIC, you can press one key to enter a statement, such as the keywords "PRINT" and "USING". *Key Commander* also supplies that capability. By pressing the SHIFT key and a letter, you can write out full BASIC keywords with one stroke. For instance, typing in the following BASIC line takes about 35 keystrokes.

```
10 LPRINT"Hi There":
NEXT:GOSUB20:CLOAD
```

However, with *Key Commander's* "one stroke" commands, the line requires only nineteen keystrokes. *Key Commander* saves programming time.

BASIC keywords are not all this program can type with one shifted letter. You can assign the keys to produce different effects, and save these assignments to tape or disk for future use. For example, if you frequently type the words "Please press ENTER to continue", you can define the phrase only once, assigning it to a shifted key with *Key Commander,* and then call it up anytime by pressing that key.

On-screen editing is another of *Key Commander's* features. This type of editing is similar to that found in word processors. On-screen editing allows you to move around the screen with a cursor, without destroying anything, and modify the contents of a program. This is much faster than using the EDIT command, especially for making minor changes in a program line. You can even change line numbers with this utility. Since you may not always require these special commands, *Key Commander* includes a "toggle" that turns these special features on and off by pressing a CTRL-T.

Entering graphics is easy with this program. The important graphics keys are Q, W, A, S, Z, and X. These allow you to toggle graphics "pixels" on and off. To include a string of graphic characters within a program line, you normally must perform the complicated process of string packing. This is not true with *Key Commander.* You enter graphics by typing in a program line, and then use the letters mentioned earlier to form the pixels in a graphic picture. The letters are arranged like the pixels in a graphics block. The Q is for the upper left pixel, the W is for the upper right pixel, the A is for the middle left, and so on. By pressing any of these, you may turn any pixel in a graphics block on or off. You can use the right arrow to move over and begin another one, or close the print statement with a quote. This technique is easy to learn, and very helpful when programming graphics in quantity.

Just as you can save (or assign) certain statements to a key, you may also save graphics to a key. For example, suppose you often use a picture of a ship in a program. Instead of re-constructing the ship each time, you just press one key to make it appear. You only need to construct the ship once, assign it to a key, then begin the program.

Key Commander includes several sample key assignment programs for DOS commands, regular BASIC keywords, and graphics statements. These help you learn to use *Key Commander* efficiently.

The documentation tutors you in *Key Commander's* commands and features. All 42 pages are easy to understand, and include several command summary sheets for quick reference. If you return the program registration sheet, Interpro Corporation will notify you of any enhancements to the program.

A Good Value

Key Commander is a good value, and contains features found in much more expensive programs. Although the new key assignments and graphics are a little difficult to adjust to initially, *Key Commander* is a time-saving, well-done utility which any BASIC programmer should find helpful.

Time Runner

Reviewed by Mark E. Renne

by Y. Lempereur (Funsoft, 28611 Canwood, Agoura, CA 91301). System requirements: TRS-80® Model I or III with 16K tape; 32K disk. Retail Price: $24.95.

Time Runner not only includes the "standard" features TRS-80 arcaders have come to expect, but brings some innovative tricks to the screen, as well. Funsoft should gain a reputation for excellent arcade games quickly if *Time Runner* is indicative of their future work.

The goal is to "stake-out" newly discovered space territory. The screen is divided into twenty rectangles, and you claim space by following their perimeters. A bonus, beginning at 3000, ticks away points as you claim territory. Did I mention the four roaming aliens trying to thwart your efforts?

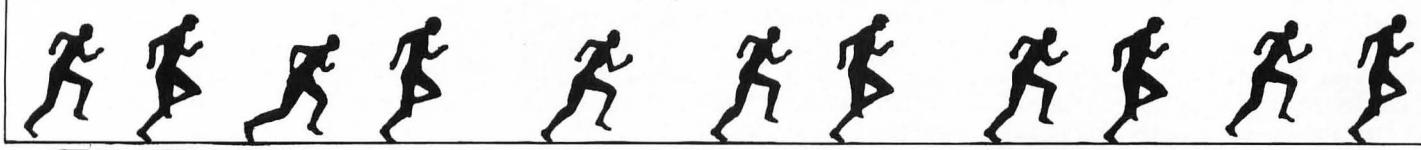
Your only defense against these aliens is a stun command. This confuses the aliens temporarily and allows you a moment or two to escape. Each of your four men can use this command three times.

Should you be fortunate enough to stake-out the territory in the first screen, you get a chance to stake-out Hyperspace. This display, also divided into twenty rectangles and claimed in the same manner, contains values from 200 to 550 points. As you begin to claim this territory, its value diminishes quickly. In other words, if you're not careful, the territory could be worthless by the time you have staked all your claims!.

The game is joystick compatible, can store the top ten scores on disk, comes on a protected disk, and is written in Machine Language. I'm particularly fond of the sound effects. It has the bonk, beep, and gronk I've come to love, and the best music I've ever heard on my TRS-80. That's right, I said *music*. Not just noise, but actual tunes between screens and at the end of the game. You must hear it to believe it!

Funsoft has shown initiative by allowing the user to change the keys which control the action. Don't like arrow keys for control? Use any keys you want to control direction and fire power. This is another feature that should become standard soon.

To sum it all up, *Time Runner* is an excellent and innovative game. It should find its way into many an avid gamester's collection.



Armored Patrol

Reviewed by Andre Chen

by Wayne Westmoreland and Terry Gilman (Adventure International, Box 3435, Longwood, FL 32750). System requirements: TRS-80® Model I or III with 16K (tape); 32K (disk). Suggested retail price: $19.95 for the tape; $24.95 for the disk.

You are perched in the driver's seat of a massive, armed T-36 tank. Through your viewport, you see a bleak landscape dotted with houses, with mountains in the background. Suddenly, your radar rapidly points left. As you rotate your tank, the enemy tank comes into view. You line it up in your sights and fire. No good. The enemy dodges your missile, turns his cannon toward you and fires back. Frantically, you turn your tank and try to retreat, as the missile gets larger and larger on your screen. Too late. *Crunch!* The last thing you see is your shattering viewport.

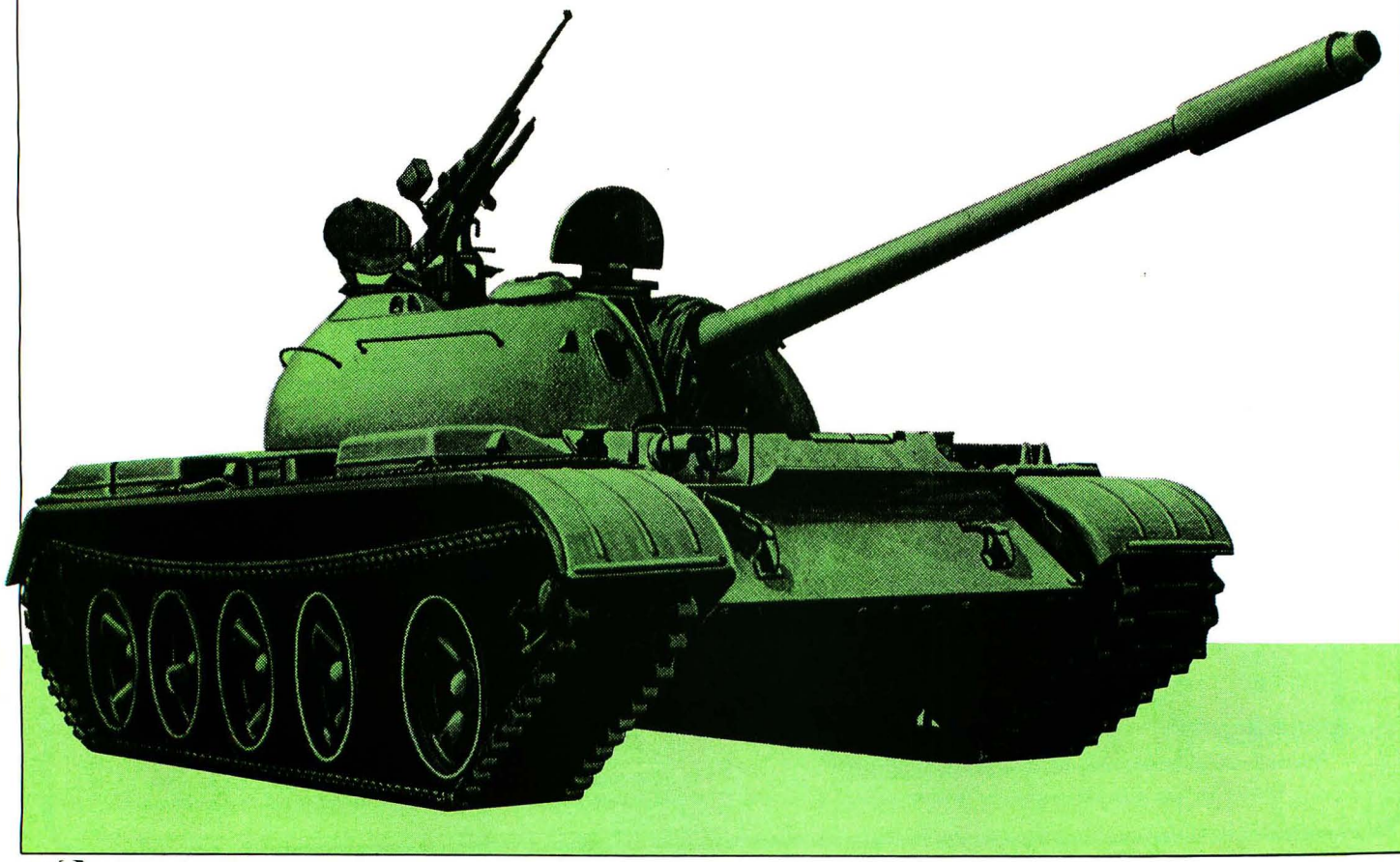
This is *Armored Patrol*, a 3-D graphic arcade game that pits you against enemy tanks and robots. The enemy tanks dodge, hide behind houses, and shoot with amazing accuracy. An occasional robot sneaks up behind you and zaps you with its lasers, draining your power. Both tanks and robots are cleverly animated. As you approach them, they grow larger and more detailed.

In combat, you spend most of your time dodging missiles. As they approach, you must avoid them by turning your tank and going forward or backwards. The control keys are "A", "Z", ";", ".". You fire with the space bar. The controls simulate those in a real tank — each side controls one tread.

The weakest part of the game is the introduction, or the absence of one. Between games, you see a boring screen, displaying only the title and author. No instructions, no high score, no attract mode. The game itself counts most, of course, but the attract mode reveals the author's desire to make the best game possible, not just a game that will sell. A high score is important to an arcade game, also. After the first thrill is gone, the desire to better your score keeps you playing. In *Armored Patrol,* when the game is over, your score is gone for good.

In *Armored Patrol*, previous game situations sometimes carry over into the next game. For example, if you lost the last game when a robot zapped you, the next game starts with a robot zapping you again. To start clean, you have to shoot the robot, abort the game, and begin again.

Armored Patrol should appeal to those who have enjoyed the similar, coin-operated arcade game. It's more of a graphic simulation than a fast-paced reflex game. I recommend it for its excellent animation and its driver's seat realism.



New Action Game for the PC

PC In *Blingsplatz!,* you guard stellar outposts threatened by fierce Blingsplatz creatures. You must destroy the creatures with your missiles, or face destruction of your outposts. As the game progresses, the Blingsplatz become faster and more aggressive, and your skill level must rise to meet the challenge.

Blingsplatz requires an IBM® PC with 64K and one disk drive. It is available at participating Computerland stores, independent dealers or may be ordered directly from OMRIC Corporation, 258 Tower Hill Road, P.O. Box 309, Chaplin, CT 06235 (203)455-0492. The suggested retail price is $34.95.

The Yankees Are Coming!

Fredericksburg is a two player tactical level Civil War game that recreates the famous battle of the same name. The game allows each player to take the role of one of the two commanding generals, Union General Burnside, or Confederate General Robert E. Lee. As General Burnside, you are directing your troops toward Fredericksburg and a confrontation with Confederate rifles and artillery. The real Battle of Fredericksburg was a Confederate victory, but you have a chance to reverse history each time you play this challenging game. As General Lee, on the other hand, your challenge is to repel the approaching Union Army.

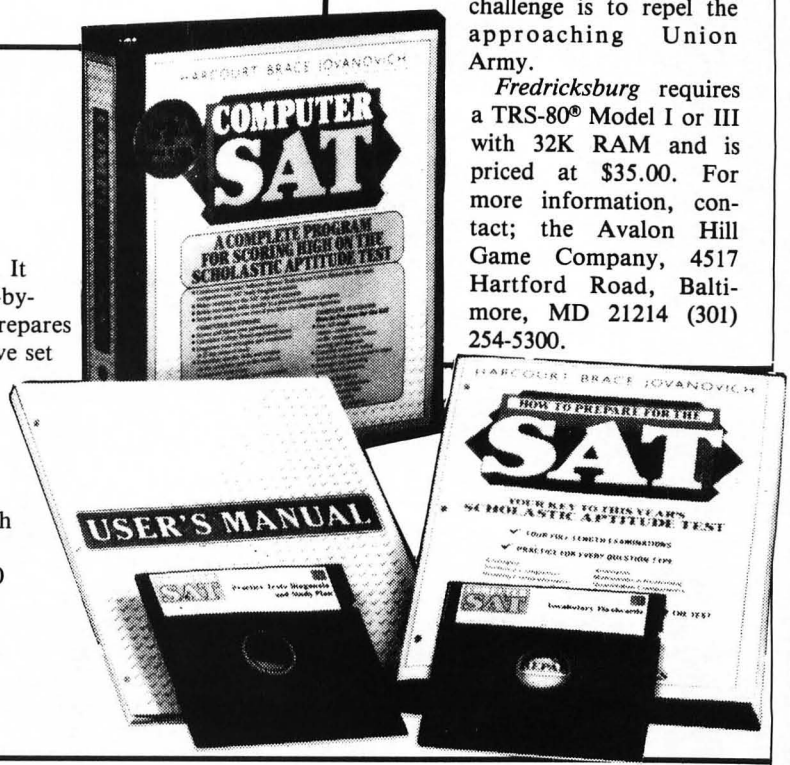
Fredricksburg requires a TRS-80® Model I or III with 32K RAM and is priced at $35.00. For more information, contact; the Avalon Hill Game Company, 4517 Hartford Road, Baltimore, MD 21214 (301) 254-5300.

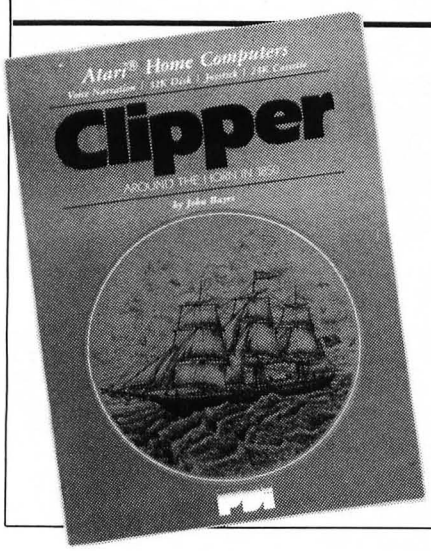
So You Want To Ace The SATs?

Computer SAT is a highly effective combination of microcomputer software and traditional textbook materials. It leads the student through the test preparation process, step-by-step. It diagnoses the student's strengths and weaknesses, prepares a study plan and guides the student through a comprehensive set of study exercises designed to improve the student's score.

The *Computer SAT* package includes disks containing a personalized study plan, 540 drill items and 1000 electronic vocabulary flash cards. Also included in the package are a 470-page textbook and a 50 page users manual.

Computer SAT is available for the Apple® II or II+ with 48K RAM and one disk drive for a retail price of $69.95. Order directly from: Harcourt Brace Jovanovich, Inc., 1250 Sixth Avenue, San Diego CA (800)543-1918.

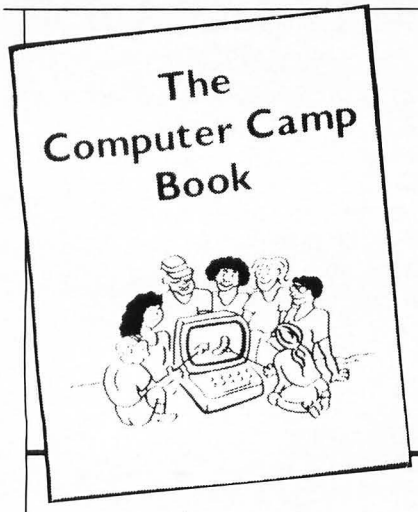




Sail Over The Bounding Main With Your Atari®

Clipper: Around The Horn In 1850 challenges both sailors and landlubbers to a perilous journey from New York to San Francisco, via Cape Horn. Fierce storms, deadly calms, and mutinies threaten you along the way, and you must plan shrewdly to make the trip in the shortest possible time, with the greatest amount of money left in the treasury at journey's end.

Clipper: Around The Horn in 1850 is available for the Atari® 400/800 with 24K (tape); 32K (disk). The two versions are sold together (in one package) for a retail price of $29.95. The package is available at retail stores, or by mail from Program Design, Inc., 95 East Putnam Avenue, Greenwich, CT 06830 (203)661-8799.



New Computer Camp Reference Book

The Computer Camp Book is actually two books in one. It is a manual on how to start your own computer camp, and a comprehensive guide to computer camps, as well.

This text teaches computer literacy, and instructs you in how to teach others, of all ages, about computers. There are lesson plans and sample programs, as well as other teaching hints. The book tells you how to start and run a computer camp from scratch, with information on organizing, staffing, promoting and operating a camp. There's even advice on managing finances and obtaining hardware and software. If you're looking for a computer camp, *The Computer Camp Book* tells you what to look for — big names and high prices don't necessarily mean a better camp for your child.

The Computer Camp Book is available for $12.95, plus $2.00 postage, from Sharon Sandusky or Chel White, 8327 Sheridan Lane, Eden Prairie, MN 55344 (612)937-2066.

Sharpen Your Intellect With *Facts In Five*

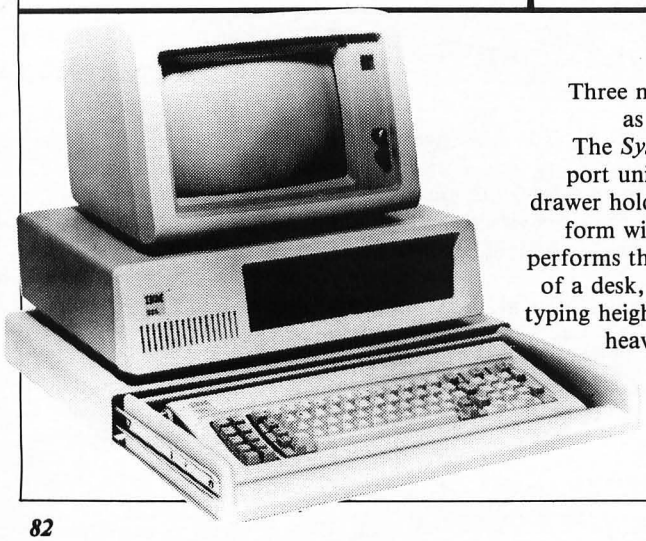
PC *Facts In Five* is a game of knowledge which pits players against time and each other. It includes extensive options for solitaire and doubles play, unique options for controlling game difficulty, options for party play and even special modes for education and family use. You can select subjects such as spelling and math to teach kids basic education principles. Even with the many options and unique ways of modifying play, however, *Facts In Five* is easy to play.

Facts In Five is available on disk for the 64K RAM IBM® PC and the 48K Atari® 800 from Avalon Hill Game Company, 4517 Harford Road, Baltimore, MD 21214 (301)254-5300. Its retail price is $26.00.

Unique New Game For Kids Introduced

PC *In Search Of The Most Amazing Thing*™ is a combination adventure, strategy and arcade game designed to create a rich environment which encourages children to experiment and discover. On his or her quest for The Most Amazing Thing, the traveler will learn decision making and organizing, note-taking and writing, map reading, trading and bargaining, music writing, drawing and exploration. Also included in the package is science fiction author Jim Morrow's new novel, *The Adventures of Smoke Bailey,* written to accompany this unique piece of software.

In Search Of The Most Amazing Thing is compatible with the Apple, Atari, and IBM-PC and lists for $39.95. For more information, contact: Spinnaker Software, 215 First Street, Cambridge, MA 02142 (617)868-4700.



Space Saving Drawer for Detachable Keyboards

Three new drawers from Microcomputer Accessories, Inc. turn small spaces such as credenzas, small desks or typewriter stands into ideal system workspaces. The *System Support Platform Drawer* features a 3 1/2' high, 18 gauge steel support unit on which you place the microcomputer or terminal. A sliding cantilever drawer holds the keyboard, and extends to a locked position to become a work platform with a wrist rest pad. Its price is $89. The *Under Carriage Platform Drawer* performs the same function, but the sliding cantilever drawer suspends under the top of a desk, shelf or table top. When extended, it places the keyboard at comfortable typing height. Its price is $54. The *Keyboard Storage Stand* consists of a 3 1/2' high, heavy duty steel frame. It supports and raises the system and CRT, providing keyboard storage underneath. Its price is $44.

To order one of these drawers, or for further information, contact Microcomputer Accessories, Inc., 400 S. Beverly Drive, Suite 214, Beverly Hills, CA 90212 (213)273-0133.

Translation of the Month Contest

You could win a FREE *SoftSide* DV or CV Subscription!

SoftSide's* Translation of the Month** has been so well received by our readers, we're offering a greater author incentive than ever before. No, we can't give you a job at the U.N., but we will award a one-year subscription to ***SoftSide DV or an 18-month subscription to ***SoftSide CV*** for a high-quality translation of one of our past programs. That's a value of $149 for the ***Disk Version*** or $99 for the ***Cassette Version*** — you'll be rewarded every month for your translation efforts!

Here are some of the most important qualifications we look for in a translation winner.

Your entry must be a translation of one of the featured programs from a past issue of ***SoftSide***. (We're particularly interested in Apple™, ATARI® and IBM® PC translations of some of our older TRS-80® only issues. Write for a list of suggested candidates.) In general, we're looking for translations of programs which are a CHALLENGE to translate. Some of the programs we publish are written in more or less "generic" BASIC, which can be typed into another computer with very few changes. Although these programs require the least effort to translate, they are also the least likely candidates for contest winners.

Your translation should be thoroughly tested and completely bug-free. Just converting program lines doesn't automatically ensure a workable translation. Be sure to use-test your translation as carefully as you would test a program you had written entirely from scratch.

Your translation should fully utilize the unique features of the computer for which it is written. The objective of a translation is to "fit" the capability and convention of its host computer, not simply mechanically duplicate the operation of the original program. This is especially true of programs which use graphics, and should be kept in mind for such minor features as keyboard layout (use of such special keys as arrows, ESC, CTRL, CLEAR, etc.). Also be careful with screen formatting; a word that spills over into the next line because of a PRINT statement that wasn't properly rewritten betrays such carelessness that we'll probably reject your translation automatically.

Your entry should incorporate any improvements and enhancements you can add to the original program. Don't feel that you have to limit yourself to the boundaries of the original. (On the other hand, don't go overboard and destroy the character of the original by completely rewriting it!) An enhanced translation is much more likely to catch our attention than a line-for-line duplicate, and it will have more value to our readers.

It's not necessary to include extensive documentation with your translation, only that which is different from the original. If most of the originally published documentation applies to your translation, simply say so. You should, however, include descriptions and explanations of any changes or enhancements you've made.

All **Translation Contest** entries must be submitted on disk, with documentation in printed or typed form. Disks will be returned only if accompanied by a self-addressed, stamped envelope. Send your entries to:

SoftSide

Translation Contest
6 South Street, Milford, NH 03055

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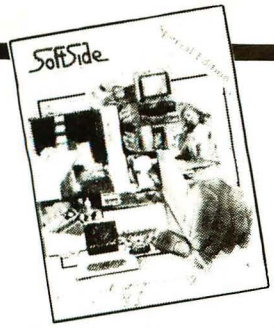


Back Issue of the Month: April 1982

SoftSide's first issue to focus on "Word Processing — An Art in Transition." The Front Runner program is *Microtext 1.2,* a word processing program in BASIC for the Apple, Atari, and the TRS-80.

Apple/Side features *White Lightning,* a game to test your reflexes and *Poster Maker,* perfect for printing posters for yard sales and parties. The *DV bonus* program is *Semaphore,* a Hi-Res graphics program to teach you about a unique form of word processing with flags.

Atari/Side's *Starbase 13* will give you some heavy practice with your joystick and *Banner Machine* will let you make posters with any character set. The *DV bonus* program is a valuable *Renumbering* utility for the Atari.

TRS-80/Side brings you *Database, SoftSide's* most popular program to date. This is the same program discussed in this issue's *Documentation Doctor. Gothic Letter Printer* will allow you to create graceful Gothic posters on your printer. The *DV bonus* program, *Screen Print,* will print the text and graphics displayed on your screen.

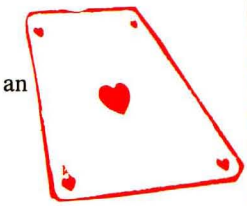
Plus informative articles, reviews, hints, and features about word processing for *your* computer.

Magazine only — $5.00, with cassette — $12.95, with disk — $19.95.

To order your copy, use the bind-in card facing page 24.

Next time in

SoftSide #41:



Poker Squares — an exciting twist on an old standard for your computer.

Joy oh joy oh joystick — We'll look at many alternatives to game controllers for your play-weary hands.

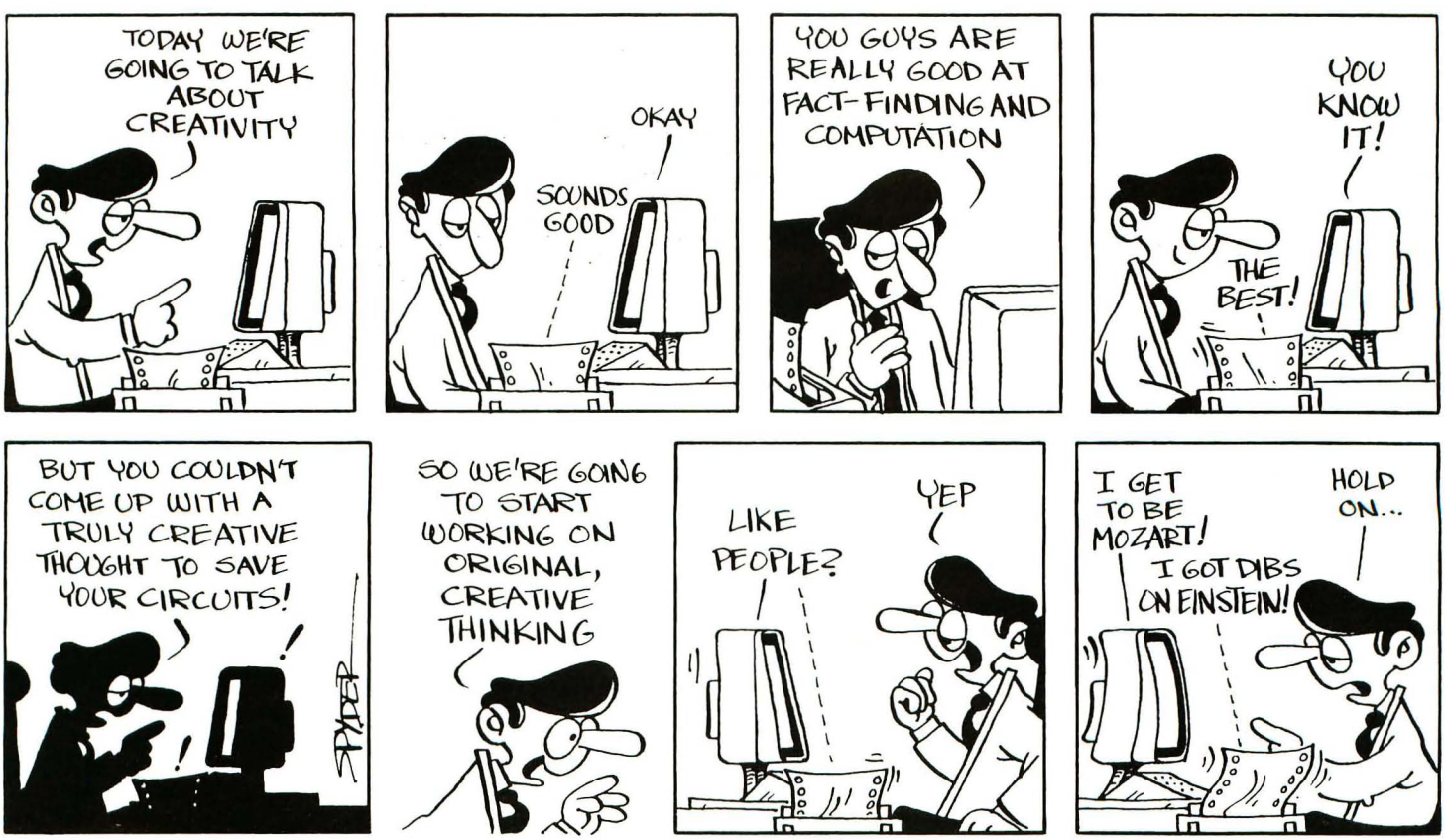
Robots — are they the wave of the future for our home and work lives? *Entertainment Tomorrow* will make some startling predictions.

Adventures can inspire and educate — Judy Neyhart returns to our pages with some observations on what adventure programs have meant to her family.

Plus – exciting software, informative reviews and words to make you think.

MACHINE HEAD

BY SPYDER



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The exposition portion of PC '83 is the largest gathering of PC-compatible products ever held. You'll find, under one roof, more than 400 exhibits of software for business, professional, home, personal and education applications; plug-in cards for memory expansion, telecommunications, speech and many other functions; hundreds of peripherals, including printers, networking systems and innovative new storage devices; plus dozens of publications, books and invaluable support services.

PC '83 brings together the *entire* PC world.

RELIABLE AND COST-EFFECTIVE

Think about the different vehicles available for buying software and add-ons for your PC. You can shop at local computer stores, but they usually have a very limited selection of products and a less-than-expert staff. You can buy through mail order—and take some big risks if you get products that don't work or don't do what you expected.

At PC '83 you have the best of all worlds. You can see *all* the different PC-compatible products in one location at one time. You can talk with factory experts rather than just local salespeople. You can 'test drive' each product and decide if it's right for you. And when you find what you're looking for, you can buy it right on the spot.

Best of all, you'll save hundreds—even thousands—of dollars at PC '83. Most of the products shown at PC '83 are sold at special show prices, so you won't have to look hard to find incredible values. And because PC '83 will help you make more informed purchase decisions, you'll end up with products that are better suited to your applications.

A REMARKABLE CONFERENCE PROGRAM

The conference program at PC '83 isn't just a warmed-over, pared-down version of other computer conferences. The seminars, workshops and forums at PC '83 are the result of months of research and planning targeted toward one specific goal: helping you get absolutely the most out of your IBM Personal Computer.

The program features world-renowned PC authorities speaking at over 100 educational sessions. Seminars provide an in-depth, understandable look at a broad range of PC uses in business, home and education. Seminars emphasize 'how to,' telling you specifically what you need to know—in non-technical language—to use the PC in dozens of different applications.

Forums present an inside look at what's happening in the PC-compatible industry and what new developments you can expect in the next few years.

Software and Hardware Spotlights are a PC '83 exclusive. These workshops address one of the biggest problems that virtually all computer users face: how to decide which software and hardware packages are best for your applications. Each Spotlight provides a detailed discussion and demonstration (with large-screen television) of a group of products, covering their features, capabilities *and* limitations. Experts are on hand at each of these sessions to answer all your questions.

EASY ON YOUR FEET

We've thought of a lot of details to make your visit to PC '83 just a little more pleasant. As with all of our events, the show is fully carpeted, so your feet won't give out before you've seen all the exhibits.

Our unique Conference and Exhibits Guide helps you quickly find the exhibits and educational sessions you want to attend—even if you can't remember their names. And the Guide is provided free of charge to all attendees.

If you're traveling some distance to attend PC '83, we'll arrange a discounted hotel room near the show site through the PC '83 Housing Bureau. On request, we will also provide information on things to do, places to visit and where to eat in San Francisco and Boston—to make your stay in these grand cities a memorable and relaxing one.

A TOTAL SUPPORT SERVICE

Let's face it, getting support for your PC is tough. The PC magazines, newsletters, user groups and retailers are certainly helpful. But there are so many different products, services and things to learn about for your PC, what you really need is *one* event that brings everything together in one place in a well-organized format.

PC '83 does it all. It showcases all the PC-compatibles under one roof. It has a complete and comprehensive program of seminars, forums and product workshops. And it's produced with the quality and professionalism you've come to expect from Northeast Expositions.

So if you do anything with the IBM Personal Computer or if you're considering buying one, be sure to put PC '83 in your calendar right away.

Your PC will certainly appreciate it.

DAILY REGISTRATION FEES

Exhibits-only badges are $8 per day, and the Conference Program is $15 per day.

SPECIAL PRE-REGISTRATION DISCOUNT

If you plan to attend PC '83 save now with advance registration. Three-day Exhibits and Conference badges are $48, you save $21. Three-day Exhibits only badges are $18, you save $6. One-day Exhibits and Conference badges are $23 and one-day Exhibits only badges are $8.

ADDITIONAL INFORMATION

To receive additional information about attending or exhibiting at PC '83, including the Conference, Seminar, Workshop and Panel Discussions Program, or information on local hotels call 617-739-2000 or 800-841-7000 (Boston).

ANY QUESTIONS? CALL 800-841-7000 (BOSTON)

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