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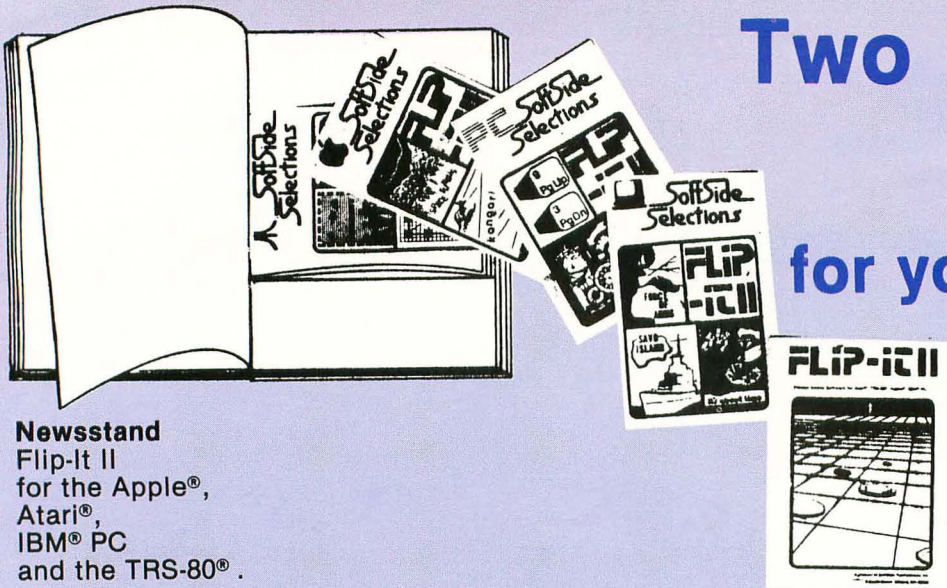
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
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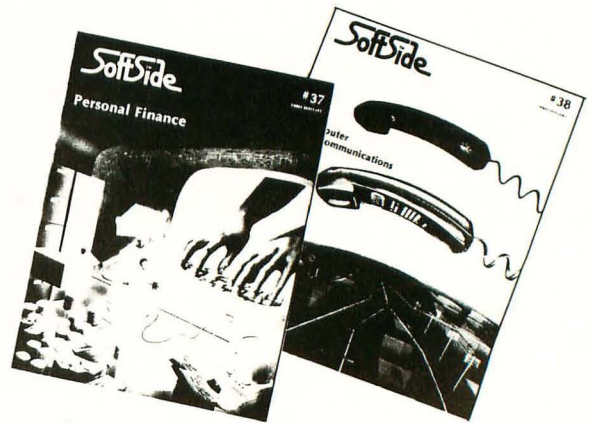
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and for You...

SoftSide Magazine

packed with reviews,
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words to make you think.



We've Changed! — and we want to make sure we remain the best magazine...for you and your computer. If you purchased this copy of **SoftSide** at the newsstand, the booklet bound into the center contains **Flip-It II**, a computerized board game for the Apple, Atari, IBM PC and TRS-80. If you're a subscriber and received this issue in the mail, the **SoftSide Selections** booklet in the center is just for your computer (or the one you told us you were interested in when you subscribed). If you didn't specify a computer system when you subscribed, we've sent you the newsstand edition.

As hard as we've tried to avoid them, we're sure there have been some mistakes on our mailing list. If the **SoftSide Selections** booklet bound into the center of your issue of **SoftSide** is not the one you'd like to receive (see the different versions under **SoftSide Selections** above), use the **CORRECTION!** card located between pages 64 and 65 to let us know. Simply tell us which booklet was bound into this issue and which one you'd rather receive. We'll send you the correct booklet for this **SoftSide** (#39), free of charge, and make sure we change our records so you receive the correct edition in the future.

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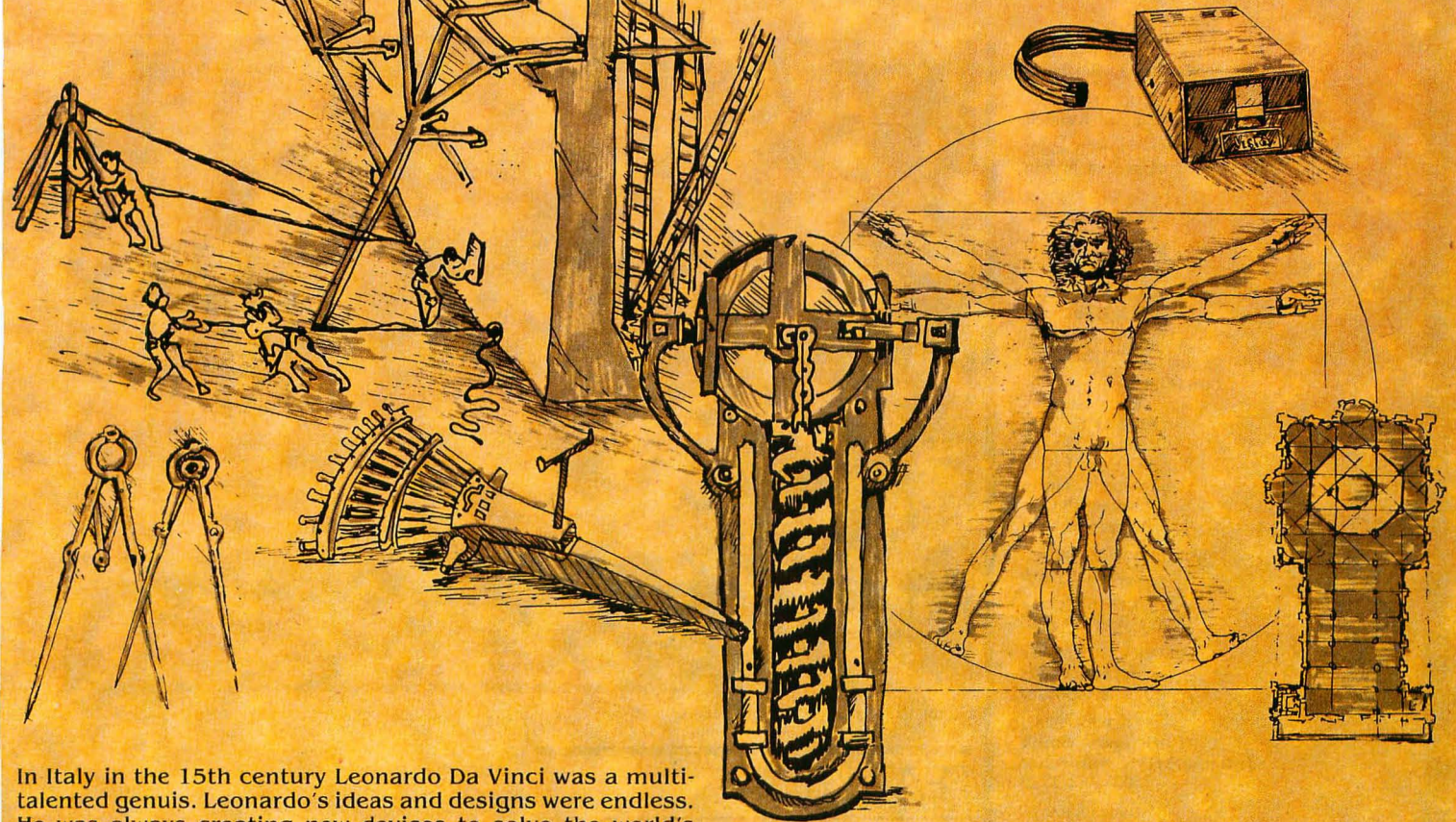
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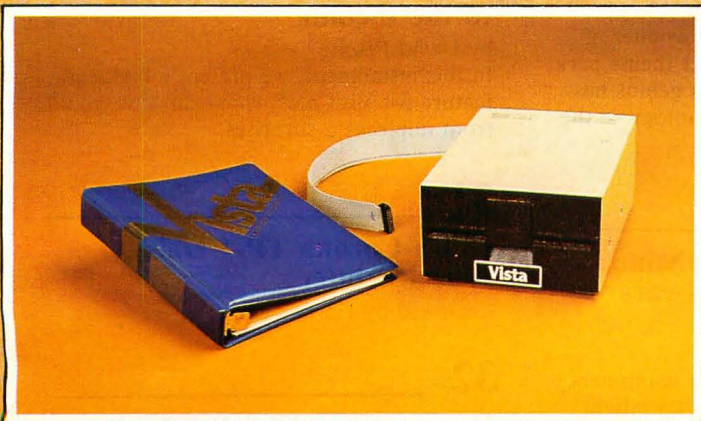
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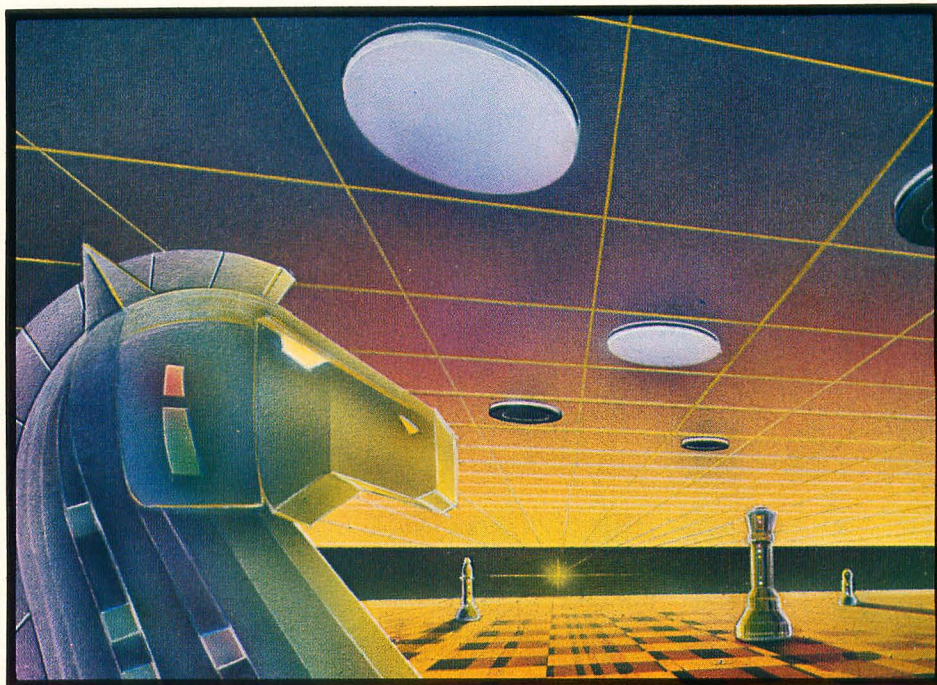
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FRONT RUNNER

Flip-It II for the Apple, Atari, IBM PC and TRS-80. In this board game, you find your computer a formidable opponent as you match wits trying to outflank and capture one another's pieces.

APPLE VERSION

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for the Atari Database Program

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Force of Arms Disk Version Bonus
Savo Island Program

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*Available on DV — Enhanced Disk Version (See bind-in card to order).

**Available on DV — Enhanced Disk Version and CV — Cassette Version (See bind-in card to order).



The New, Improved Model

I grew up hearing that there were two inevitabilities in this life — death and taxes. Technological society has made a third entry to this list — the *new, improved model*. I have come to accept the fact that no matter how multi-featured, how compatible, or how upgradeable a product is, a new, improved model is always ahead — next year, month, week or maybe even tomorrow.

Most of the industry in Western society was born of the need to “build a better mousetrap.” Witness recent developments in the toothbrush, the popcorn popper, the light switch, the coffee maker, and even our old friend, the mousetrap. It’s even becoming an adventure to return from the supermarket and discover what new techniques you have to master to get at your food.

Computers are somewhat insulated from this process by the dynamic nature of the software supporting them and their ability to adapt to a large number of modifying peripherals. More and more, wise hardware manufacturers pad this insulation by aiding and encouraging after-market hardware and software firms in the development of new features for their computer. The result is a longer market life because their system continues to compete well with other manufacturers’ new, improved products. It’s amazing to observe the whimsical Rube Goldberg machine many a user has constructed around his microcomputer to avoid changing the core processor and yet keep his system performing like the newest entry on his computer store’s shelf.

However, a time comes in the development of any entity as multifaceted as the microcomputer, when the elements of the system must be torn apart, examined for their intended purpose, and the whole system reconstructed from scratch. The new system’s designers must carefully consider the incorporation and interrelationship of elements present in the original design and those added later out of necessity or desire. Each of the systems *SoftSide* supports is undergoing this process with varying degrees of success.

Apple has taken a close look at the II+ and carefully modified and reconstructed its important elements in the Apple IIe. Atari has solved many of the problems in-

herent in the 400 and 800, and unveiled the results as the 1200. Tandy is about to release the Model IV, and IBM is redressing its PC for the home in the Peanut, to be released sometime this year. This “changing of the guard” is making many computer owners feel like victims of the *new, improved model*. We’ll take a closer look at just how new and improved each of these releases really is in future issues of *SoftSide*, but for now, let’s examine the implications of these and other important changes in the technology of our everyday lives.

Wait and See

In general, most human beings resist change. We are most comfortable when we know what’s going to happen tomorrow, and our anxiety increases proportionately to the amount of change we anticipate. In a consumer sense, this causes many people to hesitate to invest in new technology — anticipating the *new, improved model* syndrome — and avoid the whirling cycle of change the technology brings the day it enters their lives. This position of inaction can be rationalized as “waiting for them to get the bugs out” or “making sure the standards have been established.” However, the hesitation can freeze one in place if carried to its extreme.

I have several friends who have a clear need for a computer, but they refuse to submit their lives to the change it would bring, on the premise that the technology isn’t settled enough for them yet. The same people would rather stand in line waiting for a human teller at the bank when the computerized self-service teller is standing vacant. Quite often, their response, when queried on this behavior, is “Those are just a trend and if I learn how to operate one now, they’ll only change it.” Of course they’ll change it! And when “they” do, those who haven’t operated the earlier model will have that much more difficulty integrating the next generation of technology into their lives.

It is important to acknowledge a degree of validity in this “wait and see” philosophy. When any technology is in its

infancy, the cost of getting involved will be disproportionately high, reflecting the research and development costs of bringing a new product to market. However, the people who are still waiting to see if microcomputers are a fad are quickly falling behind. This is a technology which is maturing from its infancy into adolescence. If we as individuals, or collectively as a society, choose to resist the change microcomputers bring to our lives, we will end up with our feet planted in concrete, incapable of adjusting when the change becomes imperative. Worse yet, the technology will develop *sans* our involvement in its structuring. The result could be a technology designed to meet everyone’s needs but our own.

In the same context, if those of us who have taken the plunge and gotten involved with the microcomputer resist new generations of the technology, we risk limiting the layman’s view of the computer to that of a “mysterious black box,” magically producing data to be worshipped as perfection itself. I sense a small voice of resentment among current computerists when they speak of “the good old days,” and how little people entering the field now have to go through before they can get results from their computer. If anything, the “old timers” should be proud that they helped pave the way to making such an important technology more accessible. (The amount of change in the microcomputer field is exemplified by the fact that anyone who’s been in it for more than two years can be classified as an “old timer.”)

Many important questions need to be asked as we proceed into the new frontiers of technology. However, proceed we must, and it’s vital that we keep our vision as clear as possible in viewing those frontiers. Let’s make sure our natural resistance doesn’t cloud our view of the potential positive and negative effects of technology on the society of the future.

A handwritten signature in black ink that reads “Randal L. Kottwitz”. The signature is written in a cursive, flowing style.

Randal L. Kottwitz
Editor-in-Chief

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From our readers

INPUT

Roses & Thorns

Dear *SoftSide*,

When three issues of my subscription hadn't arrived, I decided to call your office and find out exactly what was happening. A cheerful voice assured me that all was well and that my errant *SoftSides* were probably still trying to find my mailbox. Just to make sure there wouldn't be any holes in my collection, though, she volunteered to send me the missing issues. To my surprise, they appeared at my doorstep within a few days. What superb service!

While the overall quality of *SoftSide* has improved vastly in the past year, your magazine could still benefit from tighter editing and more careful proofreading and testing, particularly in program listings. Program errors can cause hours of lost sleep among thousands of followers who trust that your listings, before and after *SWATting*, are correct. Perhaps you should make it a practice to type in the listings yourself from press proofs — as if you were a reader — to make sure the programs work as published. Sure, your production schedules may have to be adjusted, but as Mr. Kottwitz so aptly editorialized a few issues back, too much software is being released nowadays before it is ready for market.

Nevertheless, thanks for the many hours of entertainment and valuable programming knowledge gained from your magazine. My Atari would indeed be malnourished without you.

Kenneth T. Saiki
Honolulu, HI

Editor's Reply: Thanks for the compliments. As for the editing and proofing of our programs — yes, we mess up on occasion, sometimes profoundly as indicated by the size of our *Bugs* column this time. However, we've recently developed several utilities, specifically for the Atari, which should substantially improve our ability to catch errors in programs before they reach your hands. Thanks for your patience.

Dear *SoftSide*,

I own an Atari® 800 computer and I absolutely adore it! I have found that software is rather expensive, however. *Frogger*, one of my favorite arcade games, is a good example. Imagine my delight when I found *SoftSide* #35 at the newsstand with a frog on the cover! I grabbed a copy at once.

I immediately typed in the *Hopper* program and ran it. It was wonderful! Excellent graphics and sounds! And, oh what sounds! Water splashes, car motors, frog leaps, etc. Just great!

After enjoying *Hopper* for a while, I delved into the Atari section of your magazine. I gasped...finally someone shows pictures with their software reviews!

I guess my enthusiasm is obvious. Thanks for an excellent magazine.

Leon Fan

Music/Software Copyright

Dear *SoftSide*,

Having nearly reached the tired old age of 30, I am seldom moved to write to magazines any more. However, Issue #37 pushed me to the keyboard.

I had a few thoughts on the analogy between musical copyright and software copyright drawn in *My Side of the Page*. I am an aspiring songwriter and have had some exposure to the concepts Mr. Micklus discusses. I have been told that when a saloon buys a BMI license to play BMI songs on their juke box, it also covers songs live bands might play there. The money flows back to the writers as if the songs were played on the radio. The analogy for software would probably be that of the games in a video arcade. When a manufacturer sells a machine, the game's designer would receive a royalty. The better (and thus more popular) the game, the more the sales, and the higher the royalty.

I would take issue with Micklus' contention that distributing the results of a VisiCalc® model violates the copyright law. VisiCalc is absolutely useless without 1) a computer, and 2) some user input. I would compare my Apple® to my Fender Stratocaster guitar and the VisiCalc to my

Kustom 250-4 amplifier or to one of my special effects boxes. They look nice standing in the corner, but they're no good until I lay my fat little fingers on the fretboard and make music. Saying VisiCorp is entitled to some share in the results of using a VisiCalc model is the same as saying Fender should get some share in the music I make on their (my) guitar. I don't think this is a fair or realistic position.

Thanks for your time. Overall, I enjoy the magazine very much and I intend to keep on reading.

Gary Ragan
Baton Rouge, LA

Entertainment or Education?

Dear *SoftSide*,

I agree with Leonard Vincent (*Input*, issue #36), who asked for more game listings. If you steer away from games because you consider them primarily entertainment, you are making a serious error.

The real benefit of game listings is their instructional value for beginning programmers. When I got my Atari®, about three years ago, I picked up several books on BASIC. Such books get you started, but it only takes a few weeks to discover that all these books share one important characteristic: they are incredibly, agonizingly boring.

I was lucky to discover *SoftSide*, early in my programming efforts. I found that you offered nifty listings which I could type in and have fun with, even when I couldn't figure out how they worked, at first. But I learned. I made mistakes, and learned how to find and correct them. Sometimes the listings had errors, and debugging them taught me even more. I waited eagerly for each new issue of *SoftSide*.

There is no other magazine I know of which provides such interesting, enjoyable learning experiences for beginning programmers. If you were to aim deliberately at this goal — game listings as illustrations of programming techniques, perhaps with expanded explanatory discussion — I think you would provide a unique and valuable product. I remind you that the population

of beginning programmers is expanding at an incredible rate. Doesn't this represent a marketing opportunity, and an editorial policy, you should think about?

Edward D. Stroup
Honolulu, HI

Editor's Reply: We've not abandoned games! You're right, there is great value to be had in printed software listings from an educational point of view. As evidenced by our software in *SoftSide Selections* this time, we will continue to provide many games in the spectrum of software we offer to the *SoftSide* reader.

OUTPUT

by Randal L. Kottwitz

The "New" *SoftSide*

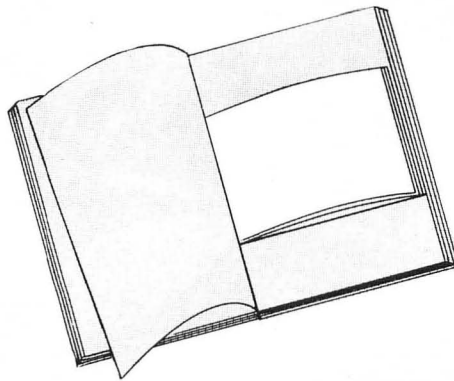
You hold in your hands the results of over a year's planning for the next generation of *SoftSide*. You've probably noticed some of the subtle changes we've introduced over the past year to prepare for this new format. The truth of the matter is that we had made as many changes as possible without a complete restructuring of the magazine. The time had come to tear *SoftSide* apart into its key elements and put it together again from scratch, reintegrating each element to give you a more readable, more useful magazine. We've listened carefully to your letters and phone calls, and tried to implement as many of your requests for a better magazine as possible in our new format.

In truth, there is no longer only one *SoftSide*, but *five* different editions, each geared to a specific portion of our readership's needs. The difference in each edition is in the booklet you'll find bound into the center of your magazine. If you bought your copy on the newsstand or in a computer store, the booklet contains our Front Runner program — this issue, *Flip-It II* — translated for each of the four computer systems we support. If you subscribe to *SoftSide*, your booklet will contain only software and documentation for the computer you told us you had or were interested in when you subscribed. You get the Front Runner too, but only the version for your computer. In addition, your booklet (called *SoftSide Selections*) contains other printed software for your computer, the documentation for the *DV Bonus Program* for your system, and the instructions for the *SoftSide Adventure Series* included on each issue's *DV* and *CV*.

We've solved several problems with the creation of *SoftSide Selections*. First, you don't have to take the whole issue of *Soft-*

Side to your computer to use our software. The booklet is scaled to the size of most other software documentation on the market, making it easier to integrate with the other manuals in your library. In addition, if you type in our software, you'll find the "steno pad" design very convenient. The booklet folds over to take less space on the desk next to your computer, and we've printed it on uncoated paper to decrease the amount of glare you'll have to contend with. If you've spent a few too many hours at the keyboard and started talking to your computer, you can now tell it that it has a magazine of its own.

Now, to tell you what's happening to the *SoftSide* meant for you (as opposed to your computer). You'll notice that the magazine has decreased a few pages this time. In actuality, we moved the equivalent of 52 pages of the large magazine into the various booklets. Had we kept it all together, this issue of *SoftSide* would have contained 132 pages, more than we've ever published before. The result is that we now prepare more material than ever to bring you features, product reviews, technical articles, columns, humor and our views on the state of home computing. We will continue to increase the amount of material we prepare for your eyes every issue, with the usual *SoftSide* attention to quality and readability. It's a great joy for our editors to consider high quality material we previously had to reject due to space limitations.



The first change you probably noticed when you picked up this issue of *SoftSide* was the second cover. We've adopted this second "front door" to the magazine to gain several advantages. We're very proud of the artwork produced for the cover of *SoftSide*. We even reduced the size of our logo last year to feature the art more fully. However, our circulation is not yet large enough to justify a paper wrapper or envelope for every issue, and the unprotected covers were arriving at your doorstep highly disfigured. In addition, the absence of large amounts of type screaming "computer" on our cover has led many uninformed newsstand owners to place us

with the science fiction or art magazines. That's not a bad association, but it doesn't sell magazines to computer owners. The second cover solves both of these problems. Our high quality cover artwork can remain unblemished. The copies mailed to our subscribers will be better protected, and we can now better sell ourselves to newsstand buyers and potential subscribers.

Don't be surprised if you find a few minor errors as you read through these pages. Most magazines would shut down for a month to accomplish such a major reformatting — we've decided to forge ahead and get the next issue of *SoftSide* into your hands as close to on-schedule as possible. We've burned a lot of midnight oil to proof each of these new pages closely, so don't be too angry if a bleary eyed editor missed a comma or forgot to put a "continued on" at the bottom of one of our pages. It's a new experience for our printer, as well.

I want to use this forum to thank all the members of the *SoftSide* staff for their contribution to this gargantuan effort. In the middle of preparing this issue, we had to bid a sad adieu to Lynn Wood, our former production manager/art director. Her contributions were greatly appreciated and will be sorely missed. However, in her place we have a new production manager, Rick Lydon, and a new art director, Mary Parkman. These amazingly talented individuals have picked up the gauntlet and brought a refreshing facelift to our type and graphics. In all, most of the horrors I envisioned as I looked forward to this "new" magazine were allayed by the staff's ability to work together toward a common goal — getting a better *SoftSide* into your hands.

There's another segment of our staff whose headaches will start the day you receive this issue — the customer service people. We've done our best, over the last year, to make sure we knew which computer each of our subscribers was using. However, I'm sure there have been some errors and some of you have received the wrong edition of the magazine. If we didn't have you registered as owning any particular computer, we've sent you the edition for the newsstand. If you've received the wrong edition, use the coupon inside the mailing cover to tell us. We'll be glad to send out the correct booklet for this issue of *SoftSide*, free of charge, and we'll correct your listing on our mailing list to make sure you get the right edition in the future. We ask your patience. In the end, we're creating a better magazine for almost all of our subscribers and we'll iron out the problems as fast as we can.

Winter has finally departed from our New England home and the fresh breezes of Spring are filling our lungs. What more appropriate time to bring our new face forward? Enjoy, and until next time, Happy Hacking! ☺

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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.

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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.

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HINTS & ENHANCEMENTS



From our readers

BASIC Line Delete For Atari®

After using John S. Kalstrom's short program for deleting lines of code in Atari BASIC, (*SoftSide*, May 1982, pg. 9) I discovered that this routine prints the line numbers you want to delete, and also all numbers in between (i.e. increment by 1), whether they are actual line numbers or not. This seemed inefficient, so I designed a better version.

This modified version (requiring only 445 bytes) lists and deletes only the actual lines of code in a specified range. Like Kalstrom's version, this program causes the screen editor to go into a "forced read" mode so that lines on the screen are entered without pressing RETURN. However, my version finds the starting address of your BASIC program, (line 32020) then finds the line numbers of your program (line 32030) and lists those specified.

```
32000 PRINT "Low, High ";:INPUT LOW,HI
6H:ST=1:ADDR=0:LINE=0:IF LOW>HIGH THEN
32000
32010 GRAPHICS 0:POSITION 2,2
32020 ADDR=PEEK(136)+PEEK(137)*256
32030 LINE=PEEK(ADDR)+PEEK(ADDR+1)*256
32040 ADDR=ADDR+PEEK(ADDR+2)
32050 IF LINE<LOW THEN 32030
32060 IF LINE<=HIGH THEN PRINT LINE:ST
=ST+1
32070 IF LINE=HIGH OR ST=21 THEN 32090
32080 GOTO 32030
32090 ST=1:PRINT "CONT":POSITION 2,0:P
OKE 842,13:STOP
32100 POKE 842,12:IF LINE=HIGH THEN EN
D
32110 GOTO 32010
```

To execute this routine, type GOTO 32000. You will then be prompted to enter the limits of the range of lines to be deleted. One word of caution — your low limit doesn't necessarily have to be an actual line number; an approximation is sufficient, (The program will find the nearest line number automatically.) However, you *must* enter an actual line number for the high

limit or the program will keep looking for a non-existent line number. Like Kalstrom's program, or any line deleter for Atari BASIC, this program will occasionally stop BASIC from functioning. To be safe, keep the range of lines to delete fairly small.

To save this program, list the routine to tape or disk (i.e. LIST "C:", LIST "D:DELETE.BAS"). Then ENTER the routine to merge with your application program.

Louis R. Lovas
Lodi, OH

Apple® Hopper Enhancement

The Apple version of *Hopper* (*SoftSide*, Issue 35) presents a blank screen while variables are reset for a repeat game. You can fix this by changing line 570 as shown below.

```
570 IF A$ = "Y" THEN HOME : PRINT
"ONE MOMENT PLEASE...": GOSUB
660: GOTO 200
```

One minor frustration with the program is that you don't always know your score when the game ends. This can be rectified by adding line 485 and changing line 490 as shown below.

```
485 TEXT : HOME : VTAB 4: PRINT
TAB( 12)"YOUR SCORE: ";: INVERSE
: PRINT SC: NORMAL
490 FOR X = 1 TO 500: NEXT X: FOR
X = 1 TO 4: POKE 6,50: POKE
7,50: CALL MU: POKE 6,15: POKE
7,50: CALL MU: NEXT X: POKE
CLK,0: PRINT : PRINT : PRINT
TAB( 12)"G A M E O V E R"
: PRINT : PRINT : IF NOT TS
(0) AND NOT SC THEN 550
```

Robert Stevens
Carmanville, Canada

Atari® Hopper Enhancement

My compliments to the authors of *Hopper* (*SoftSide* #35). The Atari version is terrific. Because I wanted to work for something other than just a great score, however, I worked on these bonus enhancements. They add a new frog at 10,000 points and every 5,000 points thereafter up to a limit of five frogs.

```
2350 B=N1:S=N0:H=N0:BONUS=10000
2485 IF S>=BONUS THEN FR=FR+1:BONUS=BO
NUS+5000:GOSUB 2495
2495 FOR TN=200 TO 5 STEP -5:SOUND 1,T
N,10,15:NEXT TN:SOUND 1,0,0,0
2496 IF FR>=5 THEN FR=5
2497 FOR K=0 TO FR-1:POSITION N4+K*2,2
2:? F$:NEXT K:RETURN
```

Bob Purdy
Fayetteville, NY

Bugs, Worms, and other Undesirables



Apple® Fortress Clarifications

Some copies of the Issue 36 Apple DV did not have a previously-initialized high score file for *Fortress*. The first time you run *Fortress* on one of these disks, you will see the following message:

THERE IS NO TEXT FILE ON THE
DISK.
HIT ANY KEY TO CONTINUE...

Bugs continued

Nothing is wrong with the program. Hit a key, and the game will begin normally. After you play once, the high score file will write to the disk, and you will not see the message again.

If you write protect the disk, you will see the message

DISK IS WRITE PROTECTED.
HIT ANY KEY TO CONTINUE...

You can play the game as before, but high scores will not be saved to the disk.

One further note: The filename for running *Fortress* directly is FORTRESS, not FORTRESS HELLO as stated in the article.

Applesoft® Extensions 2

There is a bug in *Applesoft Extensions 2* (Issue #37) involving &INPUT. If you are using a numeric input variable, backspacing does not always work properly. If you were to enter 97, for example, type a backspace, then RETURN, the display would show 9, but the value returned would be 97. To fix this, type in, save, and run the following program on a backup disk containing AE2.OBJ and AE2.LDR. When you are sure that the modified files work, you may delete this program, then use the new AE2 files to replace your old ones.

```
10 D$ = CHR$(4): PRINT D$*BLOAD
    AE2.OBJ,A$1A00": IF PEEK (
    8640) = 172 THEN PRINT "ALR
    EADY FIXED": END
20 FOR X = 8701 TO 8642 STEP -
    1: POKE X + 1, PEEK (X): NEXT
    X: POKE 8640,172: POKE 8641,
    255: POKE 8642,2
30 PRINT D$"UNLOCK AE2.OBJ": PRINT
    D$"BSAVE AE2.OBJ,A$1A00,L$80
    0": PRINT D$"LOCK AE2.OBJ"
40 PRINT D$"BLOAD AE2.LDR": POKE
    856,136
50 PRINT D$"UNLOCK AE2.LDR": PRINT
    D$"BSAVE AE2.LDR,A$300,L$CC"
    : PRINT D$"LOCK AE2.LDR": POKE
    6656,0
```

Atari® Saucer Formation

We have recently noticed that *Saucer Formation* (*SoftSide* Issue 35) goes into the attract mode if you survive long enough. You can avoid this by inserting the following POKE at the beginning of line 120.

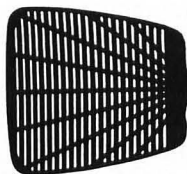
```
120 POKE 77,0:...
```

Atari® Car Race

A number of the lines in *Car Race* (*SoftSide* Issue #37) were longer than could be typed in using normal methods. Here is a listing of the lines that must be changed or added, and a new SWAT table for the revised program.

```
3 Q0=0:Q1=1:Q2=2:Q4=3:Q5=4:Q6=5:Q7=280
00:Q8=14000:Q10=6:Q11=8:Q12=20000:Q13=
1000:Q14=9:Q15=10:Q16=11:Q17=12
4 Q20=14:Q21=16:Q23=18:Q25=21:Q28=3000
:Q29=10000:Q31=1.5:Q34=20:Q35=7:Q36=30
30:Q37=26:Q39=39:Q40=40:Q41=4040
5 Q50=50:Q60=60:Q64=64:Q69=3069:Q88=88
:Q89=89:Q106=106:Q128=128:Q176=176:Q18
8=188:Q200=200:Q232=232:Q248=248
6 Q250=53250:Q251=250:Q252=53252:Q253=
53249:Q255=255:Q256=256:Q260=53260:Q27
8=53278:Q279=53279:Q300=9300
8 Q18=13:Q19=19:Q46=46:Q49=12000:Q249=
53248:Q400=9400:Q512=512
```

```
3000 GOSUB Q29:HIT=Q0:X=123:DL=PEEK(Q5
60)+Q256*PEEK(Q561):DL4=DL+Q5:DL5=DL+Q
6:POKE Q250,Q0:GOSUB Q300:GOSUB 6000
3001 V=Q2:DIS=Q0:POKE DL5,RT+Q19:POKE
DL4,Q248:NUML=PEEK(DL4):NUMH=PEEK(DL5)
:GOSUB Q400
3069 HIT=HIT+Q1:SOUND Q2,Q50,Q15,Q20:F
OR I=Q1 TO Q50:NEXT I:SOUND Q2,Q0,Q0,Q
0:SOUND Q2,Q50,Q15,Q20
3070 FOR I=Q1 TO Q50:NEXT I:SOUND Q2,Q
0,Q0,Q0:IF HIT=Q2 THEN GOTO 9100
6000 POKE Q249,Q0:POKE Q253,Q0:POKE DL
5,RT+Q34:POKE DL4,Q232:FOR I=Q0 TO X:P
OKE Q253,I:NEXT I:POKE Q249,X
6002 POKE Q253,Q0
9100 SOUND Q1,Q0,Q0,Q0:SOUND Q0,Q0,Q0,
Q0:FOR I=Q0 TO X+15 STEP Q2:POKE Q250,
I
9102 IF I/Q5=INT(I/Q5) THEN SOUND Q2,Q
50,Q5,Q11
9400 N=Q2*(LEVEL-Q1):NN=LEVEL-Q1:SETCD
LOR Q5,Q0+NN,Q0+N:SETCOLOR Q0,Q4+NN,Q5
+N:SETCOLOR Q1,Q11+NN,Q10*NN
9402 SETCOLOR Q2,Q17+NN,N+Q11:RETURN
```



SWAT TABLE

For ATARI®: CAR RACE - UPDATED VERSION

(Modified Parameters: NU = 6, B = 300)

LINES	SWAT CODES	LENGTHS	LINES	SWAT CODES	LENGTHS
2 - 3	BH	358	22010 - 22060	EZ	276
4 - 5	AR	330	22070 - 22120	HQ	276
6 - 100	CG	359	22130 - 22180	WB	276
150 - 1026	GY	298	22190 - 23040	FR	276
1040 - 1150	KG	330	23050 - 23100	XW	276
1170 - 1999	JL	316	23110 - 23160	LR	276
3000 - 3033	VN	315	23170 - 24020	DC	276
3034 - 3050	ID	247	24030 - 24080	EP	276
3051 - 3057	BP	184	24090 - 24140	HA	276
3058 - 3066	UK	137	24150 - 25000	SV	276
3067 - 4040	BX	182	25010 - 25060	RJ	276
4050 - 7030	FT	256	25070 - 25120	NZ	276
7050 - 8000	RZ	311	25130 - 25180	LX	276
8010 - 9102	UY	196	25190 - 26040	FN	276
9112 - 9200	UE	206	26050 - 26100	QO	276
9210 - 9402	TQ	185	26110 - 26160	HU	276
10000 - 10030	MU	274	26170 - 27020	UF	276
10060 - 10100	DI	146	27030 - 27080	JZ	276
10200 - 10240	MP	235	27090 - 27140	NJ	276
10250 - 12030	II	98	27150 - 28000	GG	276
14000 - 20040	ZO	266	28010 - 28060	AT	276
20050 - 20100	LU	276	28070 - 28120	MI	276
20110 - 20160	AY	276	28130 - 28180	WT	276
20170 - 21020	QK	276	28190 - 29040	FR	276
21030 - 21080	CO	276	29050 - 29100	TL	276
21090 - 21140	QK	276	29110 - 29160	JE	276
21150 - 22000	GB	276	29170 - 29190	YW	138

STARCROSS:

INTERLOGIC SCIENCE FICTION

Reviewed by Jay Marrone

from Infocom, Inc., 55 Wheeler Street, Cambridge, MA 02138. This game is available for all four of our systems. Individual system requirements are as follows: 48K RAM IBM® PC, 32K Apple® II, II+ or Iie, 32K Atari® 400/800, 32K TRS-80® Model I or III. Disk drive is required with all systems. Suggested retail price: \$39.95.

As an experienced gamer who enjoys simulated space exploration, I looked forward to Infocom's game, *Starcross*. *Starcross* is a text adventure, but that shouldn't prevent arcade players from participating.

The game has a nice premise. You don't just play *Starcross*. In a very real sense you participate in an event which unfolds during the year 2186 A.D. The story is quite predictable in the first few moments, but this helps you develop the maturity to deal with the complex situations which confront you as a space adventurer. The deck plan of the alien craft, sadly, is not original to one who has read "Rendezvous with Rama," by A.C. Clarke. But then again, aren't all alien spaceships designed by the same interstellar manufacturing company?

When you reach the alien craft, you must decipher a hexagonal pattern before the outer door of the craft will open. A nice touch — however, you'll need a great deal of luck to open the outer door on the first try. Waiting, another feature in the game, does nothing once the player has muffed the pattern interpretation. I know, because I endured innumerable waits at that door. To all prospective space explorers, one final warning: "Don't wait too long once you're inside the alien spaceship."

It is difficult to get a feeling of space exploration in the game because the only space that you cross runs from the start of the game to the encounter with the alien craft. A map functions as the mass detector output, and enhances the sparse space sensations, but it serves no real purpose other than to list the coordinates of objects in the

immediate vicinity of your space craft. You can maneuver your ship, *Starcross*, to any point on the map, but the game ends unless *Starcross* follows its course to the inevitable encounter with the alien craft. The motion vectors on the map do not correspond to actual movement. It would have been great if the objects had true space motion and it wouldn't have taken much to incorporate the motion equations into the game. Perhaps in the sequel?

Once inside the alien craft, the drama increases. Every step heightens the tension. When you encounter the aliens, you must consider many things. How you react to these encounters carries implications reaching far beyond the game, as you reveal your personality traits by the manner in which you handle the situations. One encounter, in particular, was an extremely unnerving experience. Even as I think about it, my hands get clammy and my nerves begin to crumble as the alien sidles up to me. What a moment!


Starcross accepts full sentences, and will even prompt the player if a noun or verb is

missing. You can enter all commands in abbreviated form but you must enter a noun-verb structure which, with certain commands, you can abbreviate even further by entering a single letter command. As the game proceeds and you become familiar with the sequence of events, you can ask the program to give briefer explanations. Features, such as SAVE, RESTORE, and SUPERBRIEF, are handy and permit you to sidestep annoying and tedious replay of the first part of the game.

Unfortunately, the program does not recognize all its words. It is extremely irritating to be told: "There is a room filled with many strange devices," and then ask: "What are the devices?" only to receive the response: "I don't see devices here."

The booklet that accompanies the game states that there is no single correct order for solving problems. That is true, but you must solve only certain problems to ultimately resolve the challenge.

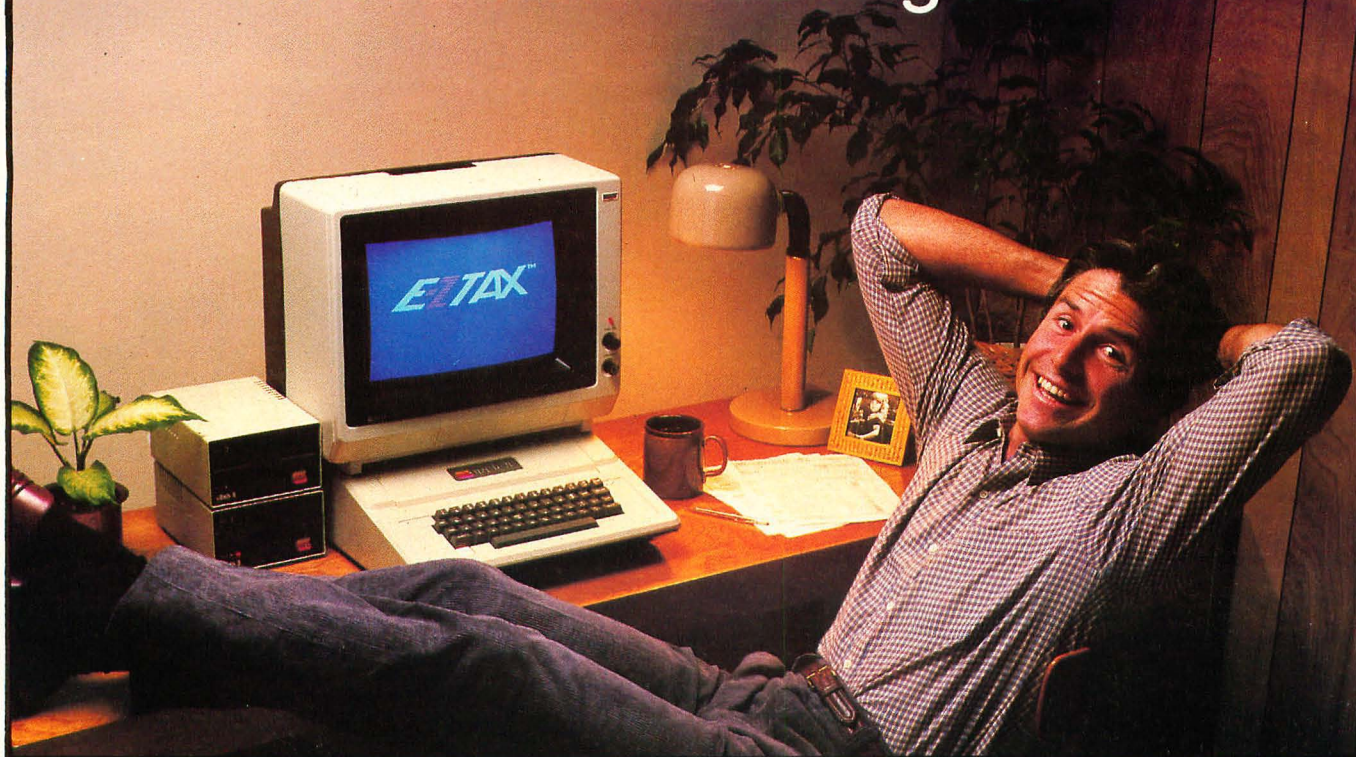
Any adventure, especially a text adventure, relies on the participant's imagination and the mood set by the text, so it is important to select the player/program dialogue carefully. In *Starcross*, some responses contradict this. For example, the response: "Not bloody likely," while humorous, does little more than break the mood that the program had established.

Fortunately, no hints give away the expedient resolution of the challenge. *Starcross* is astronomically ahead of many text adventures and, thanks to the commands BRIEF and SUPERBRIEF, bears repeated playing very well. 



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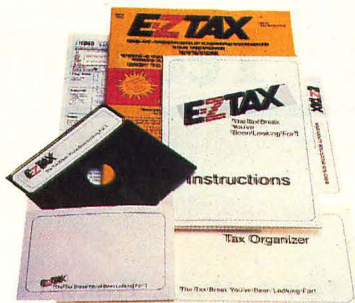
1040A	2106
1040 EZ	2119
1040 page 1 & 2	2210
Schedule A	2440
Schedule B	2441
Schedule C	3468
Schedule D	3903
Schedule E	4137
Schedule F	4684
Schedule G	4972
Schedule R/RP	5695
Schedule W	6251
1040 ES	6252
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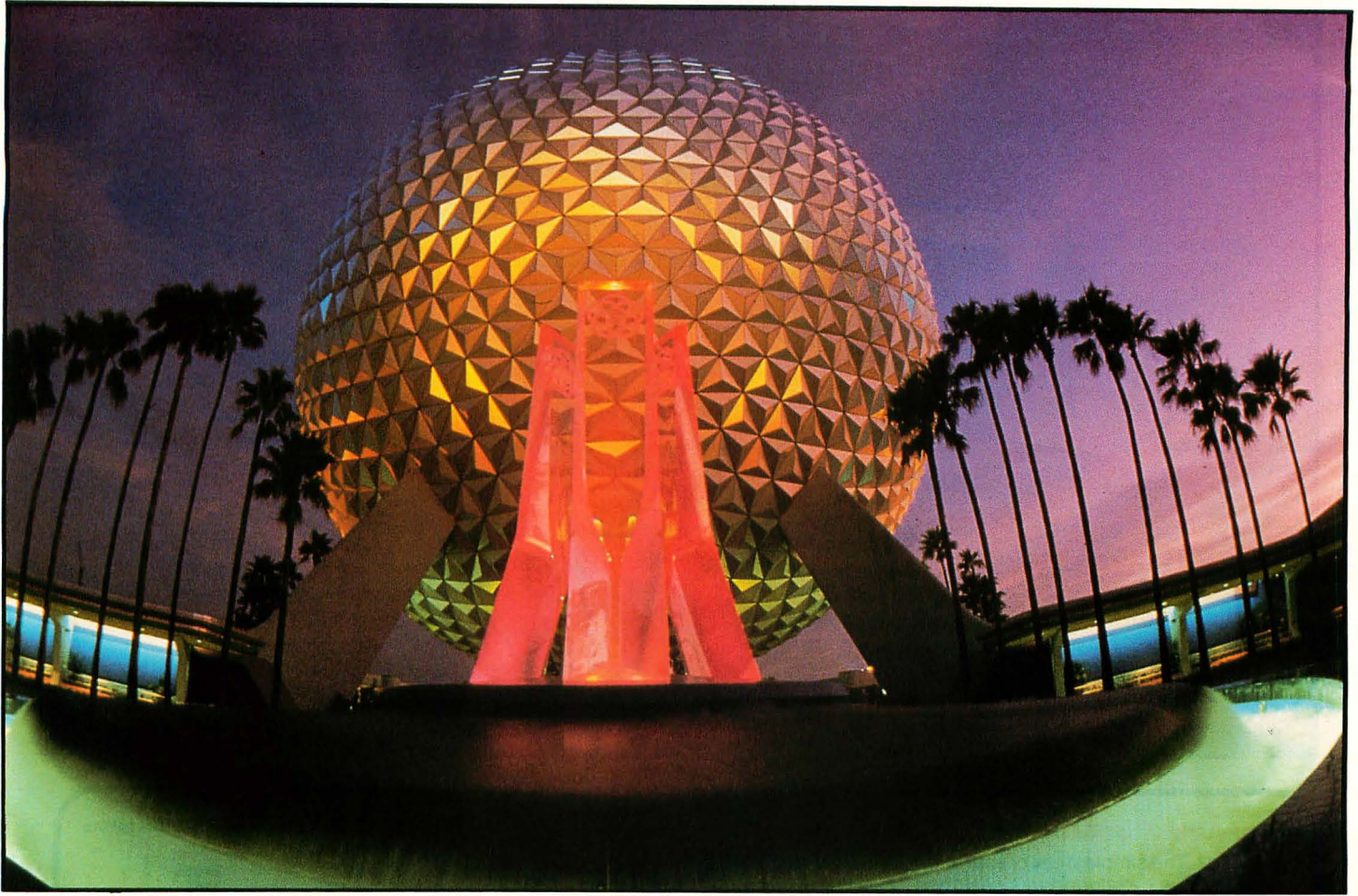
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Spaceship Earth stands majestically at the entrance to Future World, and is the first exhibit greeting visitors to Epcot. All photos courtesy of Walt Disney Productions.

Disney's EPCOT: Technology Or Magic?

by Fred D'Ignazio

Walt Disney Productions unveiled the world's premier "theme" Park on October 1, 1982. The park, known as *EPCOT*, cost Walt Disney Productions and their collaborators almost a billion dollars, and will one day sprawl across almost 600 acres in northern Florida. The park's twin components, Future World and World Showcase, have a single theme: Man's ability to survive through communication.

Four thousand laborers, 1800 planners, a host of corporate giants (like Bell Telephone, Kraft, Kodak, and General Motors), and several foreign countries (in-

cluding Canada, Mexico, France, China, and Japan) worked sixteen years to complete *EPCOT*. Disney's talented crew of *imageers* (artists, architects, and engineers) handled most of the design. A thousand outside consultants, including noted science fiction author Ray Bradbury, also made contributions during the final stages of the park's construction.

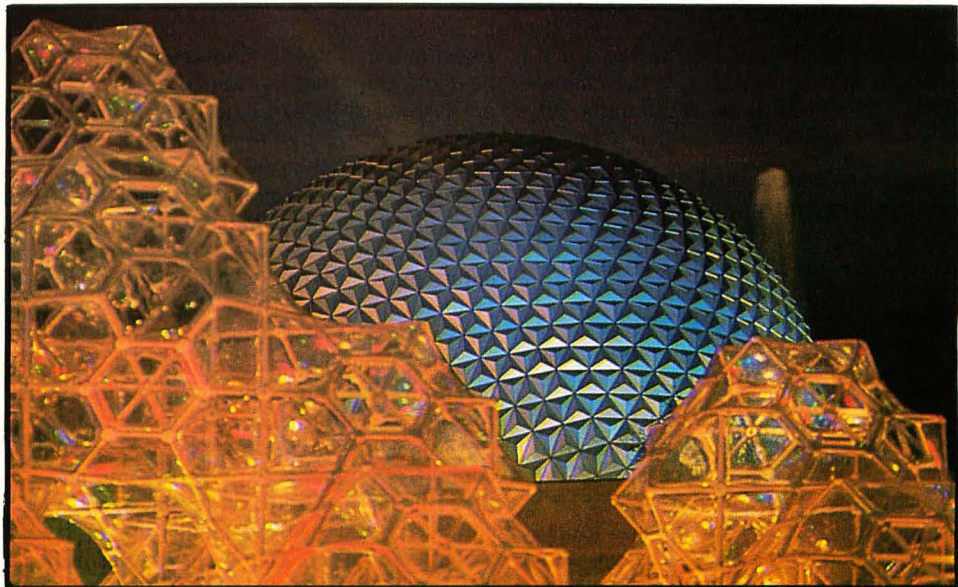
EPCOT's genesis can be traced back to the late 1950's and early 1960's when Walt Disney and his brother, Roy, were developing Disneyland, in California. Walt was planning the Magic Kingdom and Disney

World in Orlando, Florida, and he was already thinking beyond Disney World to a dream — a utopian community of the future. Walt Disney Productions had recently acquired a 28,000-acre tract in northern Florida. Disney World would fill only a couple hundred acres, leaving a lot of room for other projects.

Disney formed a select team he called WED (for Walt E. Disney design). He discussed his "experimental community" idea with his WED associates and called the community *EPCOT*, for "Experimental Prototype Community of Tomorrow." He

...EPCOT would become a conduit and a showcase for the newest ideas coming from government, industry, and the universities.

The fantastic exterior of the Journey into the Imagination beckons visitors inside to the Kodak exhibit, featuring a 3-D film and a hands-on electronic playground.



envisioned a domed city for the future, where modern technology would feel as warm and familiar as a fireplace or an old, comfortable sweater.

The EPCOT technology would be gentle and unobtrusive. It would take care of every daily need. Garbage would never need hauling, the grass would never need mowing, the house would never need cleaning, and the thermostat would never need adjusting. Technology would take care of everything — quietly and almost invisibly.

On the evening of December 14, 1966, Walt Disney lay, critically ill, in a hospital in Burbank, California. Walt was in a weakened condition, and his brother Roy tried to get him to relax, but Walt insisted on discussing EPCOT. He told Roy about his dream that EPCOT would become a conduit and a showcase for the newest ideas coming from government, industry, and the universities — not just from America but from countries around the world.

Walt's excited words and ideas that night were nearly his last. The following morning, on December 15, 1966, he died of an acute circulatory collapse.

After Walt's death, Roy and the other members of the WED team immediately began planning for EPCOT. At first, designers attempted to remain loyal to Walt's original idea — for a community of real human beings. Walt had wanted people — men, women, and children — to move to EPCOT and turn it into a functioning city of the future.

But, after a few years of planning, Disney officials decided that building a futuristic utopia with real people was too ambitious. As soon as real people settled in EPCOT, Walt Disney Productions, as a private company and the community's founder and landlord, would be faced with a host of thorny problems. The company would have

to immerse itself in city politics, set up a school system, a police department and a fire department, create a sports program, build churches, mosques and synagogues, start a newspaper, create a TV station, and monitor and mold people's culture, their leisure activities, and their lifestyles. Before long, the company would be embroiled in all manner of quarrels, disputes, and lawsuits. The community side of EPCOT meant real people. For a company that specialized in cinematic and amusement park fantasies, real people would be a major headache.

In the end, Disney officials decided that building a real community would be "impractical." According to one official:

"Walt Disney believed that American industry could offer solutions to many of the problems of modern urban life. He wanted to create a model city where people could actually live, work and play.

"We decided that we really couldn't experiment with people's lives in a way that a real, functioning city would have required. Instead, we tried to ac-

complish Walt's goal by doing what we do best — building a Theme Park."¹

continued on page 16

¹ Quoted in Bill Truesdale's, "EPCOT Center: Disney's New World," *Travel Holiday*, October, 1982, p. 28.



Did you ever see a carrot dancing? In the humorous Kitchen Cabaret, animated foods present a song and dance revue about the importance of proper nutrition.

Entertainment Tomorrow *continued*

Walt's dream, in the 1960's, was for a community of people. Today, in the 1980's, EPCOT has become a community of creative concepts.

Disney imagineers, and their counterparts in other companies, have unleashed a dazzling array of "creative concepts" in plastic, steel, and celluloid. Human progress — historically and in the future — is dramatically imagined and presented in exhibits that focus on communications, motion, invention, and energy.

Bell Telephone, in its Spaceship Earth Pavilion, traces the evolution of human communication. Kraft lets us survey the past and future of agriculture — everything from bananas to shrimp grown through aquaponic and hydroponic farming techniques. Kodak takes us on a Journey Into

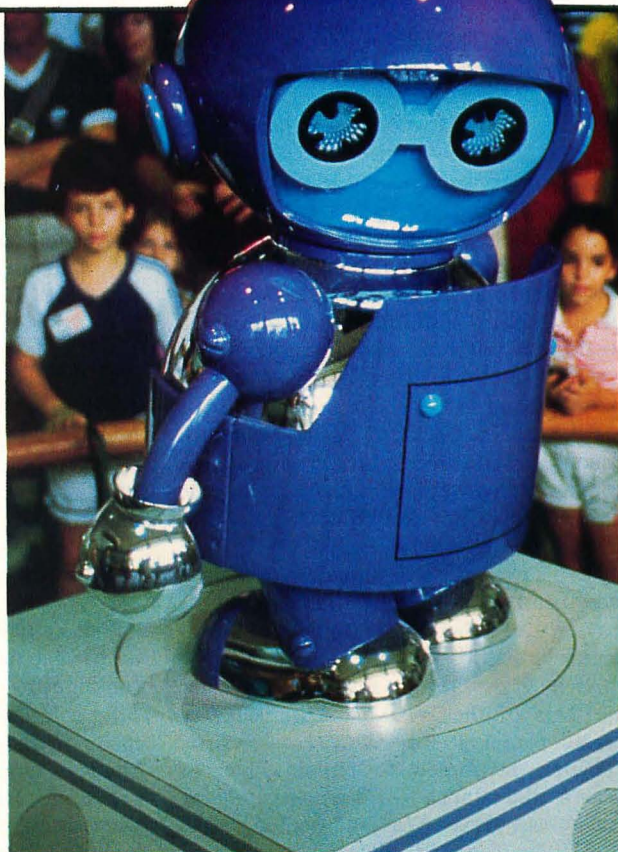
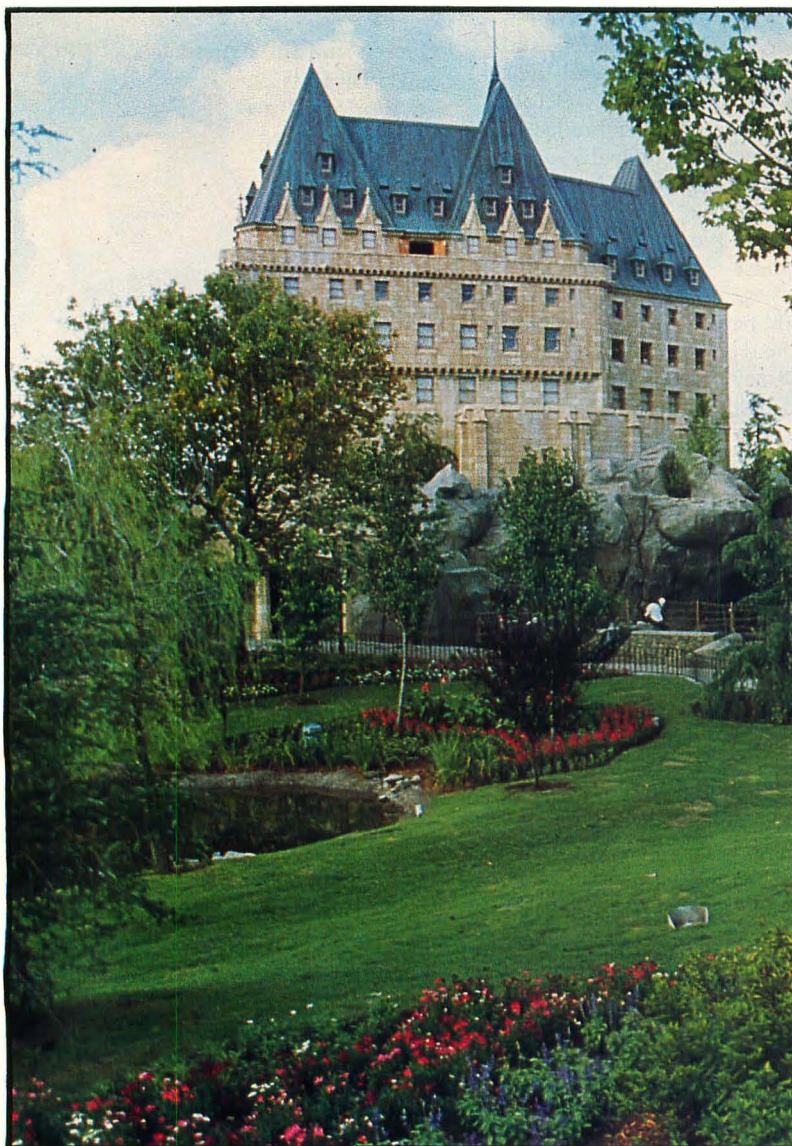
Imagination. Exxon's Universe of Energy pavilion brags that its futuristic trolley cars are "powered by sunshine." And, indeed, they are. The energy for the six huge cars, each carrying up to 97 passengers, comes from 80,000 photovoltaic cells lined up on the two-acre pavilion roof.

When you arrive at EPCOT, you first enter Future World's Communicore, a futuristic "midway" sponsored by Sperry Univac. As you stroll along the high-tech midway, you pass lots of shops and small-technology exhibits, including a talking robot. You watch "The Astuter Computer Review," a cybernetic musical in which computers explain how they work and how they run EPCOT. You get to play games, a computerized census quiz, and you can try your hand at creating your own roller-coaster arcade game.

EPCOT's landmark is Spaceship Earth, a 180-foot-high geodesic dome suspended fifteen feet off the ground on six giant steel legs. It is the first large-scale geodesic structure to achieve a completely spherical shape. Inside the dome is the world's largest geosphere. You board small, self-propelled "time machines" and journey into the past on a track that spirals around the inside of the dome.

In the lower part of the dome, you travel through thousands of years, then shoot through a space tunnel into "outer space." Outer space is an artistic rendering of the Milky Way galaxy on a projection screen 150 feet in diameter. Your car turns 180 degrees, and you see the Earth and nearby, a Space Shuttle. You feel like you are floating among the stars.

continued on page 18



Top: SMRT-1, a robot featured in the Computer Central exhibit, converses with Epcot visitors via telephone.

Left: The famous Chateau Laurier hotel looms majestically behind Victoria Gardens in Canada, part of Epcot's World Showcase exhibit.



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Entertainment Tomorrow continued

EPCOT is a theme Park, but with an identity and focus different from its neighbor, Disney World, only two and a half miles, by gleaming monorail, to the north. Disney World creates fun for the sake of fun. *EPCOT* creates fun for the sake of information.

Fun — or entertainment — is still the key word. *EPCOT* officials concur with Dick Nunis, President of Disney World, when he says: "I subscribe to what Walt once said and that is, 'I'd rather entertain people and hope they learn than teach people and hope they've been entertained.'" ²

Disney's chief designers have certainly absorbed his message. In the early 1960's, twelve-year-old Tony Baxter sat next to Walt Disney and pulled the levers that ran the rides of Tomorrowland, in Disney's first amusement Park. Now, over twenty years later, Baxter is one of the designers of Kodak's Journey Into Imagination Pavilion. According to Baxter: "Up to now, rides were exciting but not very informative. So we've combined the two to give you a ride and a theatre show that's informative and exciting." ³

To entertain the seven to ten million *EPCOT* visitors they expect each year, Disney Productions sent film crews around the world to shoot over a million and a half feet of film. Some of the filming was done through an electron microscope. In the Horizons Pavilion (which opens this year), you will ride through three enormous, interconnected hemispheres and get to see some of these images on an 80-foot projection screen. You'll see the incredibly small become incredibly large — for example, an ant's eye that is eight stories high.

In the Universe of Energy, the *pre-show* is projected on 100 rotating, triangular screens. In another theatre, the world's largest animated film is projected on a screen 155 feet wide. An environmental research station uses the world's largest 3-D screen. A ferocious lion appears on the screen. He jumps out of the screen, through a flaming hoop, right into your lap!

Not all of the visual fireworks are on film. Disney technicians have spent years perfecting a secret entertainment technology that borders on magic. Ac-

ording to one Disney technician, "It looks like magic, and that is precisely why we don't talk about it."

The *EPCOT* special-effects crew uses lasers to generate some of their special effects. In one pavilion, they create ghostlike three-dimensional creatures. In the Universe of Energy Pavilion, a twenty-foot-high computer-controlled *audio-animatronic* brontosaurus lumbers up to your car, pants loudly, then slobbers on you. A Disney-patented scent, *eau de swamp*, pervades the room.

Elsewhere, Mt. Vesuvius erupts and buries the Roman city of Pompeii in molten lava. The smell from the volcano is almost overpowering. It comes from Disney *smellitzer* machines which blow another

“Up to now, rides were exciting but not very informative. So we've combined the two to give you a ride and a theatre show that's informative and exciting.”

Disney scent, *bouquet of volcano*, twenty feet across the room.

The fiery, glowing lava pours down the side of the mountain right in front of you. It looks hot, real and dangerous. But don't be afraid to touch it. It's made from a secret Disney recipe called *orange goo*. Disney technicians spent months experimenting with possible "lava" substances, from Jell-O® to mineral oil mixed with talc. They ended up combining orange dye, black-light pigments, and polyacrylic acids into a custom blend that resembles material used in toothpaste and some laxatives.

Dozens of other audio-animatronic performers joined the automated brontosaurus, including 35 robotic comedians in GM's World of Motion Pavilion. One of these comedians is a toga-clad Roman

salesman in a used-chariot lot surrounded by broken-down chariots and signs like "SAVINGS MAXIMUS!" and "CHARIOTS GLORIOSUS!" with slashed prices in Roman numerals.

In The American Adventure, a cast of audio-animatrons play the parts of 36 famous Americans. Benjamin Franklin and Mark Twain host a show that combines film presentations and a Broadway musical.

In the Italian Pavilion, you see Michelangelo, lying on his back, painting the Sistine Chapel, and in Kraft's The Land Pavilion you find the most loveable of all the audio-animatrons: a "Kitchen Kabaret" of singing meats, vegetables, fruits, and dairy products. The "Kabaret's" lead singer is a giant, grinning stalk of broccoli.


The Unfinished Dream

EPCOT may have opened its doors on October 1st, but it is far from being finished. In fact, part of Walt Disney's dream was that *EPCOT* "never be finished." Disney wanted an ongoing community that would evolve as its inhabitants evolved. The community never materialized, but *EPCOT* can still become an advanced staging area for new ideas and new technologies. It can introduce and demonstrate these ideas and technologies as soon as they emerge from research labs and from the creative centers at universities, countries, and companies around the globe.

Over the next few years, several new pavilions will open their doors. In 1983, General Electric will publicly unveil its Horizons Pavilion. And in 1984, the Living Seas Pavilion will open. Visitors will enter the aquatic ecosphere, travel in bubble-shaped vehicles through 5.7 million gallons of water, and visit an underwater colony.

Technology and Magic

In fact, there is nothing magic about *EPCOT*'s special effects. They are the result of a shrewd blend of technologies borrowed, pioneered, and exploited by Disney technicians. What is magical is the impact of these technologies on the imagination of *EPCOT*'s visitors.

People who visit *EPCOT* are cramped together, by the tens of thousands, in a small plot of land in northern Florida. Yet, through Disney's wizardry and their own imaginations, they can journey to hundreds of bizarre, fascinating, and remote places in space and time. Their panoramas are breathtaking. Their horizons are infinite. 

² Quoted in Larry Bonko, "Disney's Biggest Dream," *Roanoke Times and World News*, November 6, 1982, p. C-1.

³ Quoted in John Culhane, "EPCOT Center: Walt Disney's Unfinished Dream," *Reader's Digest*, July 1982, p.68.

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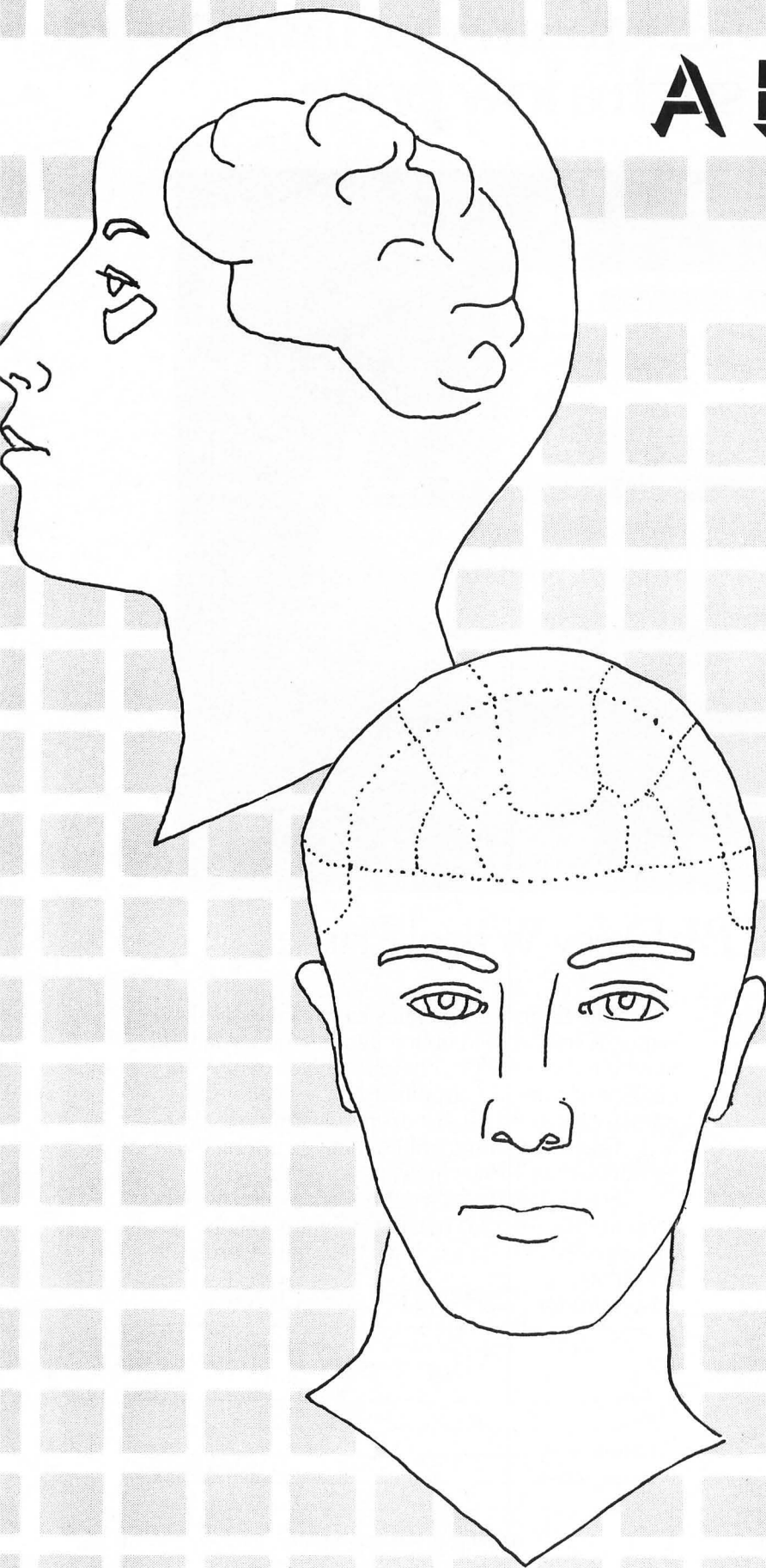
By Peter Joseph Favaro

Have you ever settled down after dinner for *one quick game* of *Mutant Androids* from *Bimbo 9* only to return from battle in the wee hours of the morning? I know the feeling — the irresistible urge to press SYSTEM RESET just one more time. Some outspoken and melodramatic video game critics call this “addiction.” I don’t buy that theory.

As a scientist, I reject it because absolutely no evidence exists to support such a notion. Aside from the obvious lack of data, the word “addiction” conjures up images of mysterious seduction and physical dependence, and suggests that a bunch of printed circuits and silicon chips can somehow control human behavior, even to self-destructive extremes.

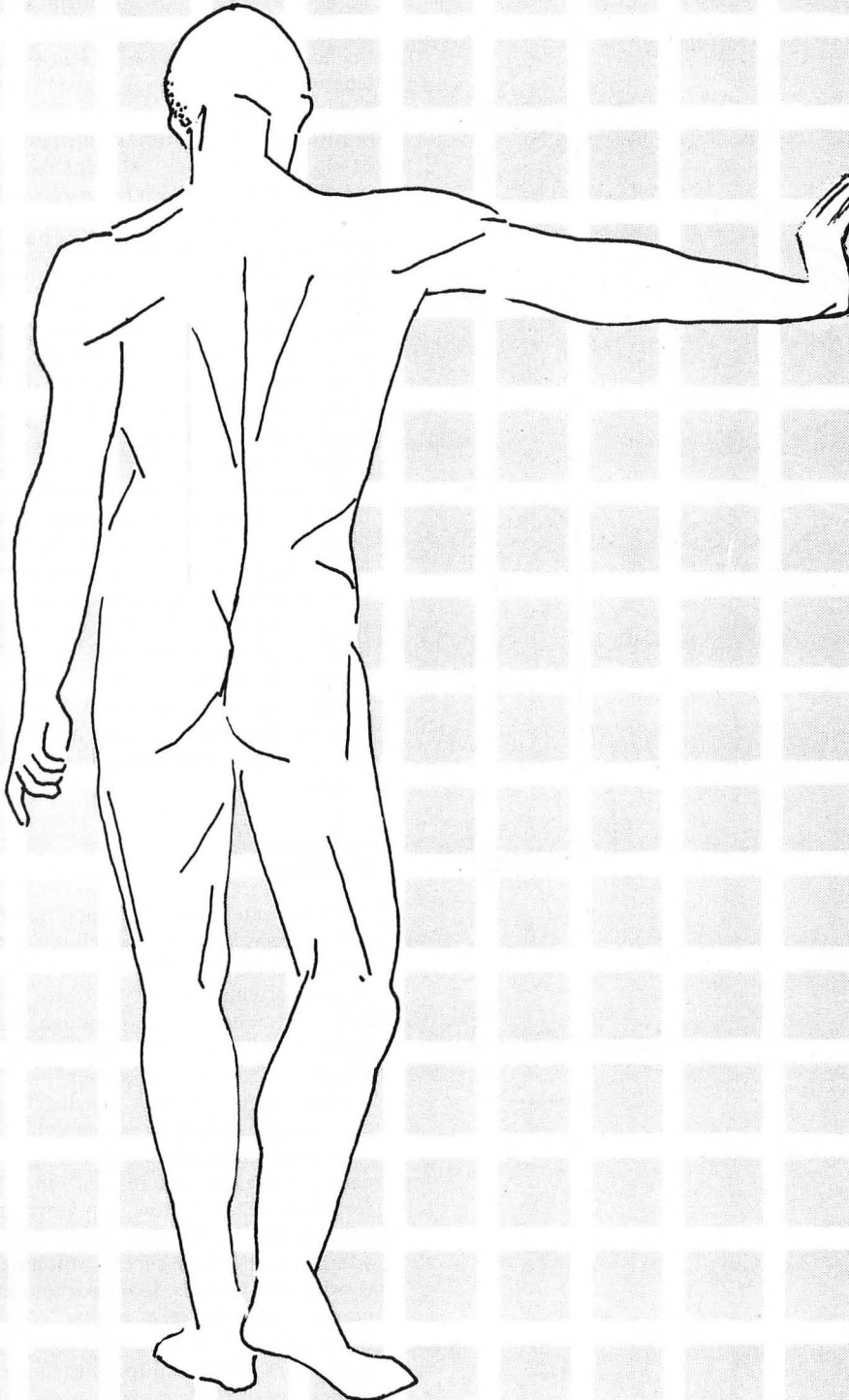
Unfortunately, even the most popular video game cartridge advertisements encourage you to believe this (and, in so doing, exhibit some self-destructive behavior of their own). “Addiction” remains a trendy but inaccurate description of a hobbyist’s enthusiasm in a relatively new form of entertainment. Enough complaining.

If video games aren’t addictive, then why *are* they so good at keeping us on task for long periods of time? Furthermore, in creating game and educational software, how *do* designers stimulate sustained interest? The popular branch of psychology known as behavioral psychology, or learning theory, may offer answers to these questions. One behavioral technique in particular — reinforcement — can be a powerful tool in developing software which captures and retains attention.



YOUR MIND?

Software Design (Part 1)



Understanding Reinforcement

Reinforcement theory proffers this common sense postulate: "When a behavior is followed by a reward or reinforcement, the probability of that behavior reoccurring increases." Programmers should know that computer game players *play* because the games stimulate them, make them feel good — the games *reward* them. Since enjoyment is a powerful factor in learning, educational games can teach as well.

Behaviorists contend that very subtle behaviors, such as those we exhibit to attract members of the opposite sex, or even behaviors which seem somewhat unpleasant, are all subject to the principles of reinforcement. For instance, since we are "reinforced" on payday, we return to work the next week, which explains the human behavior of "going to work." Behaviorists also hypothesize that people will often work for less tangible social rewards such as praise and recognition and that reinforcement can shape behavior without your full awareness.

Some people criticize behavioral psychology as overly simplistic. In some respects I agree, but I do think that reinforcement affects many behaviors, particularly motor learning, and that learning theory or behavioral psychology lends itself to many kinds of computer programs.

What I have explained so far may seem like common sense, but the application of learning theory and reinforcement to computer programming is very complex. Many "rules" or characteristics govern the reinforcer (reward) and its presentation. The strength and size of the reward, and type of reinforcement, must be considered. *Pac Man* is a familiar illustration of many of these concepts. The game successfully implements almost all characteristics of reinforcement techniques so it is no wonder that this game still reaps a harvest of quarters daily!

Kinds of Reinforcement

One man's pleasure is sometimes another man's pain, but I will assume here that people attracted to computer games are reinforced by similar things. The experiences that make playing educational and recreational games interesting and exciting are common to most people who play, and are frequently the reasons *why* people play. Most "computer-game reinforcers" will fall into one of two basic categories: (1) success experiences; and (2) feedback, or knowledge of results.

Nothing succeeds like success, and the best programmed games and educational applications provide opportunities for many kinds of success, a powerful reinforcer. The most obvious kind of success

continued

Battle For Your Mind *continued*

comes with mastery, or the attainment of a new skill. Just learning how to play a game can motivate people, so the game should not be so simple it becomes boring, or so complicated it becomes frustrating. This factor deserves special consideration when game or educational software designers write manuals and instructions for their applications. Very detailed instructions with "hints" on how to beat the game will bias the user into adopting someone else's strategy. The player misses the success of beating the game independently. I vehemently oppose the deluge of popular books and magazine articles creatively titled

"1001 Ways to Win at Video Games," and so on. Multiple skill levels and difficulty levels, which increase as the game progresses, are common opportunities for success. The more creative game designer will increase the speed of the targets or the difficulty of the mazes, and will change the nature of the task as the game progresses, challenging many skills (i.e. reflex and coordination skills, problem solving skills, memory skills, and so on).

Achieving mastery over a mechanical opponent is a conflict played out since well before folklore hero John Henry pitted himself against a steam powered adversary

in a railroad track laying competition in the 1800's. Perhaps it is so popular because we perceive machines as more perfect than we are. In outperforming them, we can fantasize that we are more perfect. Or maybe it's just more fun! In designing games, one of the most tedious and difficult tasks is making the computer smart. Here again, *Pac Man* is a good example. Not only do the ghosts get faster, which is simple enough to do, but they become more relentless and more accurate, a more difficult programming task. As effective as this is, however, good game "psychology" should not stop here. For instance, you could program a maze game to "out-manuever" a human opponent simply by knowing what most humans do in a particular situation. Social science research tells us that when people have a choice to bear either right or left, they usually choose right. How much more challenging games would be if they anticipated human behavior based on social research statistics! Games would be more unpredictable and probably more challenging too — reinforcing out-thinking as well as out-manuevering the computer. We experience success not only in skill mastery, but also in the attainment of tangibles, whether real or symbolic. I am referring to the collection of points, special bonuses, and free plays in educational and recreational games.

These things cannot pay the rent, but they symbolize success to video gamers. Freebies cannot occur too often, as the activity may soon become boring. A good way to keep a high interest level, particularly in educational applications, is to make the user work hard and never let him get used to receiving rewards, or success at predictable intervals. A few surprises within the program are always good. The presentation of the fruit in *Pac Man* attempts this, but, after 100 or so games, players anticipate it.

Feedback

People can receive feedback on any one of the sensory channels: smell, sight, touch, taste and hearing. Most microcomputers carry information to only two sensory channels, sight and sound (although they can adapt to provide output and input on the kinesthetic, or touch channel).

Reinforcing through feedback means that hearing music or some other sound after performing game tasks helps us "connect" the game stimuli and the desired responses. This is how you learn to play most games in the first place. The better you learn, the more success you have. This is why feedback is so important to programs. You make a similar connection when you look at the scorekeeper and see your score in relation to your success. Imagine how difficult a game would be if no



points were displayed, or if the user was ignorant of what he had to do to win. In working with a game which uses points to provide feedback, the system must be logical in some way. Some of the nicest looking games have poorly planned scoring routines which detract greatly from playing enjoyment.

Again, the *Pac Man* scoring is clear, sensible, nicely displayed and not too "generous." In programming educational games, it is important to avoid giving positive feedback for incorrect answers. A colleague and fellow computerist, Dr. Frank Seigel, notes that "cutesy" sounds and graphics following an incorrect response may make the wrong response an attractive alternative to a child bored with getting the right answer. In game and educational programs for younger children, the computer should do little or nothing for an incorrect answer and offer a variety of responses when the child chooses correctly.

Negative Reinforcement

I hesitate to mention this term because it is somewhat confusing, even to experts in

psychology, but it is a very important part of many applications. Until now, "reinforcement" has meant a positive incentive which keeps the user interested in playing a game. Technically this is positive reinforcement, because the incentive is positive or pleasurable and increases the behavior of staying at the task. Negative reinforcement also increases the probability of a behavior occurring in the future by letting the person escape or avoid something unpleasant.

My favorite illustration of negative reinforcement draws on the common human behavior of waking up with an alarm clock. We can escape this unpleasant and aversive stimulus by jumping up quickly and terminating the source of irritation, or by waking up just before the alarm goes off to avoid hearing it. Stopping something negative results in something positive. In computer games, getting gobbled up by Inky, Pinky, Blinky or Clyde is aversive because it brings us closer to ending our game and our enjoyment. Therefore, avoiding the ghosts is positive because it lets us enjoy the game more (i.e. we succeed, we win, and so on). Do not confuse this with *punishment*, which decreases the probability of a behavior happening again in the

future. The distinction may be less than crystal clear. It is a complex one to grasp. In game programming, a mixture of positive incentives such as points, bonuses and "freebies" plus the excitement of the chase, or more accurately, the excitement of escape, is a powerful combination.

Effective Reinforcement

How dull would life be if, every time you played a game, you won, or if every time you took a chance on a lottery or bet on a horse, you increased your winnings a million fold without ever losing. (Ah yes, I can hear the moans of sympathy.) All kidding aside, if this were the case, you would soon have more money than you could possibly spend. This might be nice, but you would soon become bored playing the lottery, or "taking a chance" on anything.

The same would be true if we didn't have to compete to win at sports. Every time we stepped up to bat we would hit a home run. Every time we shot a basketball, it would go through the hoop.

Apply these examples to computer game play. How exciting would your favorite

continued

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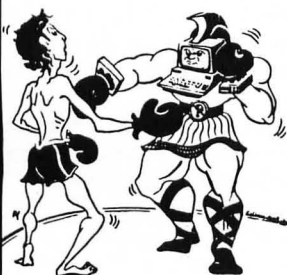
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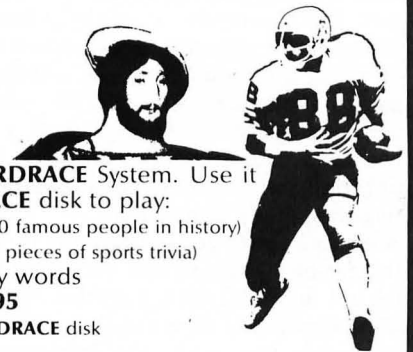
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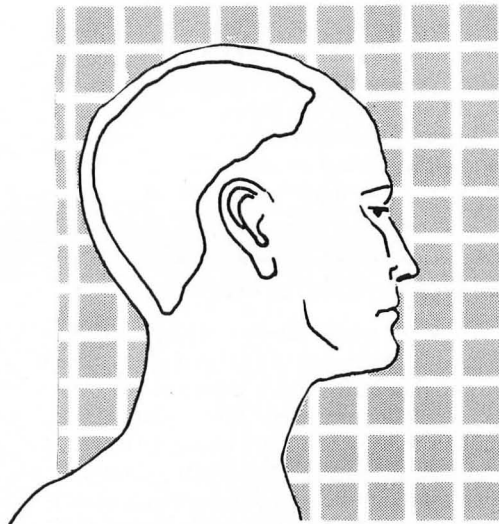


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game be if every time you moved the joystick you won a free man? Soon, you would accumulate so many “freebies” that, no matter how poorly you played, the game would last for hours. Getting a higher score would require endurance, and nothing more. You can over-reinforce a player for a particular game behavior. A game must constantly challenge the player to master the skill for a short time, then quickly step up the requirements for success so that the player must again increase his effort.

Four basic principles help us to maximize the effectiveness of a reward so that it does not “wear itself out.”

- The first principle is *contingency*. It states that a reward will be effective when delivered only after a desired behavior occurs. *Pac Man* reinforces you by giving you one point for gobbling a dot, several hundred points for eating a ghost, a different amount for eating the fruits, a free man for achieving ten thousand points and a new board for clearing the previous one. Each of these game behaviors has a reward contingent upon its completion.

- Since a pretty good ratio exists between the size of the reward and the difficulty of the task involved, you can say that *Pac Man* also follows the principle of *size*, which suggests that the larger the reinforcement delivered, the more effective the reward will be — the larger the reward, the more people will work to get it.

- For the reward to be meaningful it must not be too frequent. The person working for the reward must be “ready” for it, not over-loaded with it — hence the third principle, *deprivation*, works to keep the player “hungry” for the incentive. It is good game psychology to space the biggest incentives far apart and the smaller ones as close as necessary. Sometimes it adds interest to build a hierarchy, where game tasks are chained together so that the availability of reward B is contingent on achieving reward A.

The first application which comes to mind here is in adventure style games,

although a once popular arcade game called *Phoenix* used this technique very effectively. This game had multiple screens, each with slightly different tasks, essentially requiring you to shoot one of several types of aliens. On the final screen, the player had to break through a wall to get to the “king” monster. By the time I had worked my way up to the last level, my attention and interest level were absolutely at their peak.

- The last principle, *immediacy*, states that a reward should immediately follow the completion of the desired response. This is another principle to use in developing adventure games. In many adventure games, you often have to wait hours, or even days, for the reward (i.e. the solution of the adventure). For people who are good at delaying gratification and who feel rewarded by “the thrill of the chase,” this is fine, but little rewards obtained during the chase can make an adventure more effective.

The last issue vital to understanding effective reinforcement in computer applications is the schedule of reinforcement. This refers to how often a reinforcement is delivered, relative to how many times you perform a particular behavior. Common questions raised by this issue are, “How many freebies should I allow per game,” and “How often and at what times should ‘special bonuses’ occur in a game?” As I noted before, delivering a reward too often can decrease interest. On the other hand, too few rewards can lead to frustration and diminished interest.

Reinforcement Schedules

Two schedules of reinforcement performing somewhat different functions are the *fixed* schedule and the *variable* schedule. The rate at which a behavior is reinforced is called *fixed* when the player is aware of the contingencies involved. For instance, in designing a particular game, the designer sets the rule that for every hundred targets hit, you will receive a free man. The player knows just when he will receive the reward, and sets his expectations accordingly. This kind of schedule usually leads to a high interest level as the player attains the reinforcer, and a declining interest after the player receives the reward.

All of us are familiar with the somewhat quickened heart beat and the “butterflies in the stomach” feeling when we are near a free man. After we achieve it, a letdown sets in because we know that we are once again at the furthest point possible from obtaining the next free man.

A somewhat different schedule of reinforcement is the *variable* schedule. The computer game equivalent of this occurs when the player is unaware of the contingencies involved, because the opportu-

ity for reward occurs at random intervals. Two popular examples are the presentation of the UFO in *Space Invaders*, and the presentation of the two spaceships in *Asteroids*. Variable reinforcement schedules usually result in a high and uniform response rate (translating into prolonged interest and maximum enjoyment). Variable reinforcement schedules, unpredictability and randomness in games can contribute a great deal to holding attention. This technique works best if things are not too unpredictable. Most game enthusiasts like to have some control over what is going on. To have control, you need to be able to predict what will happen.

Concept Integration

It is important to integrate all of the above concepts delicately. Consider the different types of reinforcers and what elements influence their effectiveness as tools in software development. Some applications will rely more heavily on particular techniques than others. For instance, adventure games will capitalize on deprivation. Arcade games will reinforce the acquisition of a skill requiring quick reflexes. General guidelines, however, might limit how you capitalize on these concepts, so I will stop here. The following checklist reiterates some of the principles of good game design.

Checklist — A Brief Review of Important Considerations in Game Design Psychology

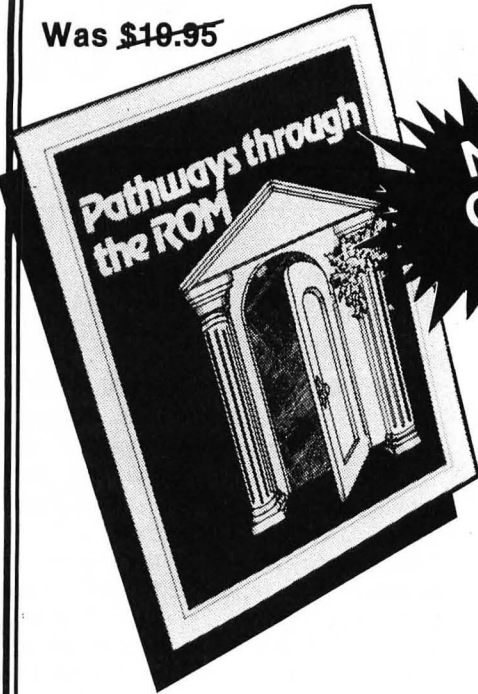
- Does the game provide opportunities for many different kinds of success (i.e., skill acquisition, problem solving, and so on)?
- Is the game too easy or too difficult to learn?
- Is the game too easy or too difficult to master?
- Does the computer take into account “human factors” to make it a smarter opponent?
- Is the player over-reinforced with too frequent bonuses or high scores?
- Is the scoring routine written in a logical, practical way? Is the point system relative to what is happening on the screen?
- Do you use both types of reinforcement, positive and negative, to add variety and excitement to your games?
- Are your game instructions simple and clear? Do they weaken your own strategy too much by giving hints on how to beat the machine?
- Does the game unwittingly reinforce an inappropriate response, such as a wrong answer in an educational application?
- Are you aware of the different types of reinforcement schedules operating in your games? Are you using them to their best advantage?

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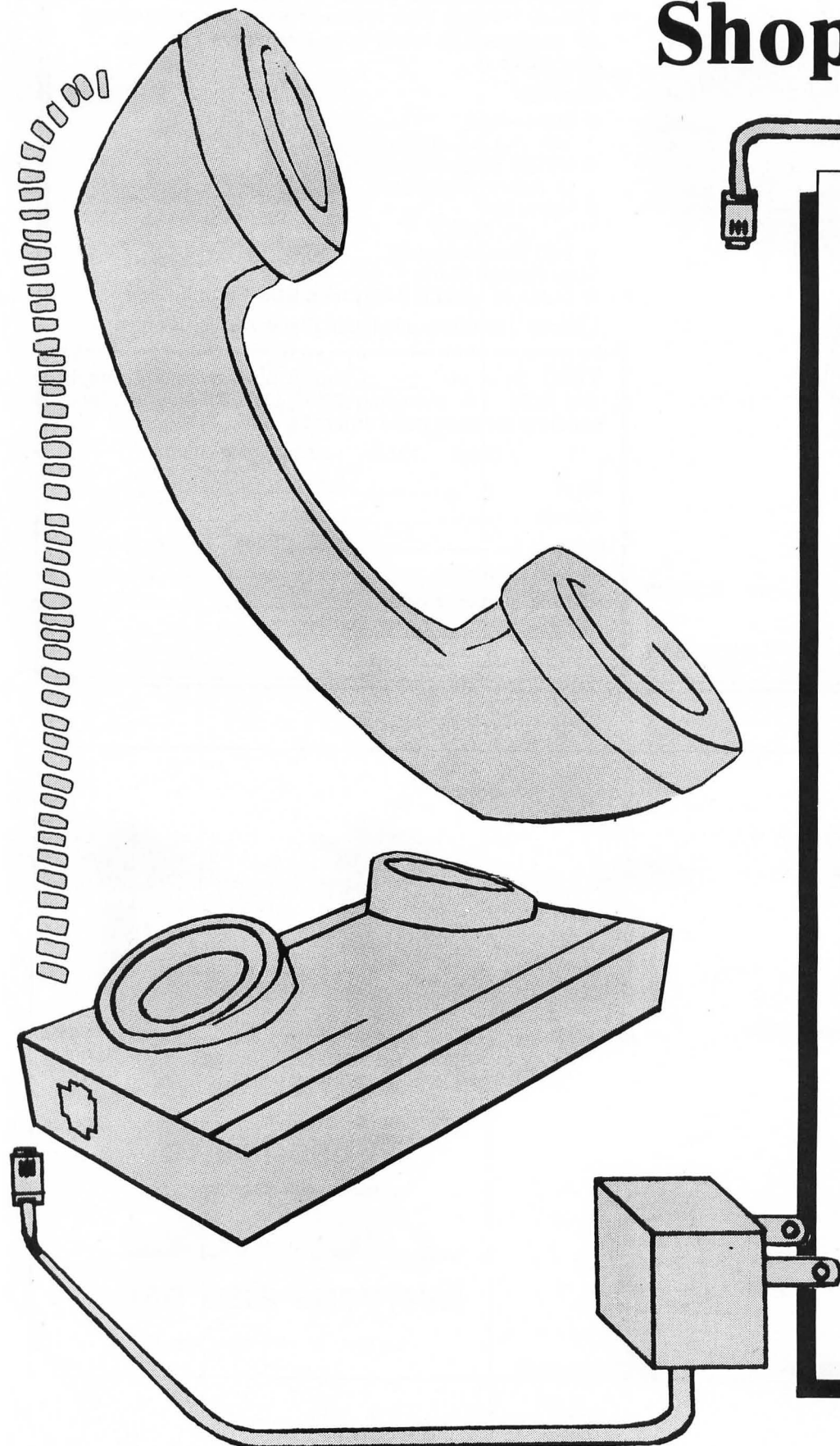
By **Tim Knight**

Terminal software is the heart of what goes on in the computer while it communicates with another computer. For some people, the terminal software is even more important than the modem.

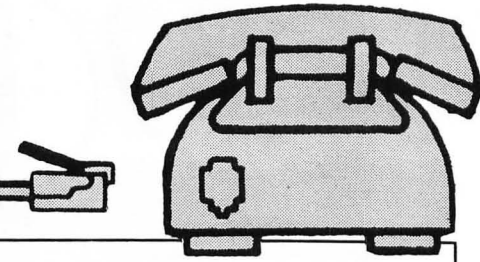
Perhaps you have heard the term "smart terminal" before. Defined briefly, smart terminal (*ST*) software is a type of communications software far superior to the basic "dumb terminal" software. *ST* software has more features, and is more expensive.

Technical Terms

- **Downloading** — means another computer is sending a program to your computer. For instance, if you say, "I downloaded a utility program from Jim's computer," you mean that Jim's computer sent the program to your computer. You can download programs, data, word processing files, binary musical data and virtually anything else the computer can store in memory.
- **Uploading** — means sending a program (or some other file data) to another computer or network. The receiving computer downloads the program from you.
- **Control Codes** — are keyboard generated ASCII codes. You can enter the codes with a series of keys (such as the up arrow and the letter A simultaneously). Control codes allow you to send commands to the network you are connected to. For instance, on the CompuServe™ Information Service, you type the CTRL (control key) and the letter C at the same time to escape from a menu. The keys are short-hand commands to the host computer.
- **Software Selectable Switches** — allow the *ST* software to alter the modem



Terminal Software



configurations directly. The configuration is the set-up of parity, duplex and stop bits.

(Don't worry about these terms...you rarely deal with them.)

● Auto-Logon — is a handy feature that lets you type in a message beforehand (such as your name and location — something required by computer bulletin board services) and then “let it go” once you are logged-on to a system. Logging on means calling up another computer and accessing its system. The auto-logon feature simplifies logging on, especially if you frequently call up computer bulletin board systems.

The Software Parade

Purchase of a modem usually includes a free program, but the program is often inadequate for any serious communication applications. Research will help you find the right *ST* Program. Once again, as with modems, *ST* software is very individual. I recommend that you investigate *ST* software by looking at the ads in a magazine specific to your computer.

One of the more recent *ST* programs to hit the market is called *TDS/DFT*, which stands for Tape Downloading System/Direct File Transmission. This excellent Big System Software program for the TRS-80® Model I or III contains all the features mentioned above, as well as programmable control keys, up to three pre-made messages, and the ability to send Machine Language programs directly over the telephone. It is also very reasonably priced.

Another great terminal program is the *Smart Series* by the Microperipheral Corporation. Since they manufacture modems for all computers, it's logical for them to make compatible software, as well. The documentation for the *Smart Series* is excellent, and has all the features mentioned

above, in addition to some bonus utilities on the disk.

A more expensive *ST* program (which works only on the TRS-80) is the *ST80 Series*. (See Page 82 in Issue #38 of *SoftSide*.) Programs such as *ST80-III* (made by the Small Business Systems Group) access bulletin boards readily, and have even more features than the *Smart Series*.

The Apple® computer accommodates a variety of *ST* programs, including *Appletel*, an intelligent-terminal software package from Logica, Incorporated. This package features the ability to send and receive graphics and text, help files for the new user, and automatic logon.

A different type of communications program for the Apple Computer is *Absolute Security*, by Dann McCreary Software. This unique program allows data transmission in cryptic form. If you have secret records to transfer and want to ensure that no one else can decipher the information, a data-transmission encryption program like *Absolute Security* guarantees your privacy.

Even the relatively new IBM® PC has several smart terminal programs. One of these is *PC-talk*, by Headlands Press, Inc. It features a “help display” for beginners, automatic dialing, and advanced file transmission. This program is written in BASIC, a departure from the Machine Language of most communications software.

Another program for the IBM PC is *ASCOT*, from Dynamic Microprocessor Associates. It features ease of use, 1200 baud operation, and complete control over the telephone. Finally, if your system can handle CP/M, Woolf Software Systems has a program called *Move-it*. This \$99 program package is well-documented and performs best with the Hayes Smartmodem or the Bizcomp Intelligent Modem. It also handles errors exceptionally well.

For reviews of two terminal programs for the Atari®, *T.H.E. Terminal* and *Telelink II*, see pg. 96, *SoftSide* #38.

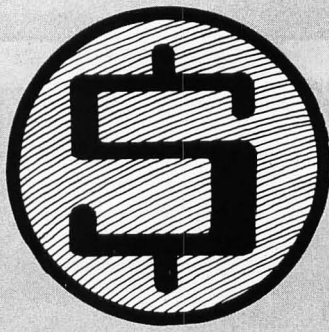
Be careful about price, also. For instance, the *TDS/DFT* package costs about \$40, while *ST80-III* costs \$150. However, *ST80-III* doesn't have a tremendous amount more to offer. You can find some real bargains if you shop around.

ST software still has two major problems: poor user support and inadequate documentation. For example, I purchased a Lynx modem, and wanted to call up various systems. It worked fine on my Model I, but on my Model III...nothing. After many weeks of trying to contact the Lynx people (Emtrol Systems, Inc.), they sent me a letter telling me to POKE 16912,56 to make it work on the Model III. Why didn't they tell me that in the first place?

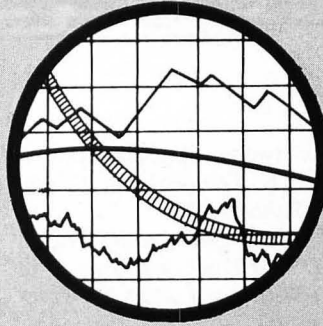
The Verdict

Do I have any recommendations? Yes, but not the ones you might expect. I cannot recommend what program is best. You might want a program that sends word processor files over the modem — some programs do that, some don't. You might want an *ST* program that allows you to go from BASIC to your smart terminal and back without any trouble — a few do that, others do not. Make a checklist of what you need. Take the checklist to the magazines which support your computer and find out which one satisfies most of your specifications. Once you find one that fits your needs and your budget, buy it.

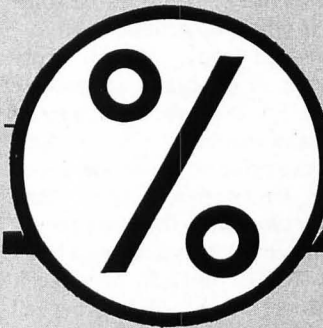
Well, the heavy buying advice is over now. The real fun begins next month when we get into computer communication applications (That's a mouthful.) A whole world is waiting out there. Next month we'll begin to explore its possibilities. ☞



CALC



SIDE



by David Peters

The *VisiCalc*® Spreadsheet Comes Home

... the first step in controlling spending is to create a budget — to decide on the amount you are willing to spend for different categories. With this aid, you can see how well you do against this decision, and highlight areas to watch.

Budgeting — *VisiCalc* Tells You How You Are Doing!

Someone told me, after the last issue, that she didn't manage her checkbook (though she knew she should), and didn't add up all her expenses (until tax time). She wondered what good *Calc/Side* was to her. She admitted that the intimidating task of keeping records manually had produced her attitude, and anyway, it was always "after the event." Each to his or her own, of course, but this time we'll add a budgeting feature that, because it is a

"realtime" benefit, may convince a few more of you that it is worth the effort.

One more aside, however: when I originally planned this column, I considered that many reader/users might still be short on experience with both *VisiCalc* and their computers. I chose the personal finance side of life, not because I knew that everyone wanted to computerize it, but because it represented a fully understandable function that involved everyone. If you key along with us, even with phony figures, you will participate in a useful "tutorial" approach to handling *VisiCalc*. We will use nearly all of the functions of *VisiCalc* in a

practical and illustrative way; and, over just a few columns, you may end up with something that you really can use!

Why Budget?

Budgeting is a way of avoiding some unpleasant surprises. Unhappily, running a car that has several years under its tires without tracking the expense can cost much more than replacing it. Finding that the money you earn runs out before the next paycheck can be a fact of life, but the first step in controlling the spending is to create a budget — to decide on the amount you are willing to spend for different categories. With this aid, you can see how well you do against this decision, and highlight areas to watch.

In Figure 1, you will see a familiar sight: our expense/checkbook management matrix from previous issues. As you discovered last time, however, there are some changes. We have omitted the checkbook balancing parts of the model, but look for other differences, as well. Notice that a month name and a month# have appeared at the top. We are assuming

Figure 1. The modified original matrix.

CHECK BOOK MAINTENANCE & BALANCING. FEBRUARY WITH BUDGET CONTROL----- MONTH # 2					INCOME TYPES-----				EXPENSE ACCOUNTS-----						
TRANS- ACTION	TYPE CODE	CHECKS	DEPS	BALANCE	PAY	PAY INVEST	MENTS	MISC	FOOD	AUTO	CASH	ENT/ VACATION	HOUSE REPS	TELE- PHONE	UTIL- ITIES
					1	2	3	4	11	12	13	14	15	16	17
BROUGHT FORWARD		696.67	2363.74	1667.07	1275.53	717.16	26.95	544.10	39.23	166.81	50.00	250.88	29.95	50.00	69.80
101	12	89.45		1577.62	0.00	0.00	0.00	0.00	0.00	89.45	0.00	0.00	0.00	0.00	0.00
102	11	22.50		1555.12	0.00	0.00	0.00	0.00	22.50	0.00	0.00	0.00	0.00	0.00	0.00
103	13	150.00		1405.12	0.00	0.00	0.00	0.00	0.00	0.00	150.00	0.00	0.00	0.00	0.00
104	12	28.56		1376.56	0.00	0.00	0.00	0.00	0.00	28.56	0.00	0.00	0.00	0.00	0.00
DEP	1		625.00	2001.56	625.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
105	13	46.00		1955.56	0.00	0.00	0.00	0.00	0.00	0.00	46.00	0.00	0.00	0.00	0.00
DEP	2		444.67	2400.23	0.00	444.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DEP	4		343.60	2743.83	0.00	0.00	0.00	343.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MACHINE		60.00		2683.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
106	16	39.99		2643.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.99	0.00
107	12	12.57		2631.27	0.00	0.00	0.00	0.00	0.00	12.57	0.00	0.00	0.00	0.00	0.00
108	14	166.00		2465.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	166.00	0.00	0.00	0.00
DEP	1		645.00	3110.27	645.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DEP	3		23.60	3133.87	0.00	0.00	23.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
109	15	18.96		3114.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.96	0.00	0.00
110	17	26.00		3088.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.00
				3088.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				3088.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				3088.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
				3088.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTALS	THIS MONTH				1270.00	444.67	23.60	343.60	22.50	130.58	196.00	166.00	18.96	39.99	26.00
	YEAR-TO-DATE	660.03	4445.61	3088.91	2545.53	1161.83	50.55	887.70	61.73	297.39	246.00	416.88	48.91	89.99	95.80

a monthly tracking system, and that the model you have built so far was "January." At the end of each month, or after balancing the checkbook, you will copy the totals across the bottom to transfer them to the line called BROUGHT FORWARD in the new month's model. (Other ways of doing this come in a future issue.)

Incidentally, creating that empty model is easy. Just /SLoad the current version, change all the ENTERED FIGURES ONLY to zero, being careful not to disturb any formulae, and then /SSave it again as CHECK BOOK EMPTY, or some such name. Now each month you can call this in, and when you save it with new data, use the month name only.

Notice that, at the total line, there are now two total rows. One is this month only, which @SUMs the column omitting the totals brought forward; the other is year-to-date which includes them. We are omitting the usual VisiCalc column and row indicators in the illustration because you will position your BUDGET ANALYSIS area in the area of the model that suits you.

Spending vs. Budget

So how do we analyze the spending against the budget? It is really very simple, and a very useful and wise application of VisiCalc. Take a look at Figure 2, which is where the action is.

We have used only the headings from the checkbook management matrix for our example. You can lump some of them together. If auto expenses require more ex-

pense columns, break out gas, repairs, insurance, parking, garaging, and so on. Then you might want to add these into one line item in the budget analysis process. The first column after the titles is the amount we aim to spend, or feel we cannot avoid spending! These are "hard" numbers that you decide. The next column is BUDGET multiplied by the MONTH# in the Figure 1 matrix (under the month name). This gives us a year-to-date budget figure to work with.

The ACTUAL figures are brought down from the upper matrix with a simple location designation, such as +E57, or (H57). You bring down the TOTALS — THIS MONTH row to the ACTUAL — MONTH column, and bring down the TOTALS — YEAR-TO DATE row into the ACTUAL — YEAR TO DATE column.

By the way, you cannot /Replicate these entries down the columns even though they are consecutive. VisiCalc understands the (R) for relationship in the replication process to mean a relationship in the same direction, down or across, as that in which you are executing it. You cannot transfer a horizontal pattern to a vertical. Here is a VisiTip, however: Just /Replicate the first Row location designation down the column (N)o change, then edit each to change the column letter. Quicker, no?

Analysis Begins

The AMOUNT UP/DN figures are simple subtractions. Now we come to a matter *continued on page 30*

Figure 2. The Budget Analysis area.

BUDGET ANALYSIS		-----BUDGET-----		-----ACTUAL-----		--AMOUNT UP/DN--		PERFORMANCE AGST	
		MONTH	TO-DATE	MONTH	TO-DATE	MONTH	YEAR	MONTH	YEAR
INCOME									
PAY 1		1300.00	2600.00	1270.00	2545.53	-30.00	-54.47	-0.02	-0.02
PAY 2		400.00	800.00	444.67	1161.83	44.67	361.83	0.00	0.00
INVESTMENTS		45.00	90.00	23.60	50.55	-21.40	-39.45	-0.48	-0.44
MISC		400.00	800.00	343.60	887.70	-56.40	87.70	-0.14	0.00
TOTAL		2145.00	4290.00	2081.87	4645.61	-63.13	355.61	-0.03	0.00
EXPENSES									
FOOD		50.00	100.00	22.50	61.73	27.50	38.27	0.00	0.00
AUTO		400.00	800.00	130.58	297.39	269.42	502.61	0.00	0.00
CASH		100.00	200.00	196.00	246.00	-96.00	-46.00	-0.96	-0.23
ENT/VACN		200.00	400.00	166.00	416.88	34.00	-16.88	0.00	-0.04
HOUSE REP		50.00	100.00	18.96	48.91	31.04	51.09	0.00	0.00
TELEPHONE		100.00	200.00	39.99	89.99	60.01	110.01	0.00	0.00
UTILITIES		100.00	200.00	26.00	95.80	74.00	104.20	0.00	0.00
TOTAL		1000.00	2000.00	600.03	1256.70	399.97	743.30	0.00	0.00

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

CalcSide continued

of taste — how you like things presented. Most people like to see a "good" figure in an income area (more income than expected) appear as a positive figure. On the other hand, most people like to see a "bad" figure, such as an overexpenditure in the expense area, appear as a negative, which "flags" it. How you want the figure to appear will determine the construction of the subtraction.

To have things come out this way, the subtraction is of the ACTUAL from the BUDGET in the income area, and vice versa in the expense area, BUDGET from ACTUAL. Thus, as you can see in Figure 2, PAY 1 did not produce what I expected, (easily spotted by the minus sign) and, I significantly overspent in the CASH category! You can format these two formulae as you wish.


Finally, in the PERFORMANCE columns, we highlight the "bad" differences but ignore the "good." The formula is an @IF statement which says that @IF the difference figure in the AMOUNT column is less than one or a minus value, then divide the applicable AMOUNT by the BUDGET. @IF it is not, then insert zero. The format of the formula would be something like:

@IF (AMOUNT < 1, AMOUNT / BUDGET, 0)

Those of you without the Boolean logic capability in your version of *VisiCalc* can just express the AMOUNT as a straight percentage by dividing it by the BUDGET.

It's probably obvious how to use such an analysis. Looking at Figure 2 again, you can draw some conclusions about how this budget is going. While a "flag" signals that the planned MISC income this month came in fourtenn percent under expectation, you can see that the year is doing fine. On the other hand, the INVESTMTS account is really off. Perhaps the forecasted income should be revised downwards.

On the expense side, things are fairly good. The new diet has reduced food expenditures considerably, but that special date early in the month was expensive — the CASH is "overdrawn." No real problem with the entertainment/vacation account, except to note that nothing is accruing for the big sun and fun trip to the Caribbean this summer.

In our next column, we will look at that easier way of transferring data from one model to another, as we did with the BROUGHT FORWARD in this example. We'll look at the Data Interchange Format (DIF) method of saving and loading data. We'll also look at overlaying, so that, even if your version of *VisiCalc* omits DIF, we will have something useful for you. 

Smith-Corona

TP-1 Daisy Wheel Printer

Reviewed by Harry Temple

from Smith Corona, 65 Locust Street, New Canaan, CT 06840. Suggested retail price: \$895.00.

You just bought a word processing program to eliminate the tedium of typing your manuscripts and correspondence. To complete the package, and produce printouts with a professional look, you need a letter quality printer, but which one to buy? Your decision should follow a careful assessment of your needs, as well as your pocketbook. A friend of mine recently faced the same decision. After looking at several letter quality printers, he decided on a *Smith-Corona TP-1*.

Features

The *TP-1* is easy to set-up. It is well packaged to avoid damage during shipment, and is solidly constructed. In fact, it looks as though it might be bulletproof.

It's easy to interface. The standard Centronics parallel interface (the model we used) plugs in, and away you go. Be prepared for a little surprise, however. The connector on the printer end of the cable looks like a DB-25 connector, not the standard "card-edge" plug. The daisy wheel is accessible and ribbon changes are no problem.

The print quality is excellent. Characters are fully formed and pleasing to the eye. Text from this printer is, in a word, classy.

The price is a very reasonable \$895, and you can find considerable discounts if you shop around.

Drawbacks

If printer speed is important, the *Smith-Corona TP-1* will disappoint you. It prints about as fast as a converted Selectric. It's *not* part of the new generation of "smart" printers. This no-frills printer has no graphics, no fancy characters, no proportional spacing and no tractors, either, though there are rumors of future upgrades. If you use fanfold paper or forms, you will have some problems. This printer is for roll paper or cut sheets.

The *TP-1* is rather bulky. It's attractive — but it takes up space. The power (on/off) switch is on the back of the printer, not the front panel. If you're forced to put it near a wall, you have to be limber to turn it on or off at that switch. Like most Daisy Wheel Printers, the *TP-1* makes an unattractive sound resembling a subdued machine gun. You won't dive for cover, but you won't feel like hanging around, either.

Conclusions

The price/performance ratio of this printer is very high. Its biggest plus is the quality of output you get for a low price. Its biggest drawback is its lack of tractors. You have to hand feed paper for documents of any length. If you want to use the *TP-1* for correspondence, that is tolerable, but for more demanding business use, it's not.

If high speed printing is important to you, or you need tractors for forms, look elsewhere. If high quality print is important and the above restrictions don't bother you, the *Smith-Corona TP-1* is cheaper than a converted Selectric, and easier to interface.

This printer is a good value. Discounted, it is an extremely good value that shouldn't be overlooked. But be sure that this printer fits your application. If all you need is a very high quality word processing output, and you can tolerate inconveniences like slow speed and no tractors, the *TP-1* fits the bill. SS



“Text from this printer is, in a word, classy.”

The Brother HR-1 Printer

Reviewed by V.S. Gavande

from Brother International Corporation, 8 Corporate Place, Piscataway, NJ 08854. Suggested retail price: \$1150 (parallel); \$1250 (with serial interface).

I had added one peripheral after another to my computer system until finally I could expand it, inexpensively, into a part-time word processor. I quickly decided on the economical and user-friendly *Electric Pencil*, but choosing a printer was more difficult. Since the price of the printer is often half the cost of the entire system, I shopped very carefully and picked the *Brother HR-1*.


The *Brother HR-1* is an imported daisy wheel impact printer that retails for \$1150 in parallel form, \$1250 with serial interface. Tractor feed capability costs an extra \$175. It comes with a 2K print buffer.

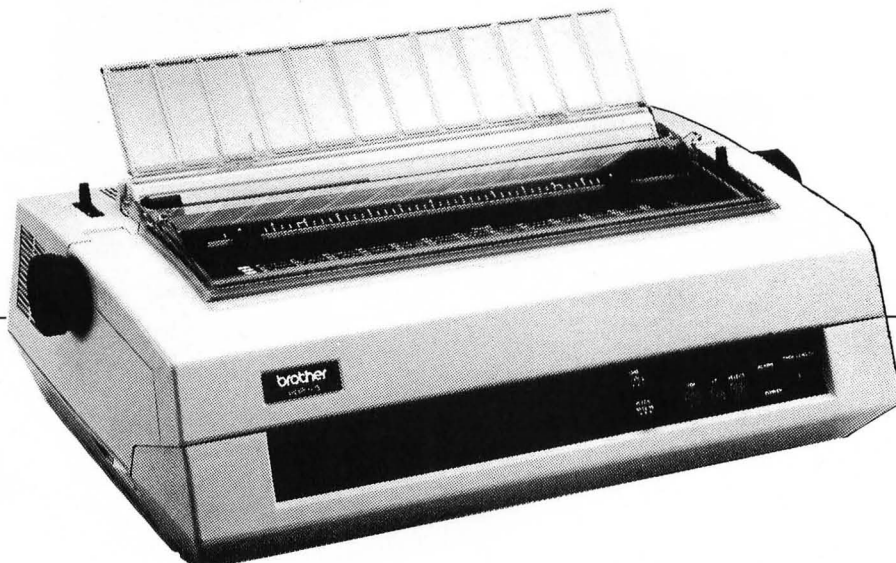
The *HR-1* can make an original and as many as five carbon copies. It prints at sixteen cps (characters per second) bidirectionally, i.e. the printer's head moves in both directions for faster printing. It features a logic seeking print head, which, rather than printing 90 spaces on a blank line, moves directly to the next line of text. The maximum line length is 130 at ten-pitch and 195 at fifteen.

The front panel consists of six switches and three lamps. The line switch sets the number of lines printed per inch at three, four, or six. The pitch switch sets the pitch at ten, twelve, or fifteen. Because the daisy wheel is designed for twelve-pitch, ten and fifteen pitch look slightly odd, but not unattractive. Use of the TOF (top of form) buttons depends on the DIP switch settings and the type of paper. When you press TOF, with perforated stock, the current page ejects and the next feeds in. With single sheets, place the sheet on the rotating drum and press the TOF button. The sheet feeds in 1.7 inches. Then you may begin printing. Press the TOF button a second time and the current sheet ejects.

The LF (line feed) and select buttons increment a line and take the printer off line, respectively. Both repeat if held down. The printer must be off line for the LF or TOF to operate. The printer also goes off line if you raise the hood of the printer. The last switch, the lines per page switch, can be set from zero to 99, and tells the printer how many lines it must space to eject the current page. The select lamp lights if the *HR-1* is in select condition, and vice-versa. The power light glows when the printer is on. Finally, the alarm lamp blinks, accompanied by a high-toned scream, when a paper feed error occurs (on tractor feed option only), or the ribbon runs out.

The *Brother HR-1* has one serious problem and two minor ones. The serious one is the noise it generates, which, without an acoustic cover, is a definite distraction. Single-strike film ribbons for this printer cost \$8. One ribbon has a life expectancy of 120,000 characters, but this is still expensive. Recycling the ribbon results in print quality almost as bad as that of a dot-matrix printer. In addition, when not using a tractor feed, the paper shifts noticeably in alignment after about twenty pages of continuous form printing.

The *Brother HR-1* is an inexpensive daisy wheel printer with many useful features and no unnecessary frills. If you feel that seeing is believing, however, go to your printer dealer and ask for a demonstration. One word of warning — you might have to wait a few weeks for an *HR-1*. They're very popular, and supplies are limited. 



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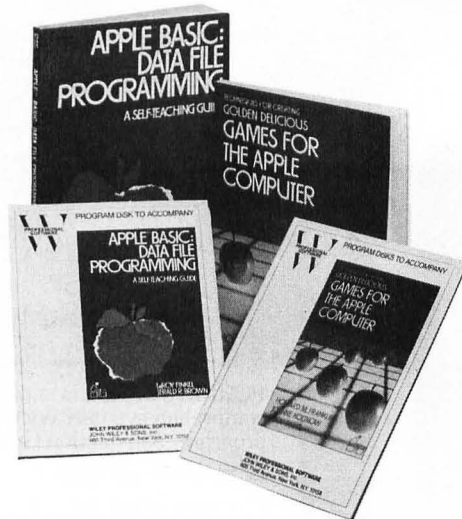
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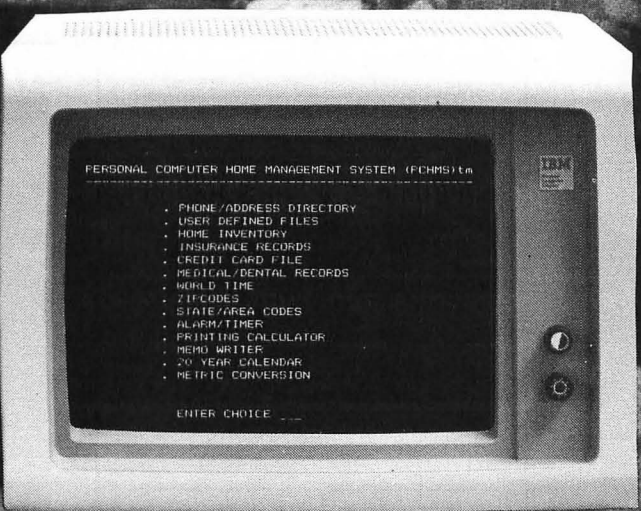
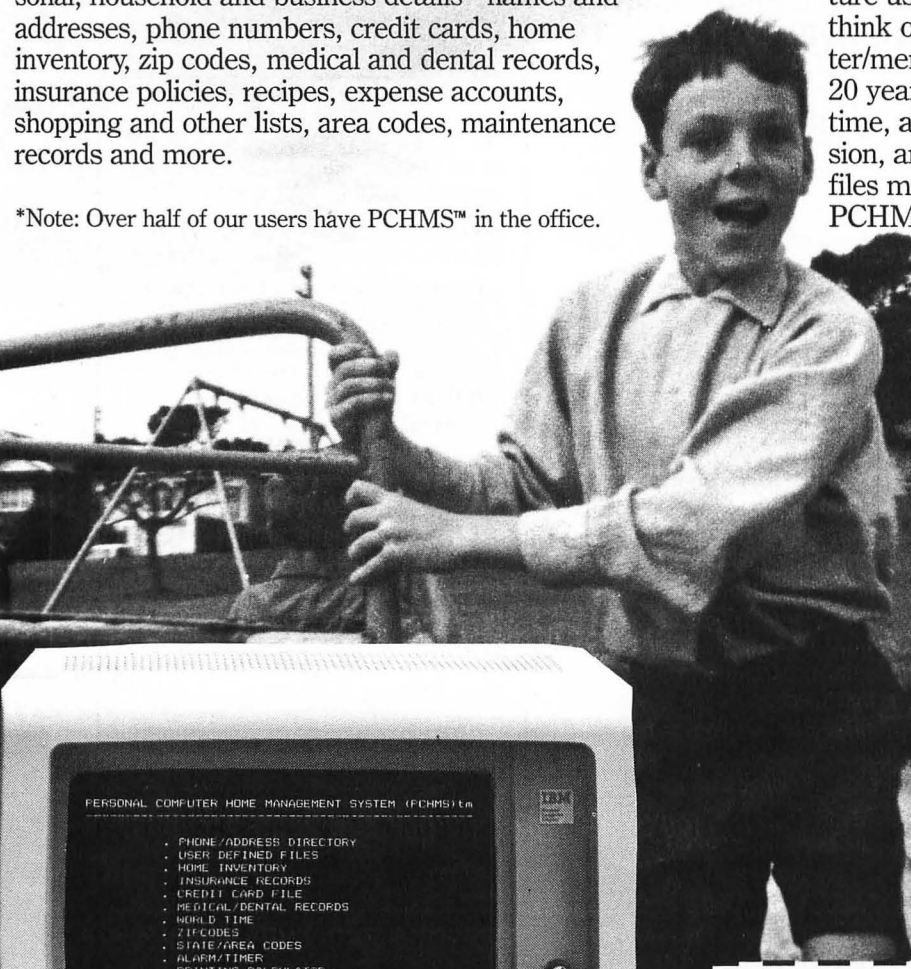
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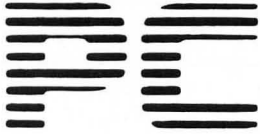
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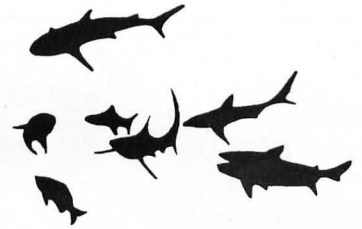




PC/SIDE

AQUA-RUN Reviewed by Robert C. Gray
Aqua-Run takes you into briny, shark-infested depths in a search for sunken treasure.

36

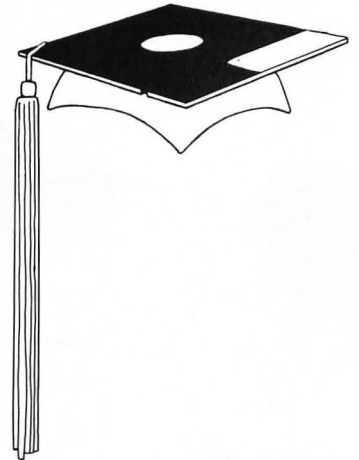


APPLE[®]SIDE

BATTLE OF SHILOH

Reviewed by Mike Shadick and Sallie Stephenson
 The South may still rise again in this exciting simulation of the pivotal battle of the Civil War.

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APPLE DISKOURSE, Part 5

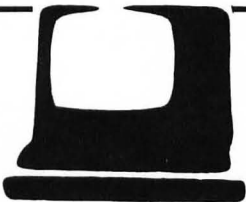
by Cary W. Bradley
 With CONV, the program for this installment, you can simplify and speed up decimal/hexadecimal conversions.

42

GLOBAL PROGRAM LINE EDITOR

Reviewed by Michael R. Sullivan
 If you've ever been frustrated by the tedium of editing program lines on your Apple, you'll love this new global program editor.

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TRS-80[®]SIDE

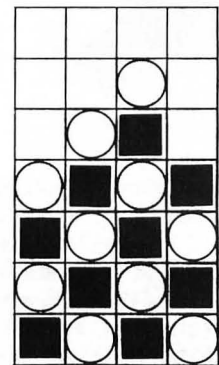
PANIK Reviewed by Mark E. Renne
 In *Panik*, evil Mzors pursue you with incredible cunning. You need quick reflexes and a master plan to defeat them.

51

OKIDATA OKIGRAPH GRAPHICS ROM

Reviewed by John Ratzlaff
 Add "dot-addressable" graphics capability to your printer with these new ROMs from Okidata.

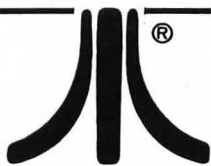
52



THE ALTERNATE SORT

Reviewed by Mark E. Renne
 This versatile, bug-free program eliminates the sorting blues on your TRS-80.

56



ATARI[®]SIDE

MINER 2049ER Reviewed by David Plotkin
 Guide the intrepid miner, Bounty Bob, through a ten level mine which abounds with both treasures and menacing monsters.

58

FILEMANAGER +

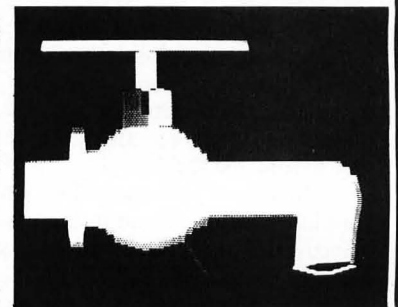
Reviewed by David Plotkin
 This database provides fast, accurate record keeping for both personal and professional applications.

60

EXPLORING THE ATARI FRONTIER

by Alan J. Zett
 In this installment, you will explore the wonders and mysteries of the GTIA chip.

66





Aqua-Run

by John McConnell (Soft Spot Micro Systems, Inc., P.O. Box 415, North Canton, CT 06059). System Requirements: IBM® PC with one single-side disk drive, 64K RAM, monochrome or color/graphics adapter, TV or Monitor. Retail Price: \$39.95.

The ocean floor is strewn with sunken treasure and your challenge is to dive for it. Trouble is, you have no map. All you have is an air-tank, an arsenal of spears, and your life. If you reach the surface with the treasure, you'll amass a high score and increase your store of provisions. If you fail, you'll lose your life. Remember: the sweeter the treasure, the deeper the dive, and the more treacherous the sharks.

"Adjust your face mask. This may be your last chance." In an instant, you're maneuvering through the ocean depths, horizontally and vertically, with the left and right arrow keys, and the up and down arrow keys respectively. Look out! An electric eel is slithering by. If he

bites, you lose life rating points. If you are sharp, you can pierce it with the quadridirectional spears you activate with the 7, 9, 1, and 3 keys. Sparring a creature increases your score, but those spears are in limited supply, so you may forfeit a piece of your suit for a later shot at a more ferocious beast and a higher point score. You are certain to encounter them.

The lower you go, the more dangerous the creatures and the more complex the ocean labyrinth. You may try to swim horizontally and run into an obstacle. Dive deeper and again your path may be blocked. You may have to swim back toward the surface to try another direction. Meanwhile, your air and life rating points are running out. At last, you find your first treasure chest among the weeds, and see others nearby. You can take only one at a time. Once you've brought the first chest to the surface, you gain a new supply of air, spears and life rating points — and an urge to dive again.

Reviewed by Robert C. Gray

Aqua-Run has five skill levels, Beginner through Master. Each level drops you into a more hazardous ocean world. While the Beginner moves within a matrix of four screens horizontally and four vertically, the Master must contend with 64 separate screens in each direction! The scoreboard at the right of the playing screen records your exact horizontal and vertical locations. With practice, you can remember your course and avoid the blockades more easily. At first, it's just a shot in the dark, and there's no memorizing the screens, even after hours of play. *Aqua-Run* randomly generates new screens, so you never really know where you'll find the next treasure.

Depending on your expertise, *Aqua-Run* can take some time. Luckily, the game and your score can be stored and reloaded later. Or, if your fingers get tired, you can freeze the screen and take a breather.

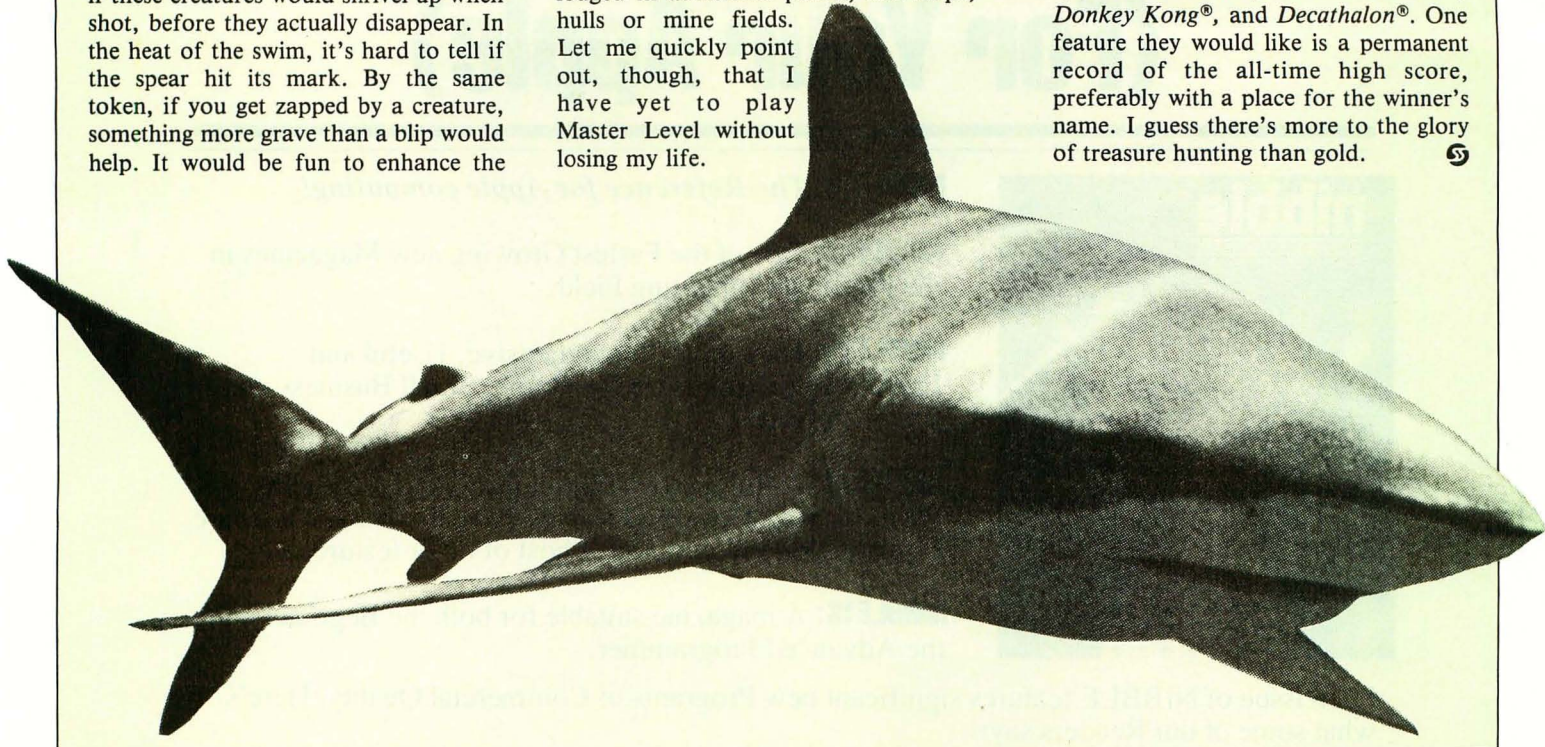
Aqua-Run relies on medium resolution graphics and selected sounds. In

future versions, I'd like to see more of both. The underwater creatures are well drawn, but it would be very encouraging if these creatures would shrivel up when shot, before they actually disappear. In the heat of the swim, it's hard to tell if the spear hit its mark. By the same token, if you get zapped by a creature, something more grave than a blip would help. It would be fun to enhance the

undersea hazards graphically. Blocked passages, coral reefs, rocks, or debris could impede the way. Treasure could be lodged in additional places, like ships, hulls or mine fields. Let me quickly point out, though, that I have yet to play Master Level without losing my life.

The challenge is there.

Aqua-Run is well-suited for the pre-teen game market. My children have spent hours with it, between *PacMan*®, *Donkey Kong*®, and *Decathlon*®. One feature they would like is a permanent record of the all-time high score, preferably with a place for the winner's name. I guess there's more to the glory of treasure hunting than gold. ♪



SoftSide™ Selections

9
Pg Up

FLIP

3
Pg Dn

-II-

it's about time

Here's something new for you — all the **SoftSide** program listings are now in **SoftSide Selections**, a handy, pull-out booklet for subscribers to **SoftSide**. If you bought your copy of **SoftSide** at a newsstand, your booklet contains this issue's Front Runner, **Flip-It II**, a challenging, computerized version of Reversi for the IBM® PC, Apple®, Atari® and TRS-80®.

This issue, PC **SoftSide Selections** features:

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PgUp & PgDn — This handy utility lets the BASIC programmer use some powerful features of the PC ROM which BASIC fails to implement.

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IBM-PC DV Bonus: The SoftSide Adventure Series

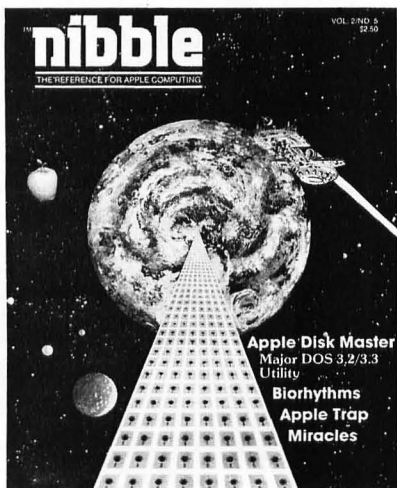
This issue's Adventure — **It's About Time**, by Peter Kirsch (IBM-PC version by Fred Condo). Travel through time to save the future from the hellfire of Henry Bowman's B Bomb.



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

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The Battle Of Shiloh

Reviewed by Mike Shadick and Sallie Stephenson

from Strategic Simulations, Inc., 465 Fairchild Drive, Suite 108, Mountain View, California 94043. System Requirements: Apple® II or II+ with 48K RAM, Applesoft in ROM, and a single disk drive. Suggested retail price: \$39.95. Also available for the TRS-80® Model I or III with 16K RAM.

Two Apple-ites Finally Did It!

Doubters claimed it couldn't be done. No "multi-purpose" personal computer could compete with video arcades in graphic detail and display.

Well, the doubters failed to foresee the likes of David A. Landry and Charles T. Kroegel, Jr., the two geniuses behind *Battle of Shiloh*. *Shiloh* is the finest vehicle yet for an Apple's game graphics abilities.

Especially outstanding is the "animated" map of the Tennessee Valley, scene of the American Civil War's pivotal *Battle of Shiloh*. "We worked for weeks programming just the map," admits the game's co-author Landry, with more than a trace of pride in his voice. "Chuck and I wanted to make the map come alive, and startle people out of their skins, even fellow Apple owners. And we did!"

A typical Apple owner's response, on playing *Shiloh* for the first time, is, "I never dreamed it could do all this! Is this some 'magic' program code or something?"

If so, the co-authors aren't telling. Staid professionals by day, Kroegel and Landry go through a Jekyll-and-Hyde transformation when they get home to their respective Apple II's. "I don't

know about Dave," Kroegel confides, "but I grow fangs. I mean, it's a combination of programming lust and love that lasts until I power down my Apple for the night, sometimes in the wee hours. When I get up to go to work in the morning, I'm just fine," Kroegel grins, showing nary a trace of his alleged nocturnal canines.

The two programmers scored their major graphics breakthrough when they discovered a shortcut to better-than-great CRT graphic displays. "It happened quite by accident," Landry maintains. "One evening, Chuck brought over a *Shiloh* prototype he'd been working on. It was just standard, with pretty good graphics — except for about three-fourths of a second (real time) of extraordinarily terrific screen action.

"What did you do?" I asked him, and he didn't know! So we dissected that minute portion of the program, and discovered the gremlin that had given us that brief spurt of spectacular screen action. Once we located it, the rest was Apple graphics history!"

Indeed it is, as every *Shiloh* player comes to know.

Not at all incidentally, both authors are Civil War buffs from way back. "We wanted to come up with an authentic 19th century battle simulation, not a down-home version of 'Galactic Ghouls,'" Landry states. "So we hit the local library hard for source material."

What they discovered — among other things — is that the real *Battle of Shiloh* was very close to a Confederate victory. Had it turned out so, the battle would have altered the course of American History for all time.

The South may still rise again in *Battle of Shiloh*, through skilled gamesmanship on the part of the "Confederate" player(s). The game's outcome, unlike that of the real battle, is up for grabs every time you play.

Interesting and sometimes disconcerting innovations in the game include appropriately-timed appearances of monkey-wrenching screen messages such as:

UNITS DID NOT RECEIVE
ATTACK ORDERS

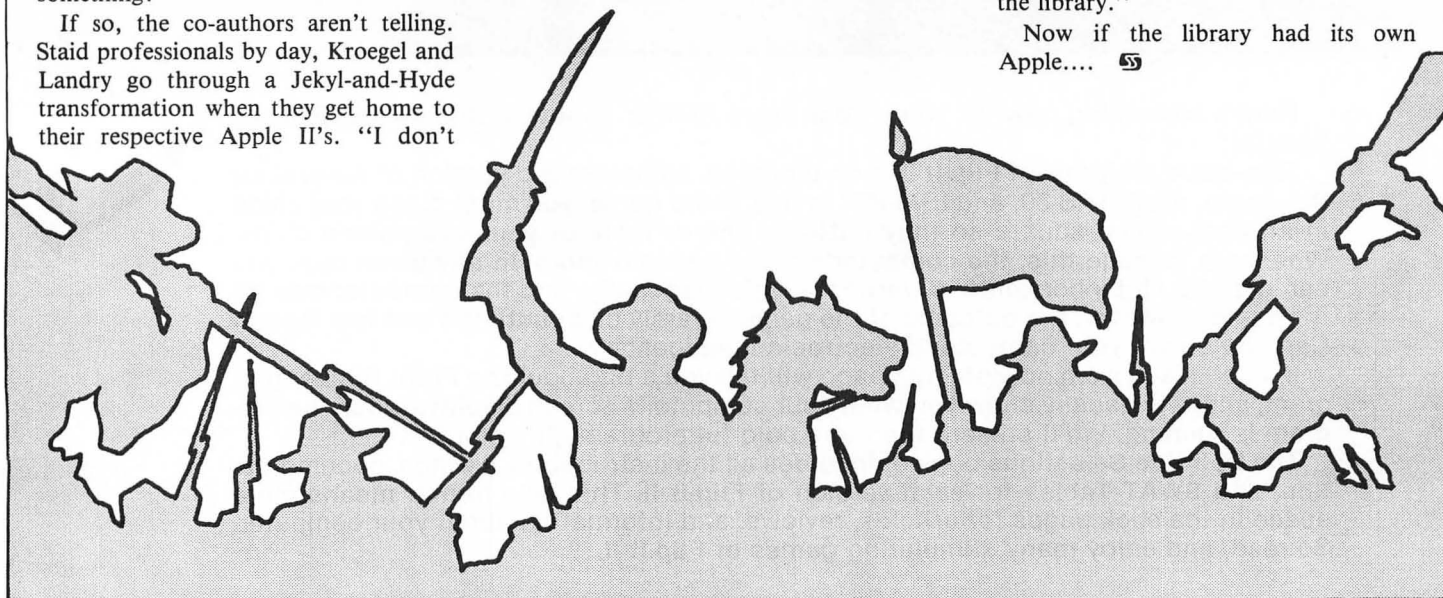
and

UNIT CANNOT ATTACK DUE
TO LOW LEADERSHIP/MORALE

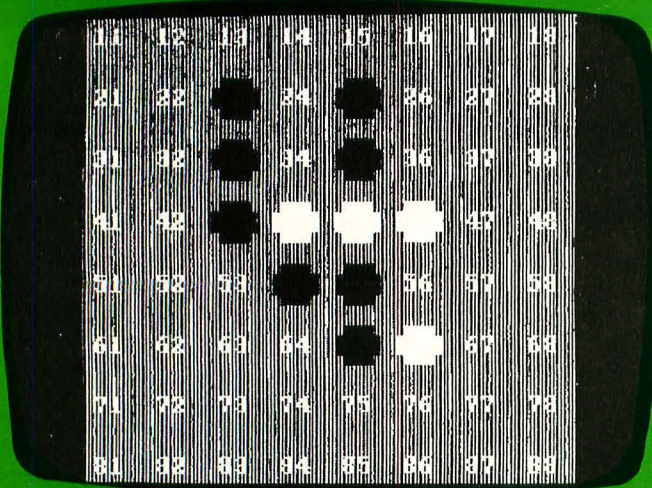
"We considered graphically exciting screen messages," Kroegel recalls, "but we opted for readability, instead."

Battle of Shiloh is anything but dull. It is, indeed, a tribute to the Apple's graphics ability, and yes, to the double-genius of Kroegel and Landry in pressing the Apple to a full measure of its gaming potential. "Chuck and I are quite a team," Landry admits matter-of-factly. "But, if it weren't for the Apple," he adds, peering over his horn-rimmed glasses, "We'd probably still be stuck in the library."

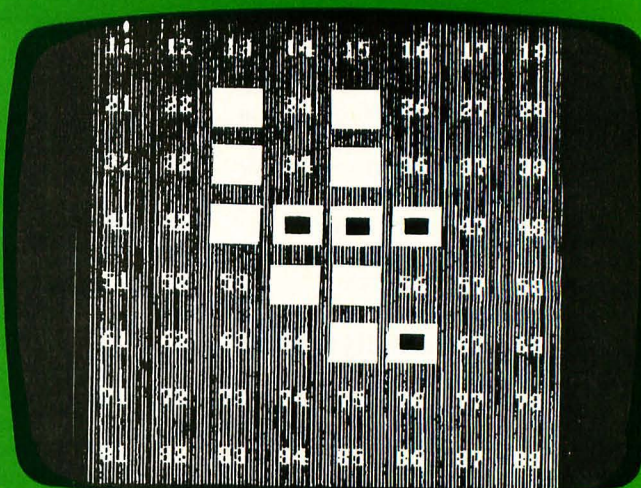
Now if the library had its own Apple.... ☞



FLIP-IT II

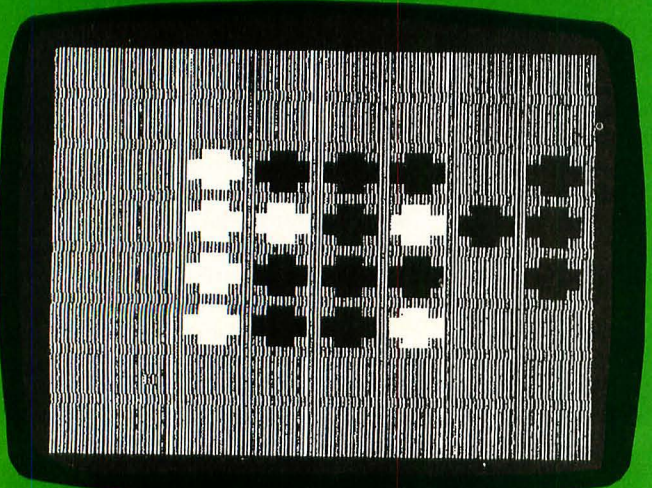


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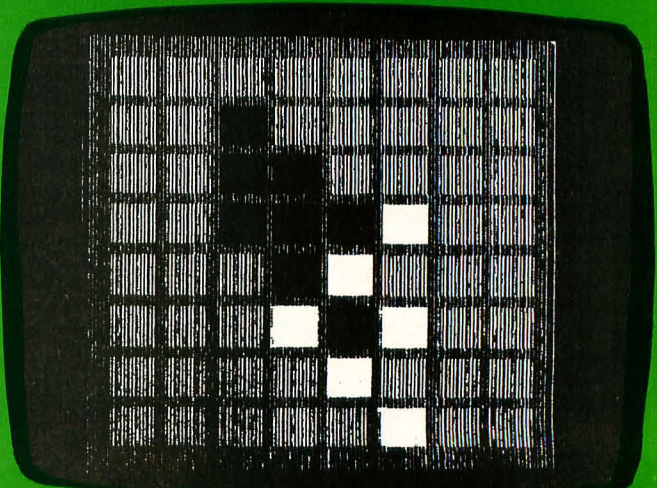


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In each issue from now on, this page will tell you a bit about the Front Runner program, and, will usually show you what your computer's screen displays when the program is running. We'll present the more colorful programs in color.

The **SoftSide Selections** booklet includes all the instructions, listings, documentation, and **SWAT** Tables for each version of **Flip-It II**. This new format means more space in the slick pages for articles, reviews, and information about your computer. So read, and enjoy many stimulating games of **Flip-It II**.





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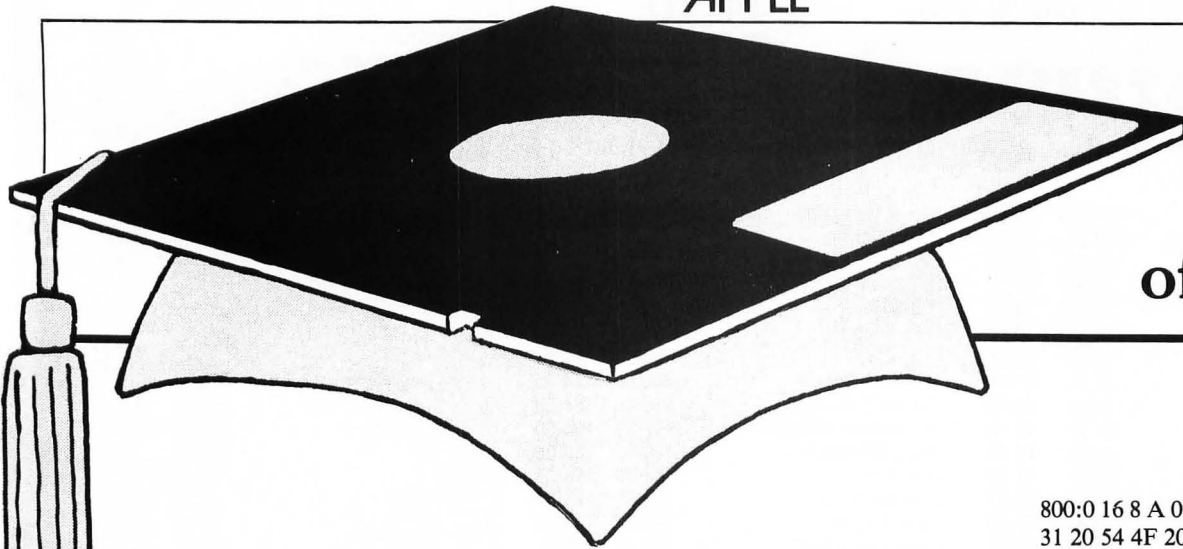
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Part five of a series



The different number forms of BASIC and Machine Language programs often necessitate cumbersome conversions between decimal and hexadecimal. Even if you write a BASIC conversion program, you still have to stop, load and run that program, and then reload the program you were working on. Our program for this installment, CONV, is a Machine Language number converter which can stay in memory at all times, and be called from BASIC's immediate mode (it won't work in a program) by the ampersand (&) function.

CONVGEN is a BASIC program that generates the binary file CONV. If you make no errors when you key in CONVGEN, you only need run it one time. Once CONV is created, type BRUN CONV. The computer responds with READY, and drops back into Applesoft®. This signifies that CONV has been loaded, and the ampersand jump vectors set to access the conversion routine. Any program in memory remains intact. To convert a number, type &D or &H followed by the decimal or hex number you want to convert. The result prints immediately, with the decimal form preceded by an inverse D and the hex form by an inverse H.

CONV consists almost entirely of jumps to routines already existing in the Apple system monitor (autostart version). It handles numbers in the Apple's address range, 0 to 65535 (hex FFFF). Decimal numbers may be

entered in either positive or two's complement form. When you enter hex numbers, both the positive and the two's complement form of the corresponding decimal number are shown.

Due to memory usage considerations, CONV does not include extensive error trapping. Erroneous entries produce various results, ranging from no output to an Applesoft ILLEGAL QUANTITY ERROR message, but nothing you feed CONV causes anything destructive to happen.

CONV resides in memory locations 768-975 (hex 300-3CF), so any operation that overwrites this area requires reinstallation of CONV.

Don't worry. This is *not* the same part of memory used by our jumps to the RWTS. The ampersand jump is several bytes beyond 768, so using CONV will not cause an unintended disk operation after it's been overwritten by one of our utilities.

BASIC and DOS

This time we're going to tinker with BASIC, and learn something about its relationship to DOS. We'll use what we learn to develop another disk utility, which will appear in the next article. CONV will be a useful aid in what we're about to do.

For illustrative purposes, consider the following simple Applesoft program, hereafter referred to as PROG:

```
10 FOR I = 1 TO 10
20 PRINT I
30 NEXT I
```

Before you type in the program, though, try this: Clear the memory of any program by typing NEW, enter the system monitor with CALL -151, and type:

```
800:0 16 8 A 0 20 46 4F 52 20 49 20 3D 20
31 20 54 4F 20 31 30 0 23 8 14 0 20 50 52
49 4E 54 20 49 0 2E 8 1E 0 20 4E 45 58 54
20 49 0 0 0
(carriage return, of course).
```

Now, go back into BASIC (CTRL-C RETURN), and type LIST. There's the program! Now try to RUN it. Oops. Something's wrong here. The program looks all right, but BASIC says it isn't. Try to list the program again. It's even worse than you may have thought.

The program won't run because when you enter a program the normal way, BASIC doesn't store all of the characters you type. When it encounters a reserved word, such as PRINT or NEXT, it stores it in memory as a one-byte "token," and uses it during program execution. When you LIST a program, BASIC translates each token back to the full reserved word.

When you enter the "program" through the system monitor, you put the actual characters into the memory locations where BASIC needs to find tokens. You'll find a listing of the tokens in Appendix F of the Applesoft Reference Manual. The decimal values of the tokens shown are in the range 128 to 234. The numbers outside this range are also recognizable to the BASIC interpreter. In BASIC (immediate mode), type NEW to be sure any existing program has been cleared, and enter:

10 ?

This creates a program whose single keyword token happens to be in memory location 2053, where you can change it and examine the results. Still in immediate mode, type:

```
FORI=0TO255:POKE2053,I:?'I='
I:LIST?:NEXT
```

Use CTRL-S to pause the listing. Values of I above 234 are especially interesting, but beyond the scope of this

APPLE DISKOURSE

By Cary W. Bradley

article. Compare the results of I-values less than 128 to the values you typed into the monitor to produce the "fake" program (remembering, of course, that these are the decimal numbers you typed in shown in their hex versions).

You couldn't list the program after you tried to run it because Applesoft maintains several pointers in the page zero portion of memory (locations 0 to 255). These tell where the program begins and ends, so the same area of memory that holds the program will not be used for other purposes during execution. Because these pointers were not properly set, BASIC prepared itself to use the same area of memory that held the program for variable storage.

While this is not a complete list, the only pointers we need to set for our purposes are:

- 103-104 (hex 67-68): Marks the beginning of the program text in memory.
- 105-106 (hex 69-6A): Marks the beginning of the area of memory to be used for numeric variable storage.
- 175-176 (hex AF-B0): Marks the end of the program text.

These pointers are stored in the form required by Machine Language; the low byte of the hex form of the number first, then the high byte. If you use BASIC to set these pointers, each part of the number must be converted to decimal separately, but CONV should make that a snap.

Unless you take action to change it, the end of the program and the beginning of variable storage should be the same. In the example above, assuming that 103-104 have already been set by the system, all you really need to set is the pointers in 105-106 and 175-176 to reflect hex 832. This will not correct the fact that you cannot run the program, but it will allow you to list it again.

Now type NEW and key in PROG, the sample program listed above. List it

to be sure it's correct, and enter the system monitor again. This time type 800.81C to look at the beginning of the memory area BASIC programs normally occupy. It should look like this:

```
0800- 00 0D 08 0A 00 81 49 D0
0808- 31 C1 31 30 00 14 08 14
0810- 00 BA 49 00 1B 08 1E 00
0818- 82 49 00 00 00
```

The following facts are significant:

Location \$800 contains a 0 required by Applesoft (this is a fake end-of-line indicator). Each program line is preceded by two bytes which contain the hexadecimal address (low byte first) of the location where the next program line begins. For example, the second program line begins at \$80D, as shown by \$801-802 above. The two bytes following each of these pointers contain the BASIC line number, in the same hex format. The rest of the bytes are either tokens for keywords or ASCII values for characters, with a 0 indicating the end of each program line.

While in the system monitor, you can change your program in ways you wouldn't normally be able to, such as numbering the lines backwards or changing all of the line numbers to the same thing. (Consult the Apple II Reference Manual for help with monitor commands.) While these techniques are really of no use in BASIC programming, you can learn a lot about the inner workings of BASIC by playing around with them.

Back To Business

Get rid of any garbage (NEW should do the trick) and restore the original sample program. Then save it to disk by typing "SAVE PROG".

Using the Disk Snooper, or a similar utility, locate and examine the contents of the disk sector which holds the data for the program. In hex, it should look something like this:

```
1D 00 0D 08 0A 00 81 49
D0 31 C1 31 30 00 14 08
14 00 BA 49 00 1B 08 1E
00 82 49 00 00 00 ?? ??
```

(followed by a lot of 0's).

Except for the first two bytes, it looks the same as the monitor listing. Appendix C of the DOS manual says that those first two bytes represent the program's length. The rest of the data is just the RAM image of the program. Reading just a little further in the DOS manual reveals that a binary file also contains a RAM image, leading to the obvious question — can you save and load a BASIC program using a binary file?

Let's try. With PROG in memory, type:

```
BSAVE BPROG,A$800,L$1D
```

Now, clear the program in memory with NEW, or by rebooting, and type BLOAD BPROG. Type LIST. Looks OK so far. Now try to RUN the program. Trouble.

Our problem is that we didn't set up the pointers to the end of the program. That's easy enough. BLOAD BPROG again and type POKE 105,30:POKE 106,8:POKE 175,30:POKE 176,8. (That isn't all of them, but it'll do the trick.) Now list and run the program. Interesting. It looks as though the difference between the disk operations for BASIC and binary files is that the BASIC loading routine sets up the internal pointers.

Another Difference

The DOS commands for loading and running BASIC programs also include the capability to relocate the program to any (reasonable) place in memory. This can work to our advantage in many applications. For example, we can free up text page two or move the entire program above the hi-res graphics area. This is done by setting the beginning-of-

continued on page 46

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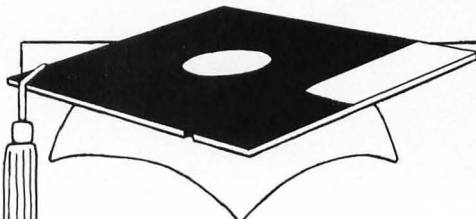
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Apple Diskourse continued

program pointer to the desired location prior to loading the program.

For example, let's load PROG at the beginning of hi-res page one, which means that it will start at location 8192 (hex 2000). Type POKE 103,1:POKE 104, 32:POKE 8192,0. Then RUN PROG. Everything looks the same as before, but entering the system monitor and typing 2000.201D verifies that the program is now located there, rather than at the normal \$800.81D. The difference between the two monitor listings is that the program line pointers have been changed to reflect the new program location. If you were to save PROG now, and examine it, you would see that the program line pointers are...

But, wait. I'm not going to tell you. Try it yourself and find out.

Incidentally, the POKE 8192,0 is essential to this operation, since BASIC needs a 0 at the beginning of the area

where the program resides, and LOAD and RUN do not provide it. Try relocating a BASIC program without a 0 at that location and see what happens.

Make sure that your Apple is set up to load and run PROG from \$2000 by POKEing 1,32,30, and 32 to locations 103-106, in that order. Next, clear the old program area of any old program tokens by typing:

```
FOR I=2049 TO 2100:POKEI,
255:NEXT
```

Then, BLOAD BPROG,A\$2000. Try listing the program, and see if you can explain the results. (You might have to RESET to stop the ensuing madness.) If you ever lose track of where the program pointers point, you can restore their initial values at any time by typing FP, which will also destroy any program in memory.

Experiment with this limited information. You're bound to discover other things as you go along. After you've played around a while, try to develop a technique to allow two BASIC programs in memory at the same time. Make each program run the other by including the appropriate POKES and a RUN state-

ment. Use PROG as one of the programs, and, for the other, create a modified version of PROG by changing line 10 to FOR I=10 TO 1 STEP -1. If you're successful, when you type RUN, the computer will print the numbers 1 to 10, in forward and reverse order, alternately, until you stop it with a CTRL-C. If you accomplish this, you've mastered what you need to know to understand our next utility, and then some. In case you're unable to make it work, I'll tell how I did it in a future article. If you come up with a different method (or a better one), I'll be happy to share it with our other readers as well.

```
$$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$
$$
$$ APPLESOFT BASIC $$
$$ 'CONVGEN' $$
$$ AUTHOR: CARY BRADLEY $$
$$ COPYRIGHT (C) 1983 $$
$$ SOFTSIDE PUBLICATIONS, INC $$
$$ $$
$$ $$ $$ $$ $$ $$ $$ $$ $$ $$ $$
```

```
100 FOR I = 768 TO 975: READ V: POKE
I,V: NEXT
```


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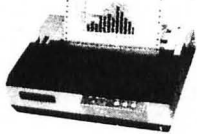
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110 DATA 32,142,253,169,29,141,2
46,3,169,3,141,247,3,160,0,1
85,203,3,32,237,253,200,192,
5,144,245
120 DATA 76,78,3,201,68,208,51,3
2,142,253,230,184,165,184,13
3,249,32,103,221,169,4,32,23
7,253,32,46
130 DATA 237,165,249,133,184,32,
103,221,32,82,231,32,183,3,1
69,8,32,237,253,164,81,166,8
0,32,64,249
140 DATA 32,142,253,76,60,212,20
1,72,208,246,32,142,253,230,
184,164,184,185,0,2,240,9,9,
128,153,0
150 DATA 2,200,76,95,3,169,141,1
53,0,2,164,184,32,167,255,16
9,8,32,237,253,166,62,164,63
,32,64
160 DATA 249,32,183,3,169,4,32,2
37,253,32,196,3,24,169,255,6
9,62,105,1,133,62,169,255,69
,63,105
170 DATA 0,133,63,32,191,3,169,1
68,32,237,253,169,173,32,237
,253,32,196,3,169,169,32,237,

253,76,78

180 DATA 3,32,191,3,169,189,32,2
37,253,169,160,76,237,253,16
6,62,165,63,76,36,237,210,19
7,193,196,217

200 PRINT CHR\$(4)"BSAVECONV,A\$
300,L#D0"



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110 - 110	TV	94
120 - 120	YS	96
130 - 130	ZL	96
140 - 140	UX	94
150 - 150	DS	91
160 - 160	TM	92
170 - 170	ZZ	95
180 - 180	GP	98
200 - 200	BH	32



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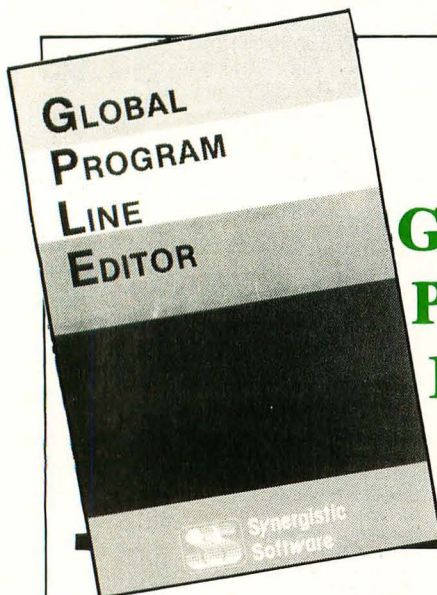
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GLOBAL PROGRAM LINE EDITOR

Reviewed by Michael R. Sullivan

from Synergistic Software, 830 N. Riverside Drive, Suite 201, Renton, WA 98055. System requirements: 48K Apple® II or II Plus with DOS 3.3 and Disk Drive. Suggested retail price: \$65.00.

If you have ever attempted to edit with the built-in Apple features, you know the frustrations of modifying an existing Integer or Applesoft® program line. Rather than POKE 33,33 and ESC I,J,K,L, it is much easier to retype incorrect lines. After retyping hordes of 100 character program lines, I was ready to forcefully dislodge my keyboard from its case. Instead, I purchased *P.L.E. — Program Line Editor*. I am happy to report that my keyboard is still intact. In fact, I have grown quite fond of it. *P.L.E.* allows you to modify an existing program line easily by inserting and deleting characters very quickly. That is just the tip of the iceberg.

G.P.L.E. — Global Program Line Editor — is a more sophisticated version of the extremely popular *P.L.E.* It retains all of the best features and improves some of the others. The major addition to the program is the global editing capability.

Edit Mode Commands

To enter Edit Mode, type CTRL/E followed by the line number that you want to modify. The target line is then displayed with the cursor positioned over the first character following the line number. You may then use any of the following Edit Mode commands:

- ←, → — the arrow keys move the cursor backward and forward in a line. They may be used with the REPT (repeat key) for speed.
- CTRL/I inserts characters before the current cursor position. As you insert characters, the remainder of the line moves to the right to make room. Another Edit Mode command will cancel insert.
- CTRL/D deletes the character at the current cursor position. The remainder of the line moves to the left as you delete each

character. CTRL/D with the REPT key quickly deletes multiple characters.

- CTRL/B places the cursor at the beginning of the line you are editing, over the first character of the line number. This command can also reposition the cursor for a Find command (see below), and for renumbering lines. (NOTE: When you renumber a line, the old line number still exists!)

- CTRL/N places the cursor one place to the right of the last character of the line. This command is handy for editing characters near the end of a line. It is much faster than the “→” + “REPT” key combination.

- CTRL/O, the Override command, works the same as CTRL/I, except that the first inserted character may be a Control character. After accepting the first character, this command functions exactly like CTRL/I. Override is useful for inserting a CTRL/D into a DOS command and/or for imbedding other Control characters into REM and PRINT statements.

- CTRL/F, the Find command, followed by a character typed n times, will locate and move the cursor to the nth occurrence of that character in the line. To find the 4th “P” in a line, type CTRL/FPPPP. This rapidly moves the cursor to the correct position.

- CTRL/Z, the Zap command, followed by a character typed n times, deletes all characters up to the nth occurrence of that character.

- CTRL/R is the Restart command. It restores the line you are editing to its pre-edited state. You must enter this command before hitting Return (see CTRL/M below). Restart is very handy for restoring characters you mistakenly deleted or zapped.

- CTRL/P packs a line by removing extraneous spaces.

- CTRL/C converts upper case characters to lower case and vice-versa (see the discussion of upper and lower case below). CTRL/C with the REPT key speeds up the conversion.

- CTRL/Q deletes all characters from the current cursor position to the end of the line, and then exits Edit Mode.

- CTRL/X cancels the line you are editing and exits Edit Mode.

- CTRL/M is the same as typing Return. It terminates Edit Mode and saves the modified line.

- CTRL/A controls upper and lower case modes (see the discussion of UPPER/LOWER case below).

All of the above commands are available with both *P.L.E.* and *G.P.L.E.* However, *G.P.L.E.* is not just a line editor. It is also a global editor. With this added capability, you can search your program for the lines you wish to edit, as well as search and automatically replace character strings throughout your program. You may also request a range of lines for editing and list lines in your program that contain a particular character string, e.g. a variable name or keyword.

Global Edit Command Format

All of the arguments defined in Figure 1 are optional (as you will soon see). STRING1 and STRING2 must be enclosed in quotes (“ ”). To imbed quotes in these strings, you must double the imbedded quotes. For example, if you wanted to search for the string “ENTER”, STRING1 would be ““““ENTER””””. This is one of *G.P.L.E.*’s few inconveniences. It slows down editing significantly. Figure 2 shows a few examples of global editing:

Figure 1

CTRL/E L1,L2,"STRING1", "STRING2"/O

L1	=	starting line number
L2	=	ending line number
STRING1	=	search string (16 char. max.)
STRING2	=	replacement string (16 char. max.)
O	=	option: R = Raw search, F = Fast search

Figure 2

CTRL/E 100,150	=	edit lines 100 thru 150.
CTRL/E 10,50,"POKE"	=	edit all lines between 10 and 50 which contain the string "POKE".
CTRL/E "READ","WRITE"	=	replace every occurrence of "READ" in your program with the string "WRITE".

A search string will be ignored if it is a substring of a larger string. For example, the search string "O" will not match the "O" in the keyword "POKE". *G.P.L.E.* will find these substrings with the RAW search (/R) option on the Global Edit Command Line (e.g. CTRL/E "O"/R).

A Global Edit Command displays each line requested or found by a search, one at a time. As each line is displayed, you are placed in Edit Mode with the option to further modify the line, proceed to the next line, or exit Global Edit Mode prematurely. To avoid entering Edit Mode for each line, use the Fast option (/F) on the Global Edit Command Line. This performs a quick global search and replace, or lists all lines where a certain string exists. For example, CTRL/E "POKE"/F quickly lists all lines containing the keyword "POKE".

Additional Features Of *G.P.L.E.*

G.P.L.E. supports both lower case adapters and a variety of 80 column video boards. *G.P.L.E.* converts Applesoft, DOS, and Monitor commands in lower case to upper case. This was not possible with the original *P.L.E.* *G.P.L.E.* also supports the very popular "Shift-key Modification" which makes entering upper and lower case characters a snap. CTRL/A places you in lower case mode; however, lower case is not turned off by hitting the Return key (as with *P.L.E.*). You remain in lower case mode until you type another CTRL/A. Once in lower case mode, a single CTRL/A puts you in upper case mode for the next character only. Typing CTRL/A twice (consecutively) places you in upper case.

G.P.L.E. enhances listing control with the addition of a Page List command. You still use CTRL/S to stop and start a listing or CATALOG, and CTRL/C to terminate a listing. CTRL/P (Page List) halts a listing and each subsequent CTRL/P displays the next 20 lines of the listing, and so on.

G.P.L.E. also provides a limited Type Ahead buffer, allowing you to type while the computer performs another task. Everything you type is saved in the buffer and then executed when the computer finishes its task. The Type Ahead buffer accepts a maximum of 32 characters. Any attempt to enter a 33rd character results in a rude "BEEP." This feature is not really much help because it does not function when the disk is spin-

ning. By the way, the Apple has a built-in Type Ahead buffer — one character in length!

If you have a Language Card, or other 16K RAM card, you can save memory and avoid conflicts between *G.P.L.E.* and other programs by loading *G.P.L.E.* into the RAM card.

One of my favorite *G.P.L.E.* features is the Escape function. I love to shorten long commands into two or three short keystrokes. Defining Escape functions to represent long commands and keywords saves a tremendous amount of typing. With *G.P.L.E.*, you can define and modify escape functions almost instantly. These functions have 1152 bytes available, which may be nested to eight levels. As an example, defining CATALOG,D1 to ESC 1, saves eight keystrokes! The possibilities are endless. *G.P.L.E.* provides a simple and flexible way of creating your own little operating system of Escape functions. You can create, delete, modify, rename, and list Escape functions without loading a separate program (as with *P.L.E.*).

I have a few negative comments about *G.P.L.E.* Minor inconveniences in Global Edit Mode should be mentioned. You *must* enclose search and replace strings in quotes. The Raw search (/R) and Fast search (/F) modes are handy, but you cannot combine them. Multiple lines are displayed in Global Edit Mode without spaces between lines, so it is difficult to distinguish where one line ends and another begins. The documentation is quite good, but knowing other editors is a great help too.

G.P.L.E. is a must for any serious Applesoft or Integer BASIC programmer. It decreases the amount of time and effort spent debugging and/or modifying your programs significantly.

55



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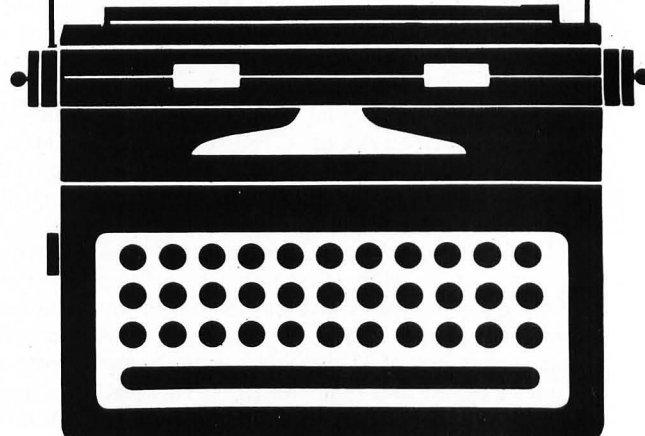
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Panik

by William Demas (Fantastic Software, P.O. Box 27734, Las Vegas, NV 89126). System Requirements: 16K TRS-80® Model I or III. Suggested retail price: Cassette — \$19.95; Disk — \$24.95.

With *Panik*, William Demas brings his magic touch to arcade games and another excellent product to the TRS-80. *Panik* is *not* an adaptation of any current video game, but combines several games to produce something totally original.

Panik is a one or two player Machine Language game compatible with all major joysticks. The disk version saves the

top ten scores and features voices. The cassette port supports sound effects and the game begins with an optional "vocal" advertisement.

As the game begins, you are trapped in the evil Mzor's multi-layered building. Ladders, scattered throughout the building, join its layers together. You possess only an empty transporter pack and an empty pistol. To load both your pack and pistol, you must gather energy from energy piles, which appear miraculously just when you need them. Each shot from your pistol takes one energy unit and teleportation takes five units.

You begin the game without energy,

so your first mission is to gather some. Now, you're ready to zap some Mzors. These pesky little devils appear when the mothership drops off the Gork Mzor, who in turn releases all of the other Mzors. Some Mzors can travel from layer to layer without ladders, presenting quite a problem. You can destroy most Mzors with one shot, but some require several shots.

At first, the Mzors only try to run into you. At the higher levels they also shoot at you and build impenetrable energy barriers. They are cunning at even the lowest level and you require chess-like strategy to defeat them.

Should you be clever enough to land eight shots on the Gork Mzor, the mothership delivers another one. This provides an excellent opportunity to blast a mothership with the plasma cannon near the top of the building and score big points.

You control the player with arrow keys or a joystick. You fire your pistol with the space bar and activate your teleportation pack with the ENTER key. The player must be in the center of the ladder to climb it and may only fire his pistol when facing right or left. You begin with three players and are given an additional player at 10,000 points.

Pressing the BREAK key pauses the game and you resume play by pressing another key. A voice even announces "START" and "STOP" during this process. To abort a mission, press both the BREAK and CLEAR keys.

Panik requires strategy and master planning. Don't try to wipe the Mzors out with one blow. Carefully deciding when to climb the ladders, zapping a few Mzors and then climbing to a different "safer" level, scores far more points. Also, it's important not to be in a vulnerable position when you run out of energy. Being chased by five Mzors with no ladder in sight is the wrong time to run out! After you reach 10,000 points, the Mzors become far more aggressive.

I recommend *Panik* without qualification to arcade lovers of all levels. It's unique, challenging and, above all, fun to play!



Okidata's Okigraph

from Okidata Corporation, 111 Gaither Drive, Mt. Laurel, NJ 08054. Suggested retail price: \$99.00.

The Okidata Microline 82A and 83A printers have become very popular with microcomputer users lately. TRS-80® fans especially like them because they can print standard TRS-80 "block" graphics. Now Okidata is selling replacement ROMs for these printers, which give them "dot-addressable" graphics capability. The manufacturer's suggested list price for the *Okigraph*

Graphics ROMs is \$99, although mail-order discount stores are offering them for as low as \$40.

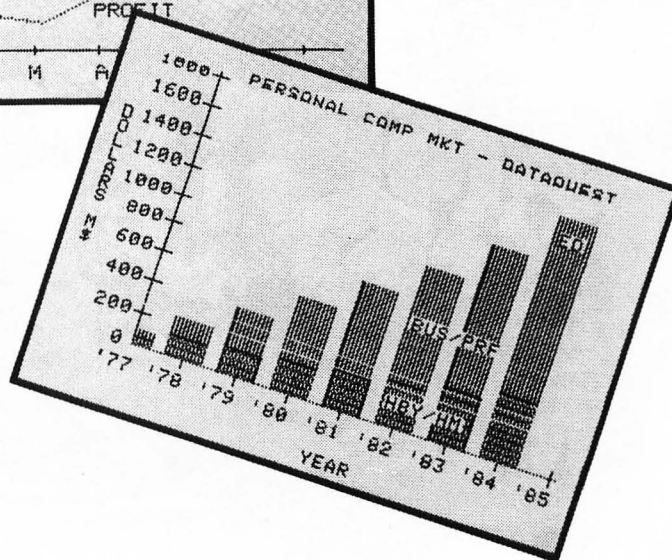
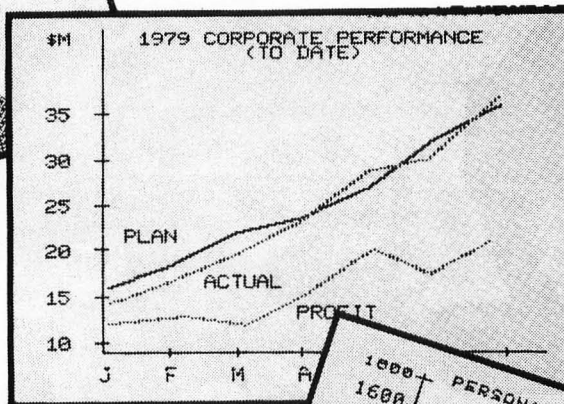
When my package arrived, I was disappointed to read that several features of the printer would be eliminated once I installed the ROMs. Specifically, it would no longer print block graphics or the foreign language sets, and the RS-232 interface, VFU, and Short Line mode would not work.

I discovered I could simulate block graphics with the dot graphics, and resigned to live without the rest of the features. Another disappointment was the small manual — only 26 pages, fourteen of which contained a listing of a screen dump routine for an Apple® II.

Installation of the ROMs seemed straightforward enough: Just remove the cover from the printer, locate and remove two ROMs, and install the two new ROMs. It turned out to be rather difficult, however, because of the close spacing of components. I scratched a nearby capacitor in the process. That small error proved to be major when I tried to test the printer. It blew its fuse and wouldn't work.

After re-installing the original ROMs and finding that it still didn't work, I called Okidata for help. To my amazement, the technician told me what I had done! Evidently, they have had this problem before. He was kind enough to mail me a replacement capacitor, which was easy to install. (The damaged capacitor was unmarked, preventing my purchase of a replacement locally.)

With the new capacitor and graphics ROMs in place, the printer finally worked again. Be *very* careful when removing and installing ROMs. Get the correct orientation (which the manual stresses) and avoid damage to nearby components (which the manual does not mention).



"The Okigraph Graphics ROMs are reasonably easy to install, but rather difficult to use... However, they provide control over every printed dot."

Graphics ROM

Reviewed by John Ratzlaff

Up And Running

At this point, I was dismayed to discover a serious flaw in the manual. Various codes to control the graphics printing were mentioned by name ("ETX", "STX", and so on), but nowhere were the codes identified by number! For instance, to enter Graphics Mode, use ETX — but what is ETX? I hoped that the main printer manual would identify the names, but they were not to be found there either. Unwilling to place another long distance call to New Jersey, I had to experiment. For your information, here they are:

STX = 2
 ETX = 3
 LF = 13 (ODH)
 SO = 14 (OEH)
 DC2 = 18 (12H)
 DC4 = 20 (14H)

With the numbers for the codes in hand, I could understand the instructions. Basically, Graphics Mode works like this:

- To enter Graphics Mode, send an ETX (3) to the printer;
- To leave Graphics Mode, send an ETX followed by STX (3, 2).

Program Listing 1. Graphics printer driver. (Model III only)

```

00100      ORG      4C89H      ;DOSPLUS 3.4 *PR ADDR
00110      CALL    READY      ;PRINTER READY?
00120      LD      A,C        ;GET BYTE TO PRINT
00130      OUT     (0F8H),A    ;SEND IT TO PRINTER
00140      RET
00150 READY CALL    CHECK      ;CHECK PRINTER
00160      RET     Z          ;RETURN IF READY
00170      CALL    028DH      ;CHECK FOR <BREAK>
00180      JR     Z,READY     ;LOOP IF NO <BREAK>
00190      POP     AF         ;CLEAR THIS CALL
00200      XOR     A          ;CLEAR A
00210      RET
00220 CHECK IN      A,(0F8H)  ;RETURN W/O PRINTING
00230      AND     0F0H      ;GET PRINTER STATUS
00240      CP      30H       ;MASK BITS
00250      RET
00260      END
    
```

Any number received while in Graphics Mode will be interpreted as binary dot information, controlling any of the dots on the print head — except that an ETX indicates that a command is coming, such as ETX followed by LF which causes a "Text Line Feed." Therefore, if you want to print a three, you have to send two threes, because the first will be interpreted as an ETX and not a three. You'll have to write your own little subroutine to check the out-going byte (while in Graphics Mode) to see if it is a three, and send another three if it is. A single three will be ignored (unless a valid command mode follows).

If it sounds confusing, it is! The manual says it all, but is not terribly clear, and provides no sample graphic programs other than the assembly-language Apple listing. In Graphics Mode, you can exit Graphics Mode, or issue graphics or text linefeed with or without carriage return. While in Text Mode, you can move the paper up in increments of 1/144 inch.

The next problem appeared as I tried to send out a whole row of random characters: It kept printing long strings of a single character. Finally, I realized the printer driver was inserting a string of linefeeds (ODH) every time it got a Formfeed character (OCH). There are

continued

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Okigraph continued

two ways around this: 1) use OUT 248,xx to send graphics to the printer (tedious); or 2) use a printer driver that won't mess with what you send it. I chose the latter method, and wrote a driver which sends anything it gets. It is shown in Program Listing 1.

The ORiGin shown (4C89H) places the driver right on top of the DOSPLUS 3.4 printer driver. With another operating system (or the ROM printer driver), you will have to place it somewhere else in RAM, at the top of free memory for example. Remember to place its address in the printer DCB.

Hitches

It soon became evident that fancy graphics on the printer would be difficult, especially since the Model III has no corresponding hi-res graphics on the screen. You can contrive simple characters, such as the "pointing hand" or other special characters found in the Model III video character generator. Convert each column of dots of the character into the corresponding hex number, and then string them together and send them to the printer. For larger objects, such as pictures or 3-D plots, you must form them blindly in (reserved) memory and dump them to the printer. Program Listing 2 contains an assembly language routine to dump a section of memory to the printer as graphics. Comments in the listing identify the starting and ending addresses of the block to be dumped, and the width of each graphics line in bytes.

I created the only significant graphics I have printed on the Color Computer, transferred them from the CC RAM to the Model III RAM (by hand — I couldn't find a simple way to interface the two machines), and then dumped them to the printer.

An interesting application of Program Listing 2 is to use it (with minor modifications) to dump the entire contents of memory, both ROM and RAM, as graphics. Most of it appears as random "garbage," but various features of the computer's memory map are clearly discernible.

I've yet to write a routine to simulate TRS-80 block graphics using dots. It was clearly a formidable project, considering

that it would take two passes to print some of the graphics blocks.

Only seven dots can be printed in a column at once. Some of the Model III "special characters" are eight dots high, so they also require two passes. Theoretically, you can write a routine to dump the video screen contents to the printer *exactly*, including block graphics, text, and special characters, but it would be a lot of work.

The *Okigraph Graphics ROMs* are reasonably easy to install, but rather difficult to use. They have a poor manual and cause the loss of several features of the printer. However, they provide control over every printed dot. If you need this capability, and already own an Okidata printer, the *Okigraph Graphics ROMs* are currently the only solution, short of buying a new printer with a more friendly dot-graphics capability. 55

Program Listing 2. Routine to dump memory block to printer.

```

00100          ORG      0A000H
00110 PRINT    EQU     4C89H          ;PUT DRIVER ADDR HERE
00120                                     ;DON'T CALL 003BH! BYTE
                                     ;TO BE SENT IS IN C, NOT A!
00130 START    LD      C,3           ;"ETX" CHARACTER
00140          CALL    PRINT        ;ENTER GRAPHICS MODE
00150          LD      HL,8000H     ;PUT START ADDR HERE
00160 LOOP 1   LD      DE,0100H    ;PUT PRINT WIDTH HERE
00170 LOOP 2   LD      C,(HL)      ;GET BYTE TO PRINT
00180          LD      A,C
00190          CP      3           ;IF IT IS A 3, AN
00200          CALL    Z,PRINT      ;EXTRA 3 MUST BE SENT
00210          CALL    PRINT
00220          INC     HL
00230          LD      A,H         ;CHECK TO SEE IF DONE
00240          CP      9CH        ;PUT END MSB HERE
00250          JR      Z,DONE      ;GO TO END ROUTINE
00260          DEC     DE         ;WIDTH COUNTER
00270          LD      A,D
00280          OR      E
00290          JR      NZ,LOOP2    ;NOT END OF LINE YET
00300          LD      C,3         ;END OF LINE — SEND LF
00310          CALL    PRINT
00320          LD      C,0EH      ;"SO" CHARACTER
00330          CALL    PRINT
00340          JR      LOOP1       ;GO DO ANOTHER LINE
00350 DONE    LD      C,3         ;EXIT GRAPHICS MODE
00360          CALL    PRINT
00370          LD      C,2         ;"STIX" CHARACTER
00380          CALL    PRINT
00390          LD      C,0DH      ;LINEFEED
00400          CALL    PRINT
00410          JP      0F058H     ;PUT ADDR. OF YOUR
00420                                     ;MONITOR PROGRAM HERE
00430          END

```


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THE ALTERNATE SORT

by Zachariah Zimmerman (The Alternate Source, 704 North Pennsylvania Avenue, Lansing, MI 48906). System Requirements: 16K TRS-80® Model I or III. Suggested Retail Price: \$19.95.

Ever been out of sorts when it comes to sorting on your TRS-80? Now, from The Alternate Source, comes a program to eliminate sorting blues.

The *Alternate Sort (Tasort)* allows you to sort up to 65 one-dimension arrays, in ascending or descending order, faster than you ever thought possible. In less than five seconds, *Tasort* can order a one-dimension array with 500 elements. The arrays may be of any variable type. The program allows tag-along arrays, but does not sort them. Provisions are made for multiple sorts. For example, you're writing a mailing list program and want to sort names by zip code; if zip codes are the same, then you want alphabetical order for the names.

Tasort is a very bright and independent program. It works with every DOS and automatically loads into high

memory. Should you load the program while the computer is in high memory, it computes that fact and eliminates the first load, saving memory. It is executed either at TRSDOS using *Tasort nn* or at the SYSTEM prompt. The *nn* indicates how many arrays will be sorted. Every array reserved requires three bytes, so the maximum memory required would be 195 bytes for pointer space. The actual program takes about 1000 bytes. Even 16K systems should have ample space for this utility.

Adding *Tasort* to your BASIC program requires four *USR* calls. The first call resets the *USR* call in case an error has occurred. The second call indicates where, in the array, sorting should start. For example, a *R=USR0(15)* indicates sorting should begin at the fifteenth element. The length and number of sorted elements pass to *Tasort* through the third call. The last *USR* call indicates the string variable containing vital sorting information. If an error should occur during the sorting process, an error message number passes back to the user through the *R* variable.


The string variable mentioned before is the key to the sorting process. A

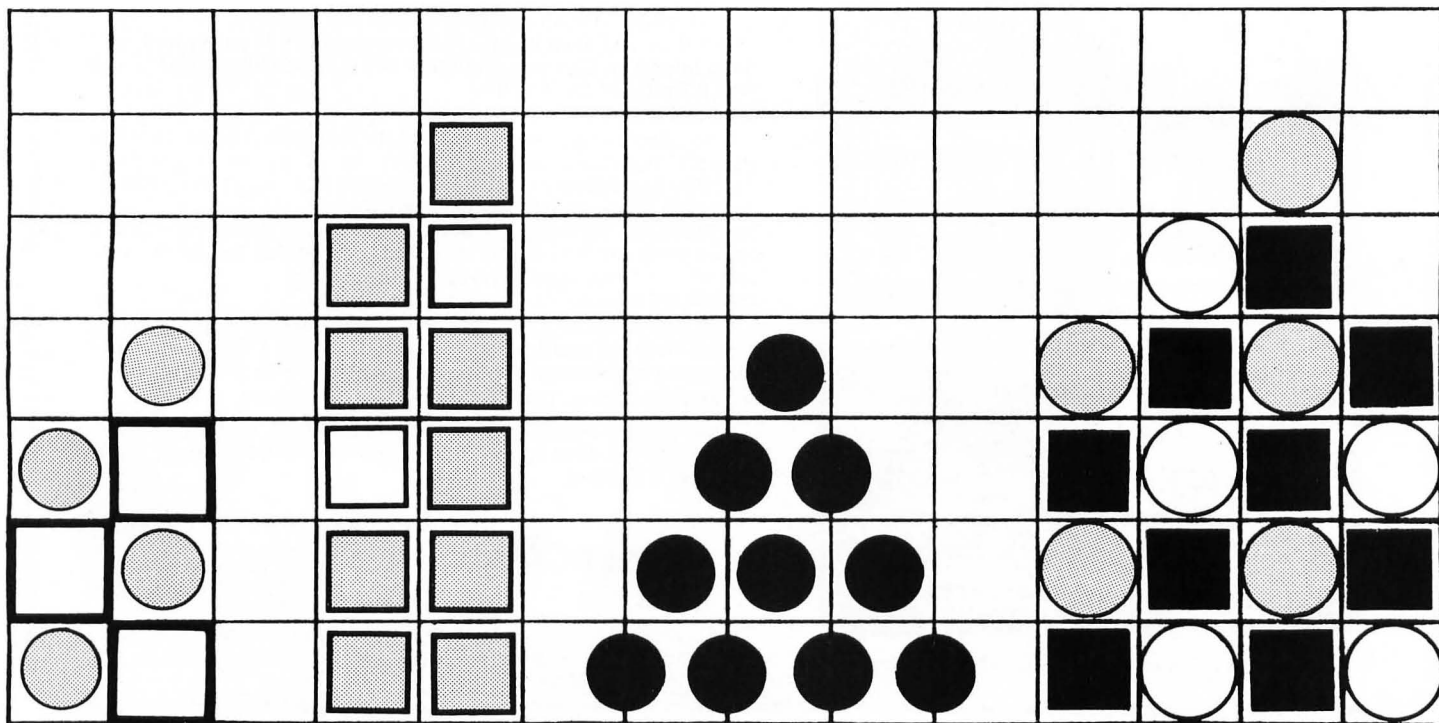
Reviewed by Mark E. Renne

variable might look something like this: *Q\$="-B,MR,+T\$,-*RG."*

The "+" before the variable causes sorting in ascending order while the "-" indicates descending. In this example, elements in *B* would sort in descending order. Since *MR* has no sign, it is a tag-along and follows the order of *B*. If two elements of *B* are equal, then elements sort in ascending order based on *T\$*. (Remember the name and zip code example.) If elements of *B* and *T\$* are equal, sorting is based on values in *RG* and in descending order. The "*" tells the program to place items beginning with a null string or zero value in *higher* order than other values. This is an extremely useful feature, as many times arrays are filled with zeroes or nulls, placing vacant records at the top.

If you wish to use *Tasort* in a program for commercial publication, The Alternate Source will grant permission for a fee ranging from \$100 to \$250.

This program is very versatile and functions perfectly. It's fast, works on all systems, and is very reasonably priced. If you're looking for an excellent sorting routine for your program, consider *Tasort*. 



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You resolve to use the Time Machine to prevent the birth of the evil Bowman. Can you succeed, or is Earth doomed to hellfire?



Here are the encrypted hints for last time's Adventure, *The Wizard's Sword*, along with a one-line decryption program for your computer. Type the one-liner into your computer, and RUN it for each hint. The encryption is the same for all four computers.

Hint 1: IFY GSV BVOOLD QVDVO GL TVG GSV ZMHDVI GL GSV IRWVOV.

Hint 2: GSV DRAZIW'H HDLIW RH RM GSV DVHG RXVYVIT.

Hint 3: RU GSV FMRXLIM WLVMH'G YIVZP GSV RXV GSVM GSV WIZTLM DROO.

Hint 4: GL PROO NVWFHZ BLF NFGX XOLHV BLFI VBVH.

Hint 5: DZEV GSV ILW... ZG GSV IRTSG GRNV.

Hint 6: ERHRG GSV HSRUGRMT HZMWH ULFI GRNVH.

Note: Use the next two hints only if you're desperate.

Big Hint 1: BLF MVVW TIVVM KOZHGRX GL TVG GL GSV TIVVM PRMTWLN.

Big Hint 2: BLF XZM TVG TIVVM KOZHGRX YB KFGGRMT BVOOLD LM YOFV.

Good luck, and happy adventuring!

HINT DECODERS

```
1 SCREEN 0,0,0:WIDTH 40:PRINT:LINE INPUT
"HINT: ";P$:FOR P=1 TO LEN(P$):J=ASC(MID
$(P$,P,1)):PRINT CHR$(ABS((155*(J>64))+J
));:NEXT:PRINT
```

```
10 DIM P$(110):? :? "HINT";:INPUT P$:F
OR P=1 TO LEN(P$):J=ASC(P$(P)):? CHR$(
ABS((155*(J>64))-J));:NEXT P:?
```

```
10 PRINT:INPUT "HINT":P$:FORP=1TOLLEN(P$):J=ASC(MID$(P$,P,1)):PRIN
TCHR$(ABS((155*(J>64))+J));:NEXT:PRINT
```

```
10 PRINT : INPUT "HINT: ";P$: PRINT
: FOR P = 1 TO LEN (P$):J =
ASC ( MID$ ( P$,P,1)): PRINT
CHR$ ( ABS ((155 * ( J > 64)
) - J));: NEXT : PRINT
```




STARRING
BOUNTY
BOB

Miner 2049er

Reviewed by David Plotkin

by Bill Hogue (Big Five Software, P.O. Box 9078-185, Van Nuys, CA 91409). System Requirements: 16K Atari® 400/800. Suggested Retail Price: \$49.95.

Miner 2049er, the new fast-action and strategy game from Big Five Software, is a superb effort and is probably destined to become a classic. Available only as a first-of-its-kind 16K ROM cartridge, it is accessible to the large audience of off-the-shelf Atari 400 owners as well as more advanced users. *Miner 2049er* was programmed by the 21-year old owner of Big Five Software, Bill Hogue, who already has made a name for himself and his company in the TRS-80® software market. The program combines action, planning, a dash of frustration, and a huge helping of humor to provide hours of fun.

Miner 2049er takes place in a ten-level mine, each level covering an entire screen. To advance to the next level, you must help Bounty Bob mine each section. Each level is constructed of girders, and, as Bounty Bob moves over a section, the girder turns solid. When all the girders in a level are solid, you move on to the next level automatically. Each level is also sprinkled with treasures left behind by previous miners. Bounty Bob can collect these for extra points. The treasures are helpful in another way as well. Mutant monsters wander about on each level of the mine. Even fleeting contact with one of these horrors causes Bounty Bob to dissolve with a striking likeness to the Wicked Witch of the West when Dorothy doused her with water in *The Wizard of Oz*. After Bounty Bob collects a treasure, however, the mutant monsters are rendered temporarily harmless and Bounty Bob can eliminate them by touching them, also getting extra points. The monsters warn you just before reverting to their dangerous form by flashing like the ghosts in *Pac Man*.

Bounty Bob, the miner, is controlled with a joystick plugged into port one. Left and right causes Bob to walk in the intended direction; the red button causes him to leap into the air. The ability to leap is handy for jumping over mutant monsters, and is necessary in the upper levels where each section of girder is very short and you must jump from section to section. The up and down directions on the joystick cause Bounty Bob to climb or descend a ladder. There are some exceptions to these controls. One level even has an elevator. Once Bounty Bob is on the elevator, the joystick causes the elevator to go up or down, or roll left and right to the extent of its track.

The ten levels of the mine are a masterpiece of diabolical inventiveness. Each level is different and has to be mastered. You'll need to deal with climbing, sliding down chutes, leaping from ledge to ledge, and several different kinds of mechanical devices. The devices include two levels with

transporters, the elevator already mentioned, and a cannon on level ten, which Bounty Bob must load with dynamite to shoot himself up to a higher section (Is this safe?)! Then there are the sections that Bounty Bob can enter, but not exit. For example, a slide may deposit Bob on a section of girder with no exit. (You can't go back up the slide.) Or, Bob may leap down to a section, but not back up. The trick here is to leave the section of girder with no exit until last, so your miner is transported automatically to the next level from the inescapable section. Of course, you only realize that you can't escape after it's too late!


Mr. Hogue further adds to the challenge with levels in which your miner must leap from section to section. The timing on some of the jumps is very critical — and some of the jumps are impossible, forcing you to figure out another way to get to the particular section. Also, Bounty Bob will survive some falls and not others, but it is trial and (ouch) error to find out which ones.

The object of the game is to complete all ten levels of the mine. Each level has a clock and you must complete that level before the clock runs out or Bounty Bob dies. You get five miners in each game.

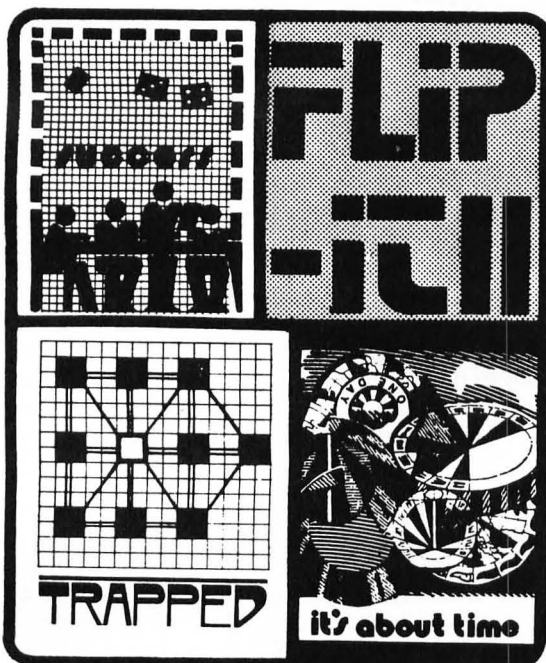
Each time you lose a miner, you must start over at the beginning of your current level, and each new game starts from level one — there is no skipping levels in this game. This is not as frustrating as it may sound. Once you master the sequence of jumps and motions to complete a particular level, that sequence will always work (at the same chosen degree of difficulty, anyway). As you learn each new level, getting through it the next time becomes routine, and you can concentrate on the levels you have not mastered. Starting all over again on a level when you lose a miner is really a necessity. In the upper levels, the only way to complete a level is to grab a treasure and then eliminate some of the mutant monsters. If you goof, you could be confronted by mutants and have no way to eliminate them without starting the whole level over.

Miner 2049er is humorous and, technically, extremely well done. The attention to small detail is amazing. Bounty Bob is displayed in four colors, and consists of three player-missiles overlapped. He is well animated — his feet move as he walks and his facial expression changes from a happy grin to an effective expression of fear as he

leaps through the air. A background shuffling noise accompanies Bob as he walks. When poor Bob dies, he flattens out 'til nothing is left but his forlorn miner's cap. The mutant creatures (up to six on any given level) are created with the two remaining player-missiles, (Bob is composed of three players, and you can patch the missiles together to get the fifth player.) and multiple display list interrupts to redefine the horizontal position of the players. The mutant creatures don't all have to be stacked up above each other, and they seem to move independently. Due to memory limitations, text screens between levels are kept simple. The cartridge maintains high scores as long as the machine is on.

If you think you'll master all ten levels quickly, guess again. You have ten levels of difficulty to choose from, so once you've mastered all ten screens at the easiest level, you can proceed to the next level of difficulty. Then the mutant creatures move faster, and all your careful planning goes down the tubes. You'll have to rethink your strategy and hone your skills still further. *Miner 2049er* is well executed, very entertaining, and should provide a challenge for many, many hours of play. 

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Filemanager +

Reviewed by David Plotkin

from Synapse Software, 5327 Jacuzzi Street, Suite I, Richmond, CA 94804. System requirements: Atari® 400/800 with 40K RAM and disk drive. Retail price: \$99.95.

Filemanager+ is the latest version of the popular *Filemanager 800* series from Synapse Software. It is considerably more powerful than the earlier versions, but you can convert files generated by earlier versions to run on *Filemanager+*.

The first thing you notice about *Filemanager+* is the program package. It comes in a dark blue padded binder, with each section clearly marked with tabs. A clearly written, step-by-step instruction book, complete with screen pictures, an appendix of command summaries, and a comfortable style, puts the beginner at ease. This is unusual, as too many manuals are written to impress rather than teach. Congratulations to Synapse Software on this score.

Filemanager+ works best with two disk drives. It functions with one, but requires additional switching between the *Filemanager+* master disk and the data disk. (*Filemanager+* is extensively copy protected and you'd better not try to put your data on the master disk!) The manual tells you how to initialize a disk, notes each time you must switch the *Filemanager+* master disk and the data disk, and then walks you through a sample file, illustrating each of the program's powerful features. When you are done, you know how to use this program.

Filemanager+ is completely menu driven. It consists of four general menus and an Initialize menu. You only use the Initialize menu when setting up a new data disk, and you can call it from the "Main" menu or the "Create" menu. The *Filemanager+* master disk must be in the drive when you call the Initialize menu, although you then switch to your new data disk.



General Menus

- MAIN menu: allows access to other menus, loads new files, reindexes and exits *Filemanager+*, saving all pertinent information.
- RECORD menu: Enters data on a form, manipulates the data to print lists, searches for a particular record, prints labels, and reviews the index.
- CREATE menu: Creates, reviews and modifies forms. Also allows access to other menus.
- UTILITY menu: Copies, deletes and renames files. Also allows you to convert one file form to another and combine two files.

The menus are split into two groups of two. You switch between the RECORD and MAIN menus and between the CREATE and UTILITY menus using the SELECT button. To get to the CREATE menu, you must load the CREATE module from the *Filemanager* master disk. To get back to the MAIN menu (and thus the RECORD menu) you must load the *Filemanager* module from the *Filemanager* master disk.

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Filemanager +

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All of this disk switching is necessary because *Filemanager +* is too long to load completely into memory. While switching disks can be somewhat tiresome, the friendliness of *Filemanager +* is worth it. (User-friendliness takes memory.) In addition, the split of menus is well thought out — for manipulating records (adding, updating, etc.) you need only the MAIN and RECORD menus, which eliminates disk switching with one annoying exception. When going to the CREATE menu after REINDEXING, the index must be saved on the data disk, then the CREATE module loaded from the master disk. No matter how you work it, you get the "INSERT CORRECT DISK" message, sometimes twice.

Using Filemanager +

For a new file, you first generate a form with the CREATE menu. This form can fill up to nine pages, so you can put a very large amount of data on one form. As we'll see later, you should put the most important information on the first page. Creating a form involves answering the prompts for field names and types. Let's say you're going to create an example file of people who owe you money. The last name and first name of the person, address and telephone number will be the first four fields. These are alphanumeric fields. Then you might have the amount of money loaned (a dollar field), the interest rate and the number of months the money has been owed. These last fields are numeric fields. *Filemanager +* also supports repeating numeric and alphanumeric fields. For example, if you charged everyone the same interest rate, you could specify the interest rate as repeating numeric. Each new entry would have the interest input carried over from the previous record.

Filemanager + contains a unique and useful type of field known as a COMPUTED field. A COMPUTED field is generated by the program by operating arithmetically on numeric or dollar fields. After creating a new form, you will be asked to define each COMPUTED field in terms of known numeric or dollar fields. *Filemanager +* supports most of the BASIC functions including Trigonometric and Transcendental (logarithmic) functions. The last field in our example will be the computed dollar field "MONEY OWED" and defined as:

```
MONEY LOANED + INTEREST RATE * MONEY  
LOANED * NUMBER OF MONTHS
```

All fields used to evaluate the COMPUTED field must have been defined already or an error will result. Even a COMPUTED field may be used in the evaluation of another COMPUTED field as long as it has already been defined. In the CREATE mode (as in most other modes) *Filemanager +* supports full screen editing. To fix a mistake, move the cursor to the error and retype or delete. When you are happy with your new form, hit START and it will be saved along with any COMPUTED fields defined. Now you can review the form. One of the nice features of the form created by *Filemanager +* is that the length of each field is indicated by the length of the underscore lines following each fieldname. As you "fill in the blanks" on the form, you know just where the end of your dimensioned field is. If you go past the end of the underscore line, your field is cut off.

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Indexing

Once you've created a form, you must input some data. Go back to the MAIN menu and LOAD (option 1) your new file. The first time you load a new file, you are asked to index it. Indexing is a clever way to get around the Speed of Loading (RAM)/Large File Size (disk) dilemma. It works like this: each record of your file is stored on the data disk as you enter it. However, the field specified as the INDEX is also stored in RAM. Searches based on the main INDEX are very fast — so the main index is the most likely field to be searched. In our example, the logical choice for an index field is the last name field. You can search four subfields in addition to the main index, but this will take considerably longer. Searching subfields without using the main index means that all the records have to be retrieved from disk, which can take quite a while. You can only index on the fields on the first page of your form. You can REINDEX at any time if you find you chose the wrong index field.

Filemanager+ allows for up to three indexes. You must have a main index, the second and third indexes are optional. Since sorting is done on the indexes, up to three sort levels are possible. You choose how many letters or numbers of the index field will use the sort. More letters use up more RAM. Thus, in our example, the file is kept in alphabetical order by last name. Should two records have the same main index — people do have the same last name — the program can sort on the second and third indexes to get things in order.

After LOADING your file (and indexing a new file) the RECORD menu does the bulk of the work. You can input new records (as you loan more people money), update or delete records, (you lend someone more money or someone pays you back) and print out a record. *Filemanager+* gives you the option of automatically printing out each record as it is called up or only printing certain records. It also lets you specify whether to advance immediately to the next record (START will pause) or wait for the START button to continue.

Search

As mentioned earlier, you can SEARCH on the main index and up to four subfields. Search ranges can be specified in several ways. *Filemanager+* will allow you to look for all records within a certain range or outside a given range. If we wanted to look at all the people whose last name begins with the letters M through Z, type M- in the Last Name field and press START. If you choose to print each record automatically, you can even specify control characters for printer control and the number of blank lines between printed records. A scan option looks for records in which a particular field contains or does not contain a chosen character string.

The LIST feature is also accessed from the RECORD menu. You can choose to search for only particular records, then list to screen or printer only certain fields of those records. In our example, it would be easy to find all the people who hadn't paid us yet by using the scan option to look for numbers other than zero in the Money Owed field. Then we could print out a list of Last Names and Money Owed. We would end up with a fairly neat two-column table of last names versus the amount of money owed by each person.

Filemanager+ will even calculate the total money owed and print that out as well — you essentially get a sales report. I've said "fairly" neat because a couple of things can destroy

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Filemanager continued

the table's neatness. If you specify more fields in the list than can fit across the screen, the fields will jump down to the next line, jumbling the list symmetry. The second is an annoying feature which could be fixed. When the field name is longer than the field length (ZIPCODE is seven letters, but current zips are only five numbers long, so you set the field length at 5.), the field name is cut off at the number of letters corresponding to the field length. (You get only five letters: ZIPCO.)

Filemanager+ is a very versatile label printer. Just as in the LIST function, you can search fields to get only certain records, then format and print whatever fields you like on a label. The program allows you to either page and print automatically, or review each record before printing.

SUBFILE is another useful feature. You can search fields to set up a subfile of only those records which meet the criteria specified. For example, you could set up a subfile of all those people who haven't paid their debts, and then use the COPY function from the UTILITY menu to generate another file of only the subfile records, perhaps to give to a collection agency.

A really excellent feature of *Filemanager+* is that the commands work very similarly. SEARCH, LIST, LABEL and SUBFILE all use similar screen formats so the user is not bewildered by many different forms. The top line of the screen (known as the COMMAND line) reminds the user which function is currently being implemented. The color of the screen is also used to good advantage, turning

red, for example, when you are DELETing. This is, I believe, a first for database managers. Datasoft's *Text Wizard*, an excellent word processor whose version 2.0 is compatible with *Filemanager+*, also makes good use of screen color changes. *Filemanager+* has a custom display list which dresses up the screen very nicely.

Convert


Probably the most powerful feature of *Filemanager+* is the CONVERT function, included as part of the UTILITY menu. After extensive use of a file you may decide that you'd like to change your form setup. With most other Database Managers, you must set up a new form and punch in all the information over again — quite a task on a long file. *Filemanager+* allows you to MODIFY a form you created earlier (CREATE menu option 3) and store it again under a different file name. You can then use the CONVERT option to move all the information in the old file into the new file, field by field. It doesn't matter if the field is a different length or in a different place on the new form, each record is copied. Any fields which didn't exist on the old form are left blank on the new one. You can fill them in by updating each new file record. You can also COMBINE two files having identical forms into one file.

Filemanager+ is good at error trapping. If you make an input or operation error, the program warns you when you attempt to execute the current function. An arrow is even placed at the line where the error occurred. It is up to the user, in general, to figure out what went wrong during an input, but the program

gives help for other types of errors. *Filemanager+* reminds you of the field names appearing on the first page of your form whenever it asks for field name input. Aborting the current operation and returning to the menu is as easy as hitting the SELECT button.

As an added feature, *Filemanager+* is designed to function with the AXLON RAMDISK, transferring to and from RAMDISK and facilitating transfer of files from RAMDISK to the floppy disk for permanent storage. Searches on files residing in RAMDISK are very fast, since data is accessed at the same speed as RAM resident data.

I have only two complaints with *Filemanager+*. The first is that five menus are a lot to keep track of. Often, I can't remember all the commands or which menu a command is on. A pull-out card showing each menu and the flow of commands from menu to menu would be a big help. Secondly, whenever you CONVERT a file, the COMPUTED fields are left blank, even though defined. In order to fill in the COMPUTED fields, you must manually UPDATE every record. You often need to do this anyway after CONVERTing, but if all you did was change some field lengths or rearrange the fields, you would not need to UPDATE except to fill in the COMPUTED fields.

For all of its power, *Filemanager+* is remarkably easy to use. I highly recommend it. Support from Synapse Software is friendly and knowledgeable. My questions on the more technical aspects of *Filemanager+* were answered promptly. If you keep track of extensive files and data, then this program is definitely for you. 

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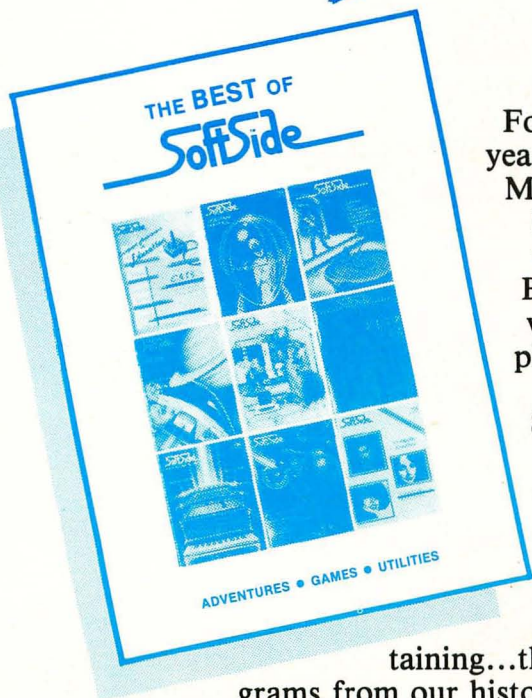
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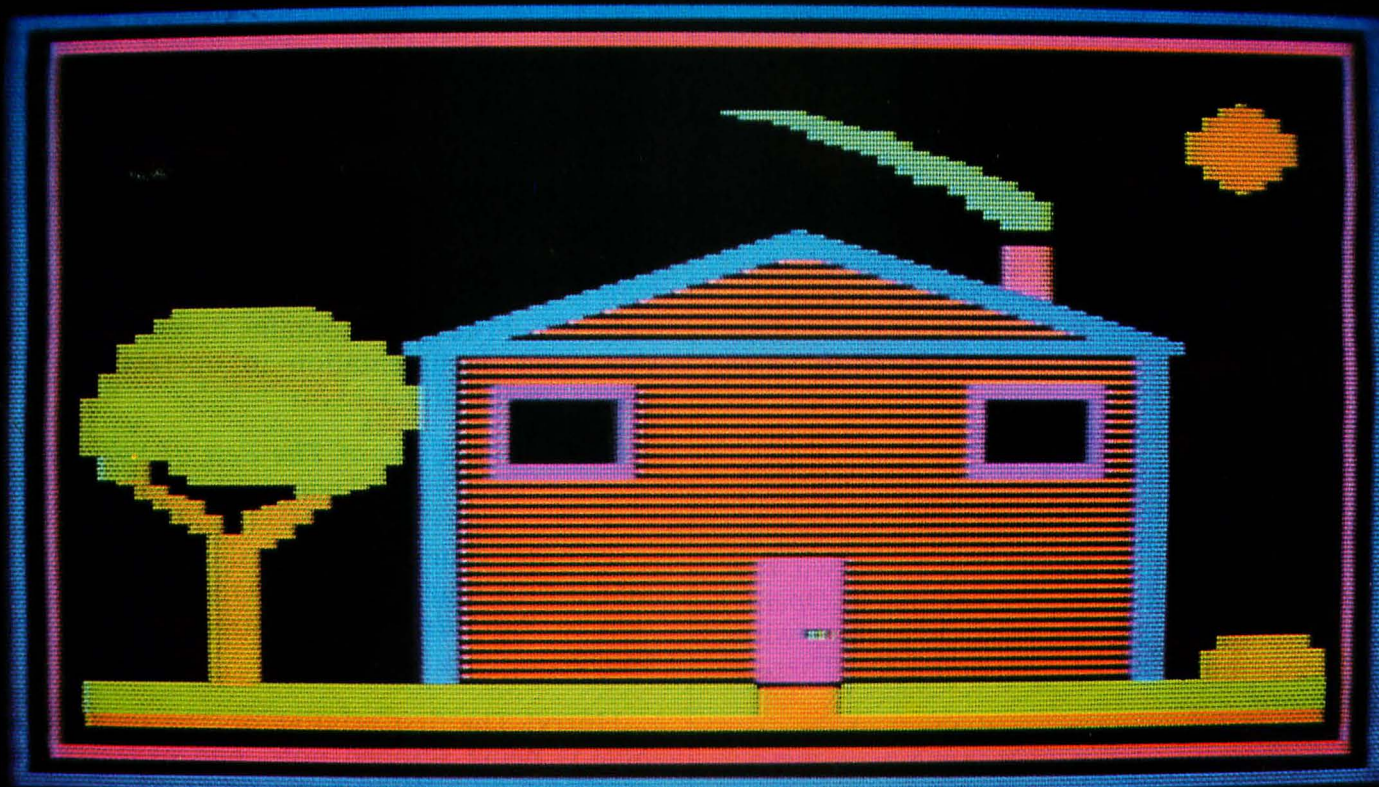
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GTIA Part 1: A BRILLIANT IDEA
By ALAN J. ZETT



If all the talk of display lists in the last few installments is getting you down, take a break as we explore the colorful world of GTIA. If you own an Atari® 400/800 bearing a shipping label dated January, 1981, or later, or an Atari 1200, congratulations! You have a GTIA computer; skip the next paragraph. If you're still not sure whether you have CTIA or GTIA, from GRAPHICS 0 try POKEing memory location 623 decimal with 64 decimal and type some characters on the screen. If the text looks like normal ATASCII characters, you have CTIA. Otherwise, the screen will be an interesting blur of graphics blocks that vaguely resemble ATASCII characters. This is caused by GTIA.

To upgrade to GTIA, you must spend a little money, and part with your Atari for a week or two. All Atari Service Centers perform GTIA upgrades. To locate the center nearest you, call the following toll free number provided by Atari, Inc.: 1-800-538-8543. Then, call ahead and make arrangements to have your computer upgraded, or buy the GTIA chip and install it yourself. The chip costs about \$22.50. If the service center installs it, you can expect to pay an additional \$60.00. The extra cost includes a thorough check-out of your computer, so it may be a worthwhile expense if your Atari needs a "tune-up." Note that this price is a general figure; actual prices may vary from center to center. You may be interested to know that *SoftSide* is planning to follow the GTIA trend. Within the next year, we

hope to convert our Atari support to GTIA computers only.

Many mysteries enshroud the GTIA chip. The GTIA adds three totally new graphics modes to any Atari 400/800 computer, and also affects the old graphics modes. Right now, let's get some general concepts down.

A Graphic Overview

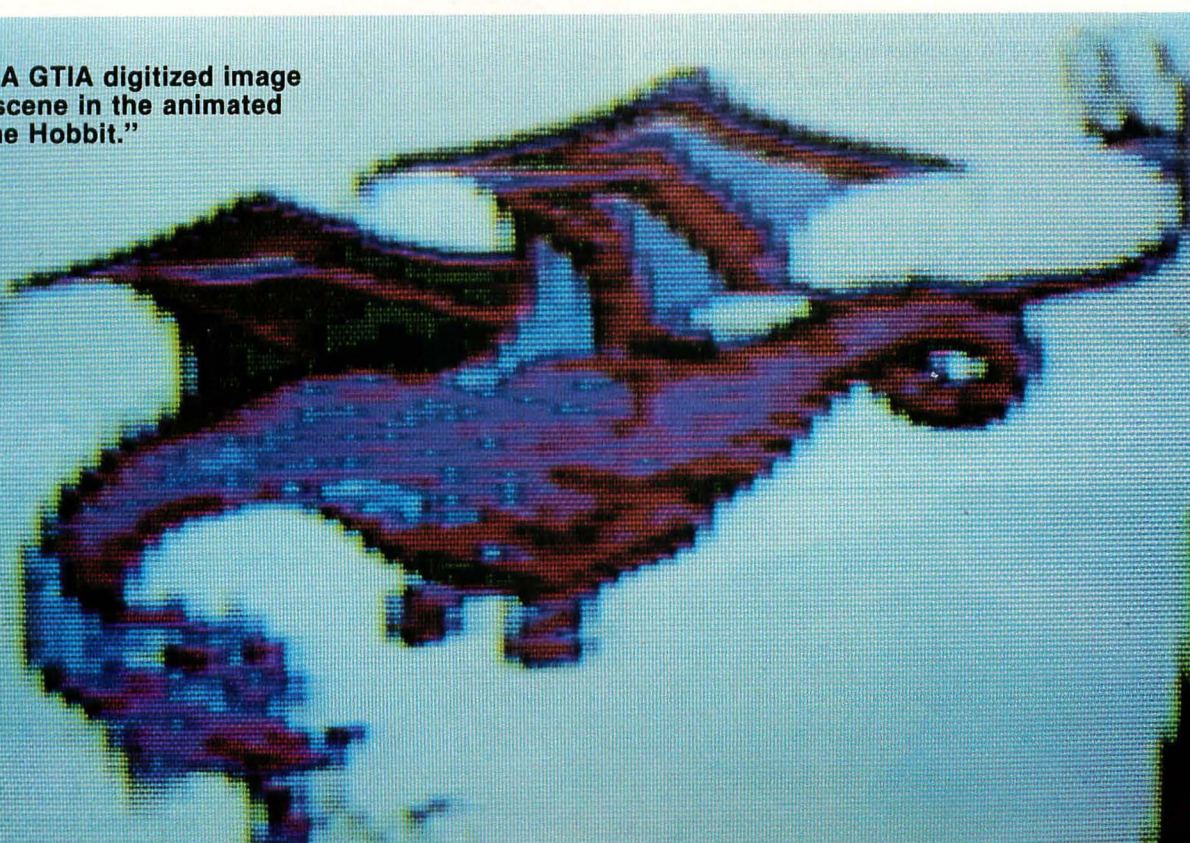
When we talk about color on the Atari, we are actually talking about three distinctly different things. To make sure we understand each other, I will explain each type.

- Hue: A particular frequency of light. The Atari has sixteen possible hues numbered 0 through 15.
- Luminance: A specific intensity of light. The Atari normally has eight different luminances numbered 0 through 15 in increments of two.
- Color: A combination of a hue and a luminance. The Atari normally has 128 different color choices.

Each new mode consists of a graphics screen with a resolution of 80 vertical by 192 horizontal blocks. This creates a Y coordinate range that allows you to plot color graphics on every scan line of the television display.

continued

RIGHT: A GTIA digitized image from a scene in the animated film "The Hobbit."



FACING PAGE TOP: Photo of the program "Farrah" from the Atari GTIA demo disk.
BOTTOM: Sample display created with "Doodle" in Graphics 11.

All photographs by ALAN J. ZETT

Atari Frontier *continued*

Although the width of a graphics dot in the *new* GTIA modes is several times longer than a GRAPHICS 8 dot, it is still only half the width of a GRAPHICS 0 text character. Add the multi-color capabilities to this and you can create some truly stunning displays.

The Operating System (OS) treats each of the new GTIA modes as a modified GRAPHICS 24 screen. GRAPHICS 24 is a full screen (no text window) GRAPHICS 8. The same data can be displayed in modes 8, 9, 10, or 11. The only differences are a smaller upper-limit for the X coordinate, and that none of the new GTIA modes have provisions for a text window. However, the similarities, when combined with the magic of Machine Language, overcome the few GTIA limitations. We'll find out more about this in the next installment. Right now, let's learn more about each new mode.

Shades of Gray

The first new GTIA mode is GRAPHICS 9, which is excellent for creating images of startling depth. It allows sixteen different luminances for any single hue. Yes, I said *sixteen!* Those not easily impressed may say: "So what? If I use CTIA in GRAPHICS 8 along with Display List Interrupts (DLIs), I can do the same thing." This is true, but CTIA supports only eight luminances for any given hue. Even though the SETCOLOR statement allows a value of 0 through 15 for luminances, the first bit is ignored by ANTIC. This means that every other luminance value (i.e. an odd numbered luminance) is treated as one value less. This results in eight different luminances of sixteen hues, or 128 colors. GTIA graphics mode 9 allows sixteen luminances. With GRAPHICS 9 and DLIs, the Atari can support a grand total of *256 distinct colors*, more than any CTIA computer could ever display. In fact, it's more than any other personal computer I know of! There is only one minor restriction; you can only have one hue on any one scan line of the display.

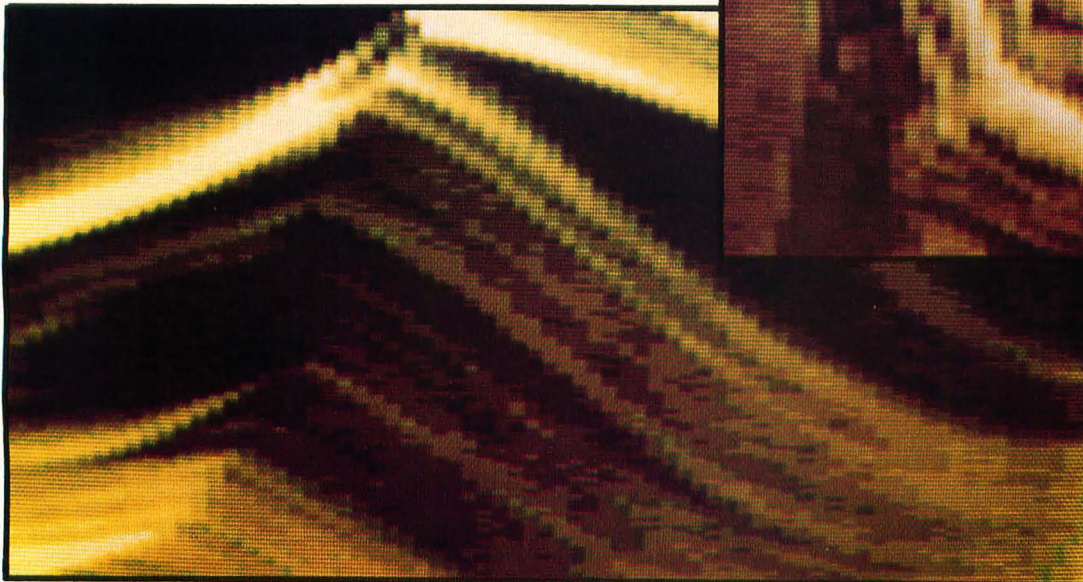
From normal BASIC operation, GRAPHICS 9 allows sixteen luminances of any one hue for all scan lines of the display. The background/border color is always the lowest luminance level of the selected main hue.

To use these new colors, we must set the base hue for GRAPHICS 9. This is done by setting color register 4 to the desired hue. From BASIC, this is as easy as SETCOLOR 4,n,0: where "n" equals the base hue number. Since color register 4 is

located at RAM location 712 decimal, we could also POKE the hue value there.

You'll get greater benefit from using POKEs instead of SETCOLORs for hue/luminance values because all numeric constants in Atari BASIC require six bytes of storage in RAM. The SETCOLOR statement takes three values, and each must be calculated. The POKE uses only two, and is therefore faster. If you use constants, SETCOLOR takes eighteen bytes of memory for them, but POKE only uses twelve bytes. The color register location holds the value computed by the formula: hue number multiplied by sixteen plus the luminance value. For example: hue 10, luminance 4 = $(10 * 16) + 4$ or 164. The POKE method also speeds up the calculation of this value from BASIC.

Since the hue of location 712 is the only value required for GRAPHICS 9, we must POKE 712 with the hue number multiplied by sixteen. This takes care of the base hue. The COLOR statement sets the different luminances. The value specified in a COLOR statement determines the luminance in which to PLOT. Luminances of 0 through 15 correspond to the statements COLOR 0 through COLOR 15. All graphics commands work in the normal manner. *continued*



ABOVE: A GTIA digitized image of a painting by Frank Kelly Freas.
LEFT: A GTIA digitized image of sand dunes.

Atari Frontier *continued*

Somewhere Over the Rainbow

GRAPHICS 11 allows one luminance in sixteen different hues. From normal BASIC operation, you can display up to sixteen different hues on each scan line of the screen. The background/border color is pure black, and cannot be changed. The luminance for all other colors is derived from the luminance value in color register 4. From BASIC, you can set the luminance with SETCOLOR 4,0,n or POKE 712,n: where "n" equals a luminance value from 0 to 15. Note, however, that in this mode, you can choose from only eight luminance levels.

This mode, when linked with DLIs, gives 128 different colors; up to sixteen hues in one luminance per scan line. Not bad at all! GRAPHICS 11 works like GRAPHICS 9. After setting the base luminance, select hues 0 through 15 with the statements COLOR 0 through COLOR 15.

Tutti-Frutti Displays

I've intentionally left the explanation of GRAPHICS 10 for last. It is the most impressive GTIA mode of all, and the hardest to understand and use.

GRAPHICS 10 allows you to create graphic masterpieces with eight main colors and one background/border color. How can this compare to modes offering sixteen hues or luminances? You can select GRAPHICS 10 colors from any hue and luminance combination. You can, with no internal trickery, display nine out of 128 possible colors on the display.

In GRAPHICS 9 and 11, you would never see a brown color (hue 15, luminance 2) next to a bright orange color (hue 2, luminance 10) on the same scan line of the display. You could have a different luminance *or* a different hue, but never a different luminance *and* hue. When using DLIs, GRAPHICS 9 can display 256 colors — sixteen different luminances of one hue per scan line, and GRAPHICS 11 can display 128 colors — sixteen different hues of one luminance per scan line. GRAPHICS 10 can display 128 colors — nine different colors per scan line! This is what makes GTIA so powerful.

Using GRAPHICS 10 from BASIC is a little tricky. The SETCOLOR command only works for color registers 0 through 4. To set up the other registers involved in GRAPHICS 10, you must POKE the colors into place. It's now obvious why I explained the use of POKE in place of SETCOLOR.

Figure 1: Map of Information for GRAPHICS 10

Memory Location	COLOR #	SETCOLOR#	Default Color
704 (02C0 hex)	COLOR 0	n/a	0 (00 hex)
705 (02C1 hex)	COLOR 1	n/a	0 (00 hex)
706 (02C2 hex)	COLOR 2	n/a	0 (00 hex)
707 (02C3 hex)	COLOR 3	n/a	0 (00 hex)
708 (02C4 hex)	COLOR 4	0	40 (28 hex)
709 (02C5 hex)	COLOR 5	1	202 (CA hex)
710 (02C6 hex)	COLOR 6	2	148 (94 hex)
711 (02C7 hex)	COLOR 7	3	70 (46 hex)
712 (02C8 hex)	COLOR 8	4	0 (00 hex)

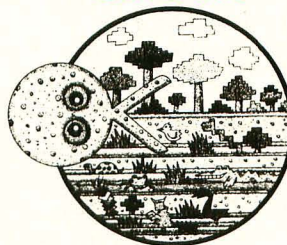
The GRAPHICS 10 memory locations are shown in Figure 1. For determined purists, those registers that can be modified with SETCOLOR are shown as well. The background/border color is at location 704 decimal. Its color is selected from BASIC with a COLOR 0 statement. All colors are selected with COLOR 0 through COLOR 8. Refer to Figure 1 for memory

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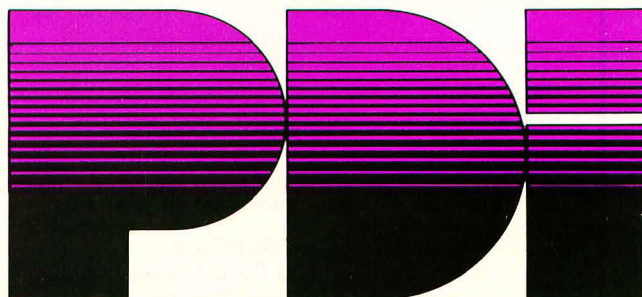


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Atari Frontier *continued*

locations corresponding to a particular COLOR statement. All other graphics commands work in the normal-manner.

The Atari's ability to change the color of graphics blocks already drawn on the display is noteworthy. This technique is known as "Graphics Indirection." In GRAPHICS 9, changing the hue of location 712 decimal causes all graphics blocks to change their base hue while maintaining their luminance level. In GRAPHICS 11, changing the luminance in location 712 decimal causes all of the graphics blocks to change their luminance while staying the same hue.

In GRAPHICS 10, however, we have nine different registers to modify. The possibilities available here are very numerous. Consider an arcade game like *Centipede*. The graphics blocks always follow the same rules for movement. In fact, the animation is done with the same graphics characters on every rack. The only difference between racks, other than the increasing level of difficulty, is the value of the color register associated with each type of graphics block. This technique is impressive when used in Atari BASIC programs as well, and is only one of many capabilities built into the Atari. When these abilities are teamed with GTIA, *look out*.

Chromatic Drawbacks

Now that you know GTIA's advantages, let's review its disadvantages.

GTIA displays all colors differently, i.e. CTIA colors look different on GTIA. You need to modify CTIA programs to make the colors look the same. Most new Atari programs with extensive color provide corrections for CTIA owners.

Sometimes, however, you can't modify the program satisfactorily. Take GRAPHICS 8 for instance. When you draw with COLOR 1, you get white. But, by plotting every other dot (only on even or odd X coordinates) you can trick the Atari hardware into displaying two more colors through a technique known as artifacting. (For a further explanation of artifacting, see Appendix IV of *De Re Atari*, Television Artifacts.) This method was used to get the high resolution color display for the program *Solitaire*. *Solitaire* was written on a CTIA machine before GTIA was common. The result: instead of red hearts and diamonds, and black clubs and spades, GTIA shows green hearts and diamonds, and blue clubs and spades.

In this instance, no other color combination or plot position renders a red and black combination, or anything close to red and black. To give a much sharper text display, Atari chose to use different primary colors in the text. The color red is now impossible to artifact. The only possible colors to artifact are blue and green. Some people kiddingly call the GTIA chip the Green Television Interface Adapter because of this effect.

What is the result? Even though GTIA makes *Solitaire* unsightly, it is an isolated case. GTIA's new color graphics modes compensate for the few incompatibilities. There really isn't any great need for the artifacting technique.

GTIA promises even more graphically exciting games and simulations than CTIA. Take a look at the photographs at the beginning of this article, produced with GTIA. Think of the possibilities!

What's Next?

Turn your attention now to Program Listings 1, 2, and 3, a collection of GTIA demos. Each displays one of the GTIA's hidden abilities and warrants some explanation.

To use the demos, type them in, one at a time, SAVE them and type RUN. Each demo consists of a number of smaller demos, and repeatedly pressing any of the console keys sends you to the next one.

Program Listing 1 is a computer-controlled, quad-drawing program. It uses GRAPHICS 11 for a total of sixteen hues on the display at one time. When you have seen enough of one drawing, press any console key to display a new one. To exit the program, use BREAK.

Program Listing 1

```

10 GRAPHICS 11:POKE 712,6:CLR
20 XM=(RND(0)*39)+40:X=1
30 YM=(RND(0)*95)+96:Y=1
40 XI=RND(0)+0.2:YI=RND(0)+0.55
50 COLOR INT(RND(0)*9)+1
60 PLOT X,Y
70 PLOT 79-X,Y
80 PLOT X,191-Y
90 PLOT 79-X,191-Y
100 X=ABS(X+XI):Y=ABS(Y+YI)
110 IF X+XI>XM-1 THEN XI=-XI:GOTO 50
120 IF Y+YI>YM-1 THEN YI=-YI:GOTO 50
130 IF X+XI<1 THEN XI=-XI:GOTO 50
140 IF Y+YI<1 THEN YI=-YI:GOTO 50
150 IF PEEK(53279)<>7 THEN RUN
160 GOTO 60
    
```

Among other things, Program Listing 2 demonstrates the technique of color indirection with GRAPHICS 10. All of the colors are selected and placed in memory locations 704 through 712 decimal, and then shifted by one. By this, I mean that location 705 is POKED with the value of 704, and so on, up to location 712, which is brought back around to location 704. This causes all

continued

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Atari Frontier continued

of the colors to rotate, simulating motion on the screen. To step through the demos, press any console key. This program contains many demos, so just keep watching.

Program Listing 2

```

10 CLR :GRAPHICS 9
20 FOR X=0 TO 69 STEP 10
30 C=0:COLOR 0
40 FOR Y=90 TO 189 STEP 3
50 PLOT X,Y:DRAWTO X+10,200-Y
55 C=C+0.42:IF C>15 THEN C=0
56 COLOR C
60 NEXT Y:NEXT X:C=0
70 GOSUB 145:C=C+1:POKE 712,C*16
80 IF C<15 THEN 70
100 CLR :GRAPHICS 9:Y=0
110 Y=Y+1:COLOR 15-INT(Y/12)
120 PLOT 0,Y:DRAWTO 79,Y
130 IF Y<191 THEN 110
140 C=0:GOTO 160
145 P=PEEK(53279):IF P=7 THEN 145
150 P=PEEK(53279):IF P=7 THEN RETURN
155 POKE 53279,0:GOTO 150
160 GOSUB 145:C=C+1:POKE 712,C*16
170 IF C<15 THEN 160
200 GRAPHICS 10:FOR X=4 TO 11:POKE X+7
01,X*16+6:NEXT X:CLR
210 COLOR 1
220 FOR X=0 TO 69 STEP 10:C=1
230 FOR Y=80 TO 190 STEP 3
240 PLOT X,Y:DRAWTO X+10,200-Y
250 C=C+0.16:IF C>7 THEN C=1
260 COLOR C
270 NEXT Y:NEXT X
280 A=PEEK(705):FOR X=706 TO 712:POKE
X-1,PEEK(X):NEXT X:POKE 712,A:IF PEEK(
53279)=7 THEN 280
300 GRAPHICS 11:CLR :POKE 712,4
305 X=-1
310 X=X+1:COLOR INT(X/5)
315 IF X/5=INT(X/5) THEN COLOR 0
320 PLOT X,0:DRAWTO X,191
330 IF X<79 THEN 310
340 IF PEEK(53279)=7 THEN 340
400 GRAPHICS 11:CLR :POKE 712,2
405 Y=-1
410 Y=Y+1:COLOR INT(Y/12)
415 IF Y/12=INT(Y/12) THEN COLOR 0
420 PLOT 0,Y:DRAWTO 79,Y
430 IF Y<191 THEN 410
440 IF PEEK(53279)=7 THEN 440
    
```

Program Listing 3 demonstrates another hidden feature of GTIA. Since each horizontal line has a resolution of one physical scan line on the display, you can use this to create more than 256

colors directly from BASIC without DLIs! The method used is a technique I call color interlacing. By plotting a block of one color directly above or below a block of another color, the two colors seem to blend because of the way the human eye interprets color. The result is a graphics block of slightly less resolution (effectively a display of 80 by 96) but of a color normally unavailable on the Atari. I call Program Listing 3 *Painter* because it demonstrates how two primary colors of the same luminance can be interlaced to produce a totally different color. When using *Painter*, you can select new colors by pressing any console key, or pressing BREAK to exit.

Program Listing 3

```

10 GRAPHICS 11
20 POKE 712,2
30 P=INT(RND(0)*16):S=INT(RND(0)*16)
40 IF P=S DR P=0 DR S=0 THEN 30
50 FOR Y=0 TO 100 STEP 2
60 COLOR P:PLOT 5,Y:DRAWTO 43,Y
70 PLOT 55,Y/2:DRAWTO 75,Y/2
80 COLOR S:PLOT 12,Y+1:DRAWTO 50,Y+1
90 PLOT 55,Y/2+53:DRAWTO 75,Y/2+53
100 NEXT Y
200 IF PEEK(53279)=7 THEN 200
210 RUN
    
```

While this program is written in GRAPHICS 11, color interlacing is most effective in GRAPHICS 10 where you can mix the hues as well as their luminances. A clever Atari programmer can create graphic displays on a screen with 80 by 96 resolution in literally thousands of new and different colors! The possibilities are endless.

The program *Doodle*, by Scott Berfield, allows you to paint on the screen in any of the new GTIA graphics modes. You can choose from two brush sizes, and select the bank of colors to use. You will discover GTIA's versatility as you experiment with *Doodle*. Play with it awhile, and you're sure to come up with ideas for writing your own GTIA programs.

Gazing Into the Crystal Ball

You may have noticed how often I mentioned DLIs in this column. I said some pretty astonishing things like "128 colors" and "256 colors." In the next installment, I will prove my statements with graphic examples, as the ominous subject of Display List Interrupts rears its ugly head for the last time. GTIA presents some drawbacks and advantages to the Machine Languages

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programmer. To ANTIC, GTIA is literally not what it seems. In any case, you will be amazed at your Atari's capabilities when we discover *GTIA Part II: The Interrupted Color*. Also in the near future, by popular request, we'll have a tutorial on screen scrolling/mapping techniques, and, later, an entire *Frontier* series on Player/Missile Graphics. Until next time; sit back, relax, write a letter with suggestions, comments, or just plain questions; and above all, explore your Atari's frontier!

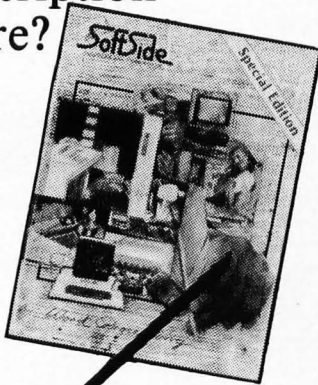
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SS SS SS SS SS SS SS SS SS SS
SS                               SS
SS      Atari BASIC              SS
SS      "Doodle"                  SS
SS Program by: Scott Berfield    SS
SS                               SS
SS      Copyright (c) 1983        SS
SS SoftSide Publications, Inc    SS
SS                               SS
SS SS SS SS SS SS SS SS SS SS
    
```

```

10 GRAPHICS 0:POKE 752,1?:GOTO 270
20 Z=PEEK(764):POKE 77,0:IF Z<>255 THEN
   N POKE 764,255:GOSUB 90
30 IF STRIG(0)=0 THEN 200
    
```

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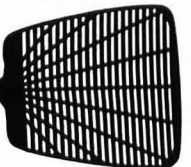
```

40 XP=XP+XD(STICK(0)):YP=YP+YD(STICK(0)):IF XP<0 THEN XP=79
50 IF XP>79 THEN XP=0
60 IF YP>160 THEN YP=0
70 IF YP<0 THEN YP=160
80 COLOR ABS(C-CMAX):PLOT XP,YP:COLOR C:PLOT XP,YP:GOTO 20
90 IF Z=6 THEN 140
100 IF Z=35 THEN GRAPHICS 0:B=BMIN:C=C MIN:GOTO 330
110 OB=B:OB1=B+1:OC=C:B=B+2:C=C+1:IF C >CMAX THEN C=CMIN
120 IF B>BMAX THEN B=BMIN
130 GOTO 160
140 OB=B:OB1=B+1:OC=C:B=B-2:C=C-1:IF C <CMIN THEN C=CMAX
150 IF B<BMIN THEN B=BMAX
160 COLOR OC:PLOT BAR(OB),183:DRAWTO B AR(OB1),183
170 IF C<INT(.5*CMAX) THEN COLOR CMAX
180 IF C>INT(.5*CMAX) THEN COLOR CMIN
190 PLOT BAR(B),183:DRAWTO BAR(B+1),183:COLOR C:RETURN
200 IF STRIG(0) THEN 20
210 XP=XP+XD(STICK(0)):YP=YP+YD(STICK(0)):IF XP>78 THEN XP=1
220 IF XP<1 THEN XP=78
230 IF YP<1 THEN YP=159
240 IF YP>159 THEN YP=1
250 PLOT XP-1,YP-1:DRAWTO XP+1,YP-1:PL OT XP+1,YP:DRAWTO XP-1,YP:PLOT XP-1,YP +1:DRAWTO XP+1,YP+1
260 GOTO 200
270 DIM XD(15),YD(15),BAR(32),C(8)
280 CMIN=0:FOR I=1 TO 15:READ N:XD(I)= N:READ N:YD(I)=N:NEXT I
290 DATA 0,0,0,0,0,0,0,0,1,1,1,-1,1,0, 0,0,-1,1,-1,-1,0,0,0,0,1,0,-1,0,0
300 FOR Q=1 TO 32:READ L:BAR(Q)=L:NEXT Q
310 DATA 8,11,12,15,16,19,20,23,24,27, 28,31,32,35,36,39,40,43,44,47,48,51,52 ,55,56,59,60,63,64,67,68,71
320 ? CHR$(125):"INSTRUCTIONS?":OPEN # 1,4,0,"K":GET #1,A:CLOSE #1:IF A=89 T HEN 600
330 GRAPHICS 0?:CHR$(125):"ENTER GRAP HICS MODE(9,10,11)":INPUT M
340 IF M=11 THEN ? "WHAT LUMINANCE?":I NPUT L:BMIN=1:BMAX=31:CMAX=15:GRAPHICS M:SETCOLOR 4,0,L:B=BMIN:GOTO 390
350 IF M=9 THEN ? "WHAT BACKGROUND COL OR?":INPUT BC:BMIN=1:BMAX=31:CMAX=15:G RAPHICS M:SETCOLOR 4,BC,0:B=1:GOTO 390
360 GRAPHICS 0?:"GRAPHICS 10 ALLOWS Y OU TO USE ANY?":? "9 OF THE 128 POSSIBL
    
```

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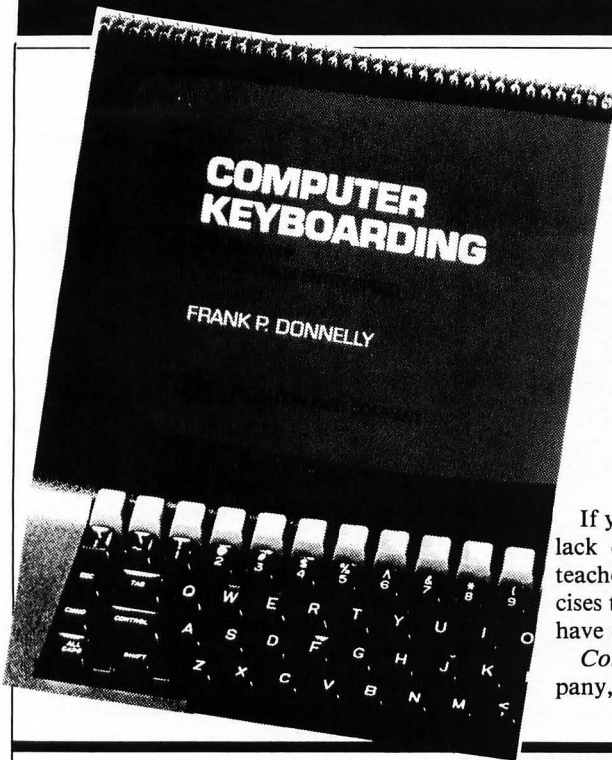
E ATARI COLORS."
365 ? "THE BACKGROUND IS SET BY THE FI RST":? "COLOR YOU CHOOSE."
370 FOR Q=0 TO 8
372 POSITION 2,15?:CHR$(156):CHR$(156 );CHR$(156):"COLOR #";Q;" HUE,LUMINANC E":INPUT H,L
374 IF H<0 OR L<0 OR H>15 OR L>15 THEN 372
376 C(Q)=H*16+L:NEXT Q
380 BMIN=9:BMAX=25:CMAX=8:GRAPHICS 10: FOR Q=704 TO 712:POKE Q,C(Q-704):NEXT Q:B=BMIN
390 C=CMIN:COLOR C:FOR I=BAR(BMIN) TO BAR(BMAX) STEP 4:FOR J=0 TO 3:PLOT I+J ,168:DRAWTO I+J,183:NEXT J
400 C=C+1:COLOR C:NEXT I:C=CMIN
410 COLOR C:XP=39:YP=95:PLOT XP,YP:COL OR ABS(C-CMAX):PLOT BAR(BMIN),183:DRAW TO BAR(BMIN+1),183:GOTO 20
600 ? CHR$(125):" WHEN THEN SCREEN IS SET UP YOU?":? "WILL SEE A PALETTE BAR AT THE BOTTOM"
610 ? "WITH A BLINKING DOT IN THE MIDD LE OF?":? "THE SCREEN.":?
615 ? " TO CHOOSE A COLOR PRESS TH E LEFT?":? "OR RIGHT ARROW KEYS UNTIL T HE MARKER"
620 ? "IS BENEATH THE COLOR YOU WANT. THE?":? "CURSOR WILL THEN CHANGE TO THE COLOR?":? "OF YOUR CHOICE."
630 ? :? " TO DRAW, JUST PICK THE COLOR YOU?":? "WANT AND MOVE THE JOYSTI CK. TO DRAW"
640 ? "WITH A THICKER LINE, HOLD DOWN THE?":? "TRIGGER WHILE MOVING THE JOYST ICK."
650 ? :? " IF YOU WANT TO START OV ER, JUST?":? "PRESS 'N' AT ANY TIME."
660 POSITION 9,21?:? "PRESS RETURN TO S TART"
670 OPEN #1,4,0,"K":GET #1,R:CLOSE #1 :GOTO 330
    
```

SWAT TABLE



For ATARI® DOODLE

LINES	SWAT CODE	LENGTH
10 - 120	AI	492
130 - 240	SQ	402
250 - 320	UV	565
330 - 372	TK	575
374 - 610	MA	545
615 - 670	JK	548




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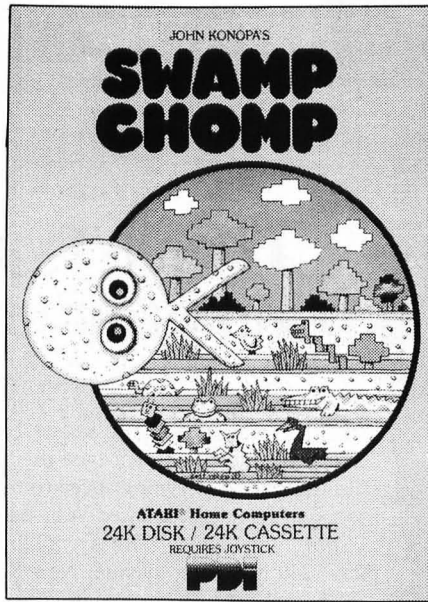
The *Color-I Plus* features handsome cabinetry, including a built-in carrying handle and front compartment controls to make adjustments easy. It is available for \$449 from: Amdek Corporation, 2201 Lively Blvd., Elk Grove Village, IL 60007.



Can You Survive The Perils Of The Swamp?

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New PC Graphics Utility Introduced

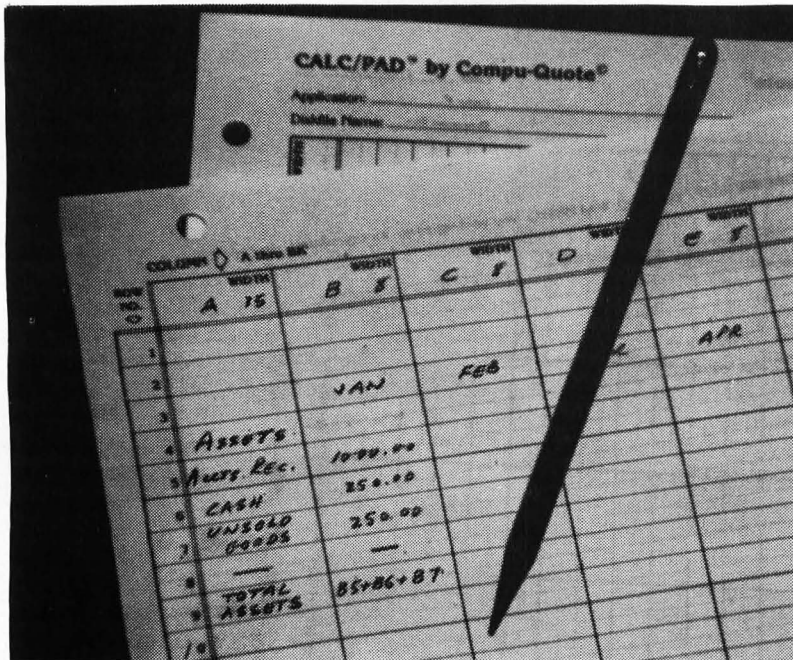
PE *Graphics Utility* is a set of easy-to-use, powerful programs for the IBM® PC. It will stand alone as a graphics generator, or display various character sets and shapes from a BASIC program. The shapes are created and edited on a large grid with the actual size shape displayed to the side. Shapes can be as large as 39 x 39 pixels. In addition, listable demonstration programs and sub-routines with accompanying explanations show you how to use the shapes you create in your own programs.

Graphics Utility requires an IBM PC with 64K, PC DOS and the color/graphics card. Its retail price is \$55.00. To order, call or write: Savant Software, P.O. Box 42888, Suite 164, Houston, TX 77042; 1-(800) 231-9900 (outside Texas), (713) 556-8363 (inside Texas).

18K Static RAM Card For The Apple®

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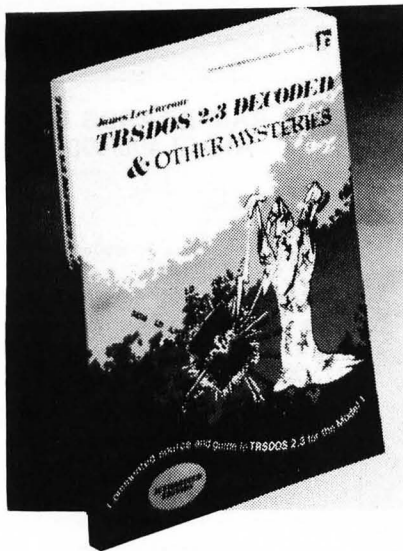
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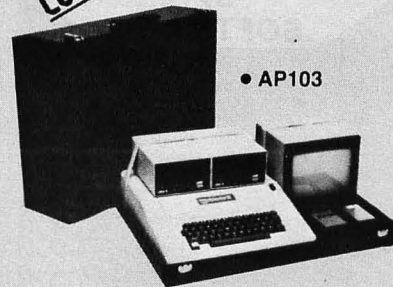
tire TRSDOS operating system code with detailed comments.

TRSDOS 2.3 Decoded & Other Mysteries is priced at \$29.95 and is available at book stores or directly from IJG, Inc., 1953 West 11th Street, Upland, CA 91786. (Add \$4.00 for shipping and handling.)

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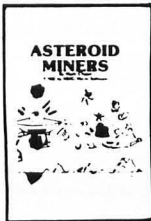
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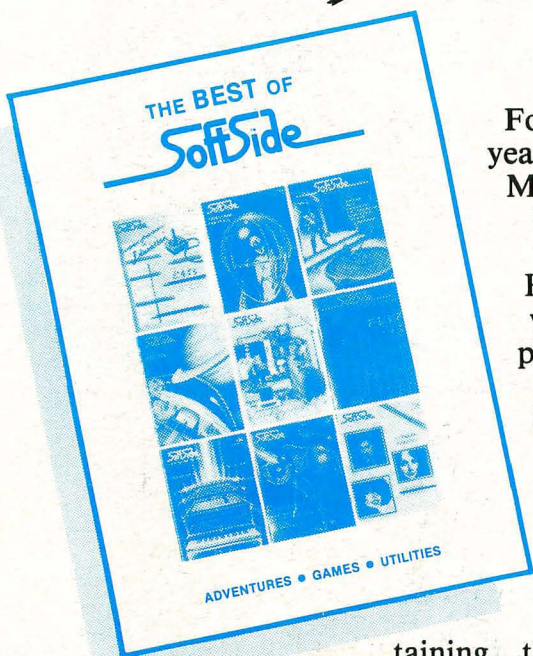
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