

creative computing

April 1980
vol 6, no 4
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the #1 magazine of computer applications and software

Atari 400 vs. Pet

Heath WH-89 —
In-depth evaluation

David Levy:
Intelligent Games

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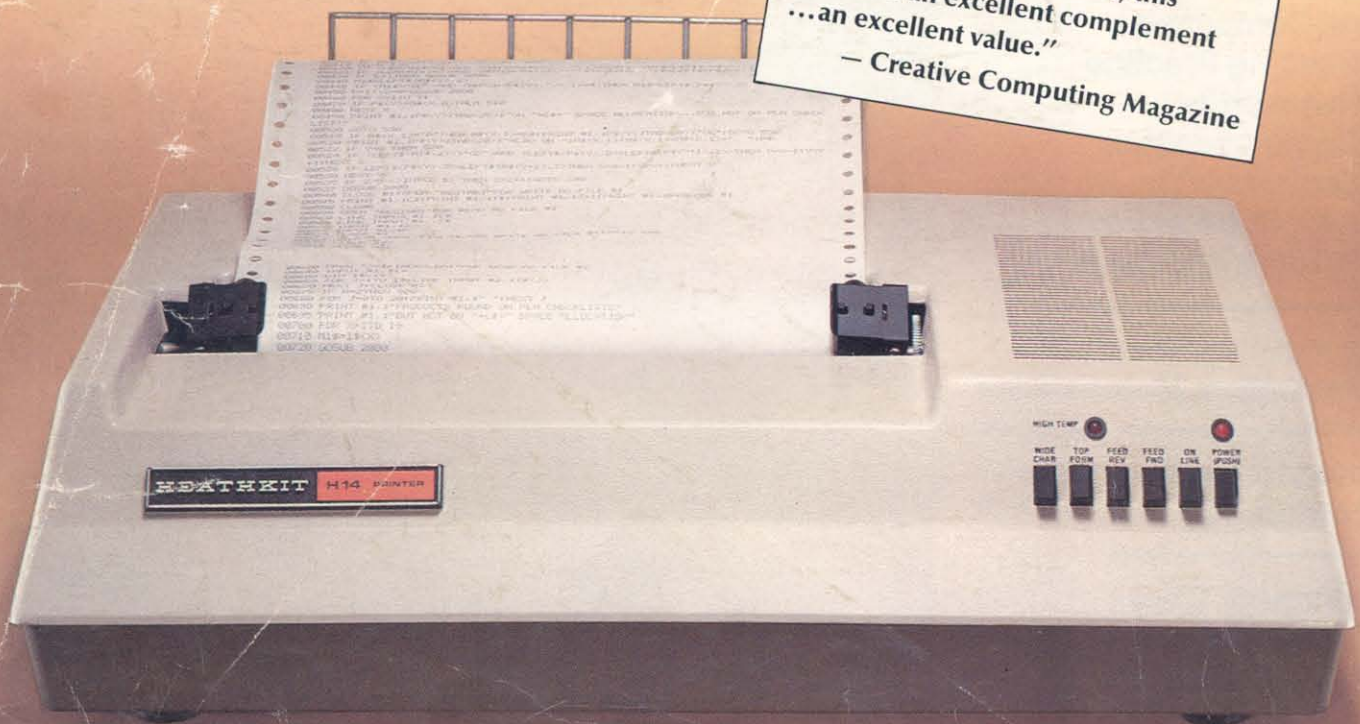
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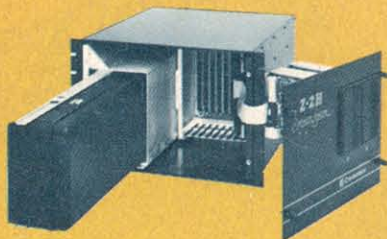
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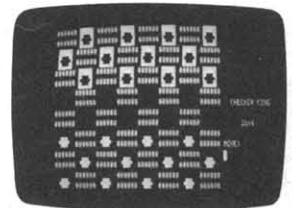
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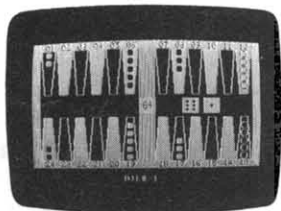
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Checker King



Gammon Gambler



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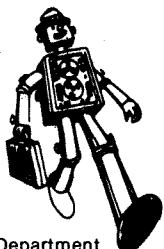
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SYSTEM DOCTOR does a thorough diagnostic check of your entire computer system. It lets you know if something is wrong before you spend time programming or entering data. The program checks the ROM to ensure that every bit is functional and checks the RAM six different ways. The disk drives are also tested in a variety of ways to ensure reliability. The cassette recorder is also tested for speed, volume and distortion with the help of a calibration tape provided with the program. The video memory and display are also checked as well as the line printer. **SYSTEM DOCTOR** also does a 12-hour check of the entire system and records the results on tape, disk or the screen. As a bonus, this program also includes the **DISK DRIVE HEAD CLEANER**. The card insert that cleans the head can be obtained free by mailing in the coupon provided. For \$28.50, **SYSTEM DOCTOR** is the first complete diagnostic program for the TRS-80. A disk version is available for \$38.50.

LINE PRINTER by Dosse Segbeaya is a machine language program that accelerates printing on Centronics printers by making it a background task. Requiring 32K and a disk drive, this program enables the user to set aside up to 16K of memory as buffer which when filled is sent to the line printer while your Basic program continues to run. Any Basic program that uses LPRINT's will run significantly faster with this program. Also included is the ability to set the number of characters per line, the number of lines per page, the spaces between lines, and the left, top and bottom margins. Page numbers can be placed anywhere on the first line starting at any given number. Printouts of anything that is on the screen can also be made by hitting shift/break. If you do programming and you use multistatement lines, **LINE PRINTER** enables you to LLIST your program with single statement lines. This rather amazing program is resident in high memory as it interfaces with almost any Basic program. It sells on disk for \$24.50.



BASIC TOOLKIT by F. Barry Mulligan is a basic programmer's dream come true. Requiring 16K or more, this program has the following features. Variables Map-Gives an alphabetical listing of each variable used, a list of the lines the variables appear on, and shows the number of times the variable appears on the line. Goto X Ref-Lists in numerical sequence the destination of each GOTO and GOSUB statement and the line number that it appears on. Recall-Allows you to recall a program after you have hit reset, accidentally typed NEW or have booted back to DOS. Merge-Enables you to merge tape or disk programs. Test Memory-Does a thorough check of memory to be sure every location is operable. Search Memory-Search for every occurrence of a two-byte combination and list the location where it occurs. **BASIC TOOLKIT** is resident in memory while programming and is accessed by hitting shift/break. A must for basic programmers, this utility sells for \$19.80 on tape, \$29.80 on disk.

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Math & Technology Program Computer Camp

The National Institute of Education (NIE) and the National Science Foundation are initiating a joint program of development and research to improve the teaching and learning of school mathematics through the use of modern information-handling technology.

Primary emphasis on the program is on the development of prototypes of educationally relevant software, instructional courseware, and methods for assessing students' progress. These should respond to pedagogical needs and opportunities, be developed with the involvement of students and teachers and appropriately modified on the basis of experience. Associated research aimed at improving our knowledge of mathematics teaching and learning processes is an essential element in the program.

Two concerns inform the development and operation of this program. First is a need to devise ways of using new information-handling technology to reduce existing inequalities in educational performance. Secondly, the development of prototypes must proceed from the outset with a concern for assuring the successful adaptation of new technology in classrooms.

Mailing of announcements will be hastened if requests are accompanied by two self-addressed adhesive labels.

Science Education Directorate
National Science Foundation
Washington, D.C. 20550
(Telephone: 202 282-7910)

Pet Correction

Greg Yob has sent a correction for the March PET column. On page 161, the first example under "The PET Is Logical" should be:

AND: 1100 If both bits are one, the 0101 result is a one. If they 0100 don't, it gives zero.

Computer Camp

Plans for the fourth annual Camp Retupmoc have been announced by Rose-Hulman Institute of Technology. The program provides an intensive six-day computer workshop intended for college-bound males who have completed their junior year of high school.

Instruction in Basic will be provided along with lectures from computer experts and scientists, some from business and industry, on computer applications. No previous computer experience is necessary for any of the first five sessions to be held June 8-13, June 15-21, June 22-27, July 6-11, and July 13-18. The last camp, to be held July 20-25, is for students with previous experience in programming, and will concentrate on APL.

Contact Dr. John Kinney, Director of Camp Retupmoc, Rose-Hulman Institute of Technology, 5500 Wabash Ave., Terre Haute, IN 47803.

RF Modulator Tip

Personal Computer owners who plan to use their computer with a TV set should be aware of the following: If the tuning of the set is quartz frequency controlled with no user fine tuning, as is the latest trend, the Sup-R-Mod II by M&R Enterprises, and other RF modulators with no provision for tuning, may not work. Use a modulator which has frequency tunability such as the one available from ATV Research, 13th and Broadway, Dakota City, NE 68731.

Thanks to Donald J. Stoner of Cudahy, WI for this information.

Real Estate Correction

For those of you experiencing problems with line 250 of the listing for Real Estate Analysis (p.66, Feb. '80 *Creative*), Mr. Liebman writes that it should read:

$K=1 \rightarrow R2(J):L=K \uparrow MO(J):N=M(J)*R2(J)*L$

In addition, he points out a problem with line 1150 which should read as follows:
IF JFLAG<2 THEN GOTO 1180.

Language Symposium

The Vassar College Cognitive Science Group will hold a two-day symposium, April 25 and 26, 1980 at the Vassar campus in Poughkeepsie, New York. The symposium will be devoted to an exploration of the role which context plays in perception and interpretation of language. Context will be considered from the points of view of social, perceptual, intentional, linguistic, and computational analysis and the ways in which they are related.

Participation in the conference will be limited to the first 150 people who pre-register.

Please contact: Cognitive Science Symposium, Vassar College, Box 525, Poughkeepsie, NY 12601 USA, (914) 452-7000, ext. 2407.

S-100 Magazine

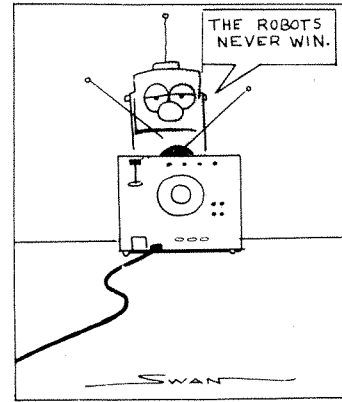
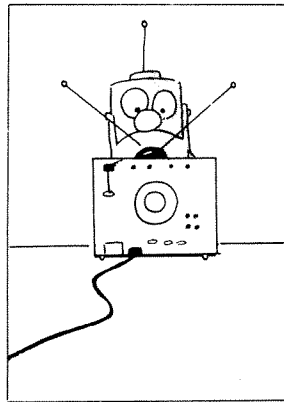
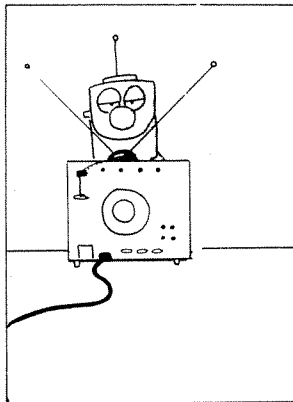
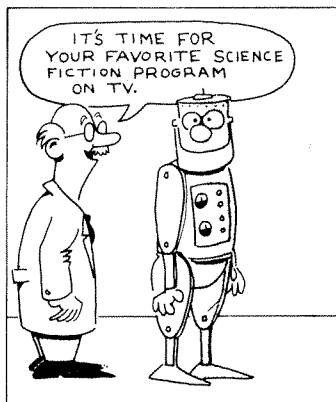
S-100 Microsystems is a new publication directed at users of S-100 microcomputer systems. It will be a forum on S-100 topics such as interfacing, CP/M, Pascal, Assembler, Fortran and Basic software.

Sol Libes, a pioneer in the field of personal computer systems will edit the publication. He is the founder and past president of the Amateur Computer Group of New Jersey.

S-100 MICROSYSTEMS will be published 6 times a year and sample copy is \$2. Charter subscription is \$7.50 (1 yr.), \$14 (2 yr.) or \$21.50 (3 yr.), prepaid USA. Canada is \$9/yr. and Foreign \$20/yr. (add \$12 for Air Mail). This charter subscription offer expires April 30th, 1980.

For more information contact: Sol Libes, 201-277-2063, S-100 MICROSYSTEMS, Box 1192, Mountainside, NJ 07092.

Conversation enriches the understanding, but solitude is the school of genius.—Edward Gibbon





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Add the Electric Crayon™ to your system and your keyboard becomes a palette, the tv screen your medium.

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Or you run any of innumerable programs. Your own BASIC language programs that generate dynamic pyrotechnic images, laugh-provoking animations.

From a combined alphanumeric-semi-graphics mode to a high resolution 256- by 192-element full graphics mode, the microprocessor-controlled Electric Crayon™ is capable of generating 10 distinctly different display modes.

Colors are brilliant and true, and up to eight are available depending on the mode.

As shipped, the Electric Crayon™ interfaces a TRS-80* computer. It may be easily

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But that's not all

The Electric Crayon is not just a color graphics generator/controller.

It is also a complete self-contained control computer. With built-in provision for 1K-byte of on-board program RAM, an EPROM chip for extending EGOST™, its on-board ROM graphics OS, and a dual bidirectional eight-bit port — over and above the computer/keyboard port — for peripherals. The applications are endless.

Shipped with EGOST™, 1K-byte of display memory and a comprehensive user's manual that includes an assembly language listing of EGOST™ and listings of BASIC demo programs, the Electric Crayon™ costs only \$249.95.

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- Electric Crayon™ Sketchpad, a sketching grid of proportioned picture elements (pixels) in a tv aspect ratio. For 128 x 192 or 256 x 192 graphics modes. 11-inch by 17-inch, 25-sheet pads: \$3.95 per pad.

SYSTEM REQUIREMENTS: the video circuitry of the Electric Crayon™ provides direct drive input to a video monitor or modified tv set. An internal up-modulator for rf antenna input may be constructed by adding inexpensive components to the existing video circuitry.

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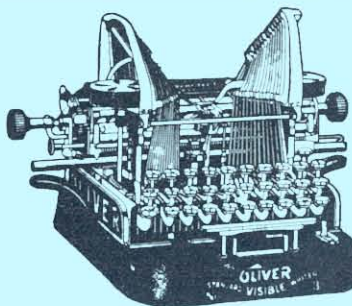
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Input/ Output



Appause for the SWTP 6809

Dear Editor:

This is in reply to Mr. Glen Worstell's letter (Feb.'80) regarding the SWTP 6809 system and his problems with it. We have ordered and received two SWTP 6809 systems here at NYU. One is the 6809-S with 128K of memory and the other is the 6809-A with 56K of memory. Both systems simply plugged together, plugged in and worked perfectly the first time. There have been no problems with the ROM SBUG-E monitor, the double-sided, double-density disks work perfectly and the CT-82 smart terminal is a delight. We have found the ROM documentation complete and useful and the information on the dynamic address translator to be perfectly adequate. Whenever we have called SWTP, their response has been very knowledgeable, helpful, and downright friendly! This goes for the president and includes all the staff in engineering and service.

One must realize that the 6809 is a very complex and sophisticated piece of hardware with a set of instruction modes as rich as the DEC PDP-11/34. The DAT resembles the PDP-11 memory management unit, and the orthogonality of registers is similar. The sequence of stack manipulations is different between the 6800 and the 6809, which can lead to much confusion to the programmer new to the 6809.

I can only assume that Mr. Worstell as president of Parsec Systems has a rusty axe to grind, or that he and his staff lack the technical sophistication to properly implement and appreciate the SWTP 6809.

Ted Wolff
NYU Medical Center
400 E. 34th Street
New York, NY 10016

SWTP Responds

Dear Editor:

Regarding the "unhappy" letter (Feb.'80, pag.13), I would like to respond to Worstell's inaccurate and intemperate statements and innuendos about the SWTP 6809 computer.

First, his complaint concerning the "non-existence" of documentation for the ROM monitor is nonsense. Enclosed is a copy of the User's Guide for the SBUG-E which is supplied to every purchaser of our computer including the complainant. Worstell's demands upon our company related to the proprietary design information for the monitor which is not provided with the computer, but which, in no way, limits the usability of the computer for the purpose for which it is sold.

Worstell's statement concerning "several bugs" in the monitor cannot be substantiated, and though we asked him for specifics, he would not, or could not, provide details. If such a problem were to exist, though none of our many other users have reported a problem, common sense tells you we would want to know the details and correct the problem, at once, for all of our users.

Worstell's second complaint concerned what he called the

memory mapping hardware. He complained that there was "no documentation on how to use it or how it works." Apparently he is overlooking pages 10 through 15 of the Computer Manual (copies enclosed) where the subject is discussed at length. Worstell apparently refuses to understand that the 64K of memory address in the computer he purchased, our Model /09 (56K), is directly addressable and, as the documentation explains, the Dynamic Address Translator is an integral part of a system designed for multi-tasking and multiple user environments (typically these functions will be implemented on our Model S/09 (128K and larger). Worstell is not correct in saying that he has paid for circuitry which he cannot use, simply because he has opted for a system which does not utilize that part of the standard design and for which he has paid nothing extra.

Regarding the 6809 OP codes, Worstell admits they are available from the chip manufacturer, Motorola. They are included in its extensive programming manual for the 6809 for sale to the public. We cannot accept his criticism that this company does not duplicate the expense of stocking and distributing Motorola's specialized literature. We know of no computer manufacturer who distributes the chip manufacturer's manuals to the end user.

Finally we categorically reject Worstell's parting shot that he had, "...been taken since they have our money..." Early on in our contacts with Worstell, when it became apparent that he was more interested in conflict and controversy than he was in conciliation, we invited him to return his system to us for a full refund of his purchase price. This he has not done.

I would apologize for the length of this letter, Mr. Ahl, but Worstell's letter, un rebutted, cannot fail to accomplish his obvious attempt to damage this company. The spirit of his attacks are damaging to this industry as well.

Daniel E. Meyer, President
Southwest Technical Products Corp.
219 W. Rhapsody
San Antonio, TX 78216

Praise for Creative's Super Invader

Dear Editor:

I would like to heap a few words of praise on the author of Apple Super Invader. A true masterpiece of programming! No, that's not good enough! I look at all my dusty tapes and endless disk catalog listings of software, now mediocre at best, and sigh. What a waste of hard-earned money. Finally, my machine has truly come alive! For my investment, I could now have purchased the arcade machine itself, (which I've read that some individuals are actually doing). But then, what a waste that would be, as I wanted a versatile, fun and educational machine when I bought a computer. M. Hata, wherever you are, thank you!

I think your magazine is the best published for personal computing. I especially enjoyed Chuck Carpenter's Apple Cart in recent issues.

L. E. Thomas
61 John E. Smith Drive
Tewksbury, MA 01876

North Star Horizon— COMPUTER WITH CLASS

The North Star Horizon computer can be found everywhere computers are used: business, engineering, home — even the classroom. Low cost, performance, reliability and software availability are the obvious reasons for Horizon's popularity. But, when a college bookstore orders our BASIC manuals, we know we have done the job from A to Z.

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"We bought a Horizon not only for its reliability record, but also because the North Star diskette format is the industry standard for software exchange. The Horizon is the first computer we have bought that came on-line as soon as we plugged it in, and it has been running ever since!"

— Melvin Davidson, Western Washington University, Bellingham, Washington

"After I gave a 1/2 hour demonstration of the Horizon to our students, the sign-ups for next term's class in BASIC jumped from 18 to 72."

— Harold Nay, Pleasant Hill HS, Pleasant Hill, California

"With our Horizon we brought 130 kids from knowing nothing about computers to the point of writing their own Pascal programs. I also use it to keep track of over 900 student files, including a weekly updated report card and attendance figures."

— Armando Picciotto, Kennedy HS, Richmond, California

"The Horizon is the best computer I could find for my class. It has an almost unlimited amount of software to choose from. And the dual diskette drives mean that we don't have to waste valuable classroom time loading programs, as with computers using cassette drives."

— Gary Montante, Ygnacio Valley HS, Walnut Creek, Calif.

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More on MicroComposer

Dear Editor:

Referring to the Micro Composer review (Feb.'80), I cannot accept credit for writing the Micro Composer software. The vast majority was written by David Williams of Micro Music, Inc. completely independent of Micro Technology or myself. I did supply the sound generation routine which is only a few hundred bytes of an otherwise huge program. The design of the music entry and editing program was done solely by Micro Music and, in my opinion, is clearly oriented towards teaching music rather than streamlined entry of music.

One thing the article failed to bring out is that the Micro Music system utilizes *software* sound synthesis with via digital-to-analog conversion. The music board supplied with the system is, in fact, an 8 bit digital-to-analog converter optimized for audio output applications. What this means is that software alone determines the type of sound produced by the system. With proper programming (not necessarily available yet), the Micro Music board could produce more than 4 musical voices, reasonably accurate musical instrument simulations, or even speech.

Another feature is the ability to create original tone colors with the system. The user can specify the harmonic makeup of each voice or optionally use the predefined ones.

One final point concerns the availability of stereo output. Two Micro Music boards can be used to produce stereo but the number of musical voices remains at four.

Hal Chamberlin
Vice Pres. of Engineering
Micro Technology Unlimited
P.O. Box 4596
Manchester, NH 03108

When to Castle

Dear Editor:

Concerning the February, 1980 Input/Output Chess comments by Stephen Kimmel:

Mister Kimmel is the recipient of some rotten input from Human 1400 when concerning the legitimacy of castling through check.

According to the Official Rules of Chess (US Chess Federation, Article 6.1:)

"Castling is prevented for the time being-

(a) if the king's original square or the square which the king must cross or that which it is to occupy is attacked by an enemy piece...."

Robert A Fowkes
(Human 1800)
3 Reeback Drive
Ossining, NY 10562



"Turning Over" The Clock

Dear Editor:

I enjoyed your October, 1979 issue, and the article "Graphics Digital Clock" pp. 110-113. However, the program contains a serious flaw as it was printed.

The problem arises when the clock attempts to "turn over." That is, when the clock tries to go from 12:59:59 to 1:00:00, (or from 23:59:59 to 00:00:00 in 24-hour format) the computer finds a "for-next" error and execution stops.

Fortunately, there is a simple solution. Insert these lines:

25 On error goto 1000

1000 If Z=24 then H=0:M=0:S=0:Resume 120

1010 If Z=12 then H=1:M=0:S=0:Resume 120

Now, when the time comes for "turn over," TRS-80 will pause for just a split second, then resume timekeeping correctly.

Otherwise, Mr. Hinrichs is to be commended on his fine application of the TRS-80's amazing Level II high speed graphics features.

Michael Sullivan
Box 90
DeKalb, Ill.
60115



Sorcerer As a Terminal

Dear Editor:

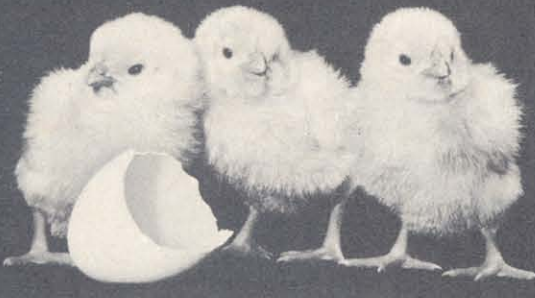
The Sorcerer's serial data cable (Exidy part number DP4005) is not enough to connect an acoustic coupler to the Sorcerer computer. It has no RS (request to send) line which is essential to the communication between a terminal and a host computer.

There is a +12 volts pin (#9) on the Sorcerer's serial interface, so I connected it to the #4 pin (RS) pin of an acoustic coupler with wire and 1K Ω (1/4 W) resistor. By this modification I succeeded in using the Sorcerer as a computer terminal.

Also, the Sorcerer dumb terminal program (supplied on cassette) has two defects. First, it doesn't select parity, the number of stop bits and the number of bits per character. Second, when the number of received characters per line from a host computer exceeds 64, the rest of the line is not printed on the CRT screen. But one can easily correct these defects by inserting some machine instructions.

Kazuo Nakamura
5-2-1-1402 Oji Kita-ku,
Tokyo, Japan 114

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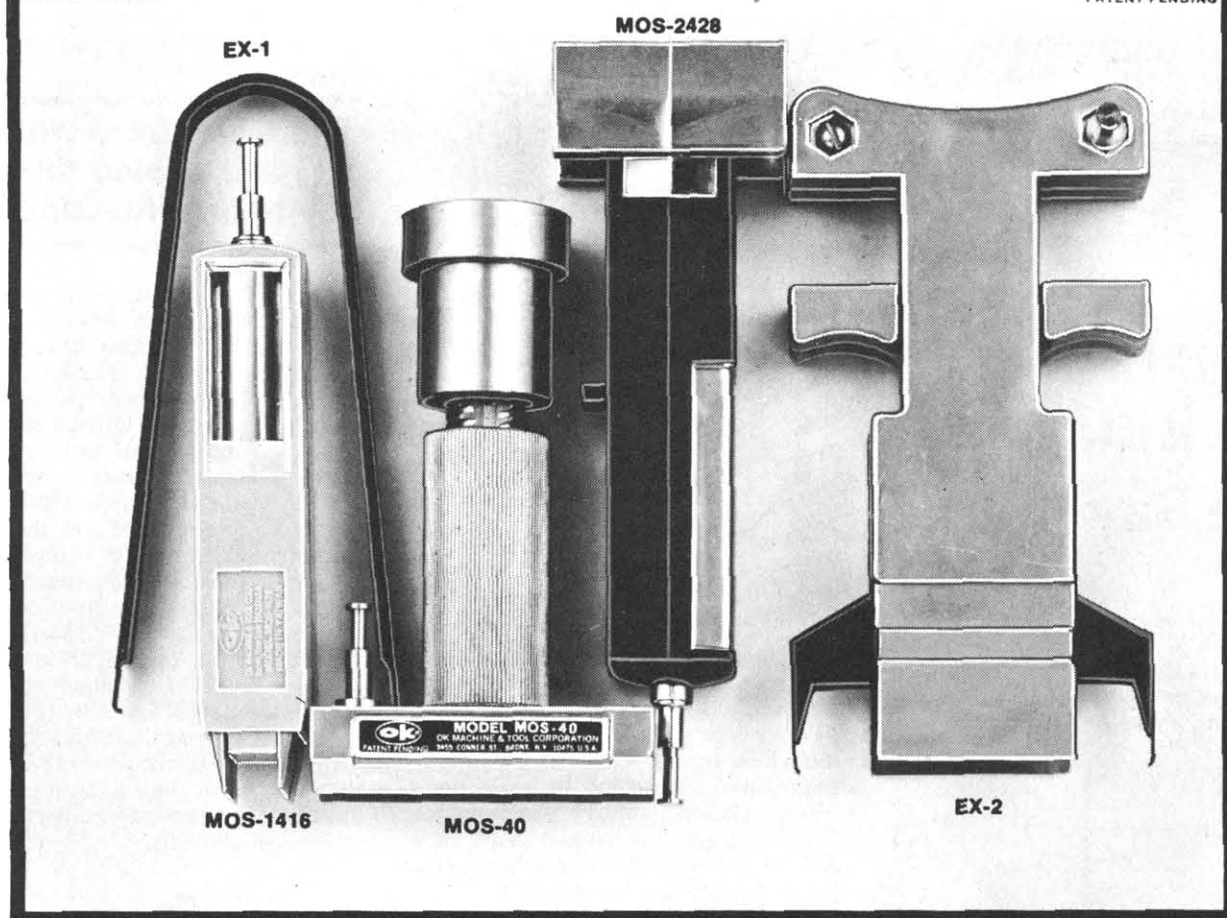


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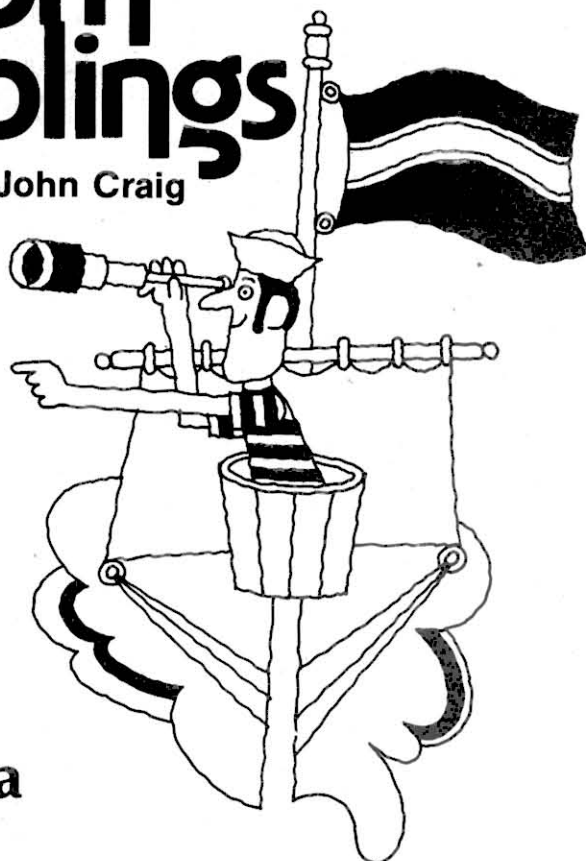
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CIRCLE 173 ON READER SERVICE CARD

Random Ramblings

John Craig



Revisiting the Bay Area

On a recent trip to the Silicon Valley we stopped in to visit several companies that are doing some exciting things. We think you'll find them as interesting as we did.



Tom Tisch, the President of Heuristics, is shown holding the H-2000 Apple Speechlink while an associate demonstrates the system.

Does Your Computer Hear You?

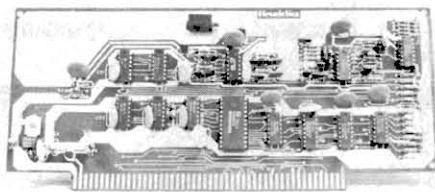
When is the last time you sat down and talked to your computer? Undoubtedly there are times when we all have choice things to say to the little monsters, but now we can also make them listen. Heuristics, Inc., has been making a speech recognition board for S-100 systems for several years now and they've recently announced a new set of boards for the Apple II. (They also make a voice recognition unit which is sold in the retail stores of a major manufacturer of personal computers.)

Before this decade is out we're going to be seeing and hearing a great deal from this technology of speech recognition and speech output. The idea of a totally speech-controlled system is not out of the realm of possibility even with today's technology. Can you imagine an operating system which, upon powering up, waits for a voice command? The operator says, "Load Accounts Receivable." The computer then responds, by synthesized voice, with, "Can't load. Please insert program disk in Drive A and data disk in Drive B." The operator corrects the oversight by inserting the correct disks. The computer then responds with, "Thank you," and

proceeds to load the program. It then asks, "Please specify function — Create Record, Update, Billing, Totals, Merge to General Ledger or List." (We have a very talkative computer.) Perhaps the most fascinating application would be in word processing where someone actually dictates text to the computer, such as a business letter or a book. I can see it now, by the year 2030 we'll have a hard time finding typists in this country!

There are times when we all have choice things to say to the little monsters.

Another area which holds great potential is speech therapy. Heuristics has a program, Voiceplot, which displays an instantaneous graph of speech patterns (3 frequency bands and amplitude). The program is available for the Apple, TRS-80 and North Star and could be very useful in training small children to overcome speech problems. The child would speak a certain word into the microphone and the graph would be displayed on the screen immediately. The instructor, or speech therapist, could then take a grease pencil and draw the graph on the CRT as it should be and ask the child to try again, this time trying to match up with the grease pencil mark. It would be fascinating to watch the speech improve as a result of that feedback. This technique could also be used to teach correct accents in foreign languages.

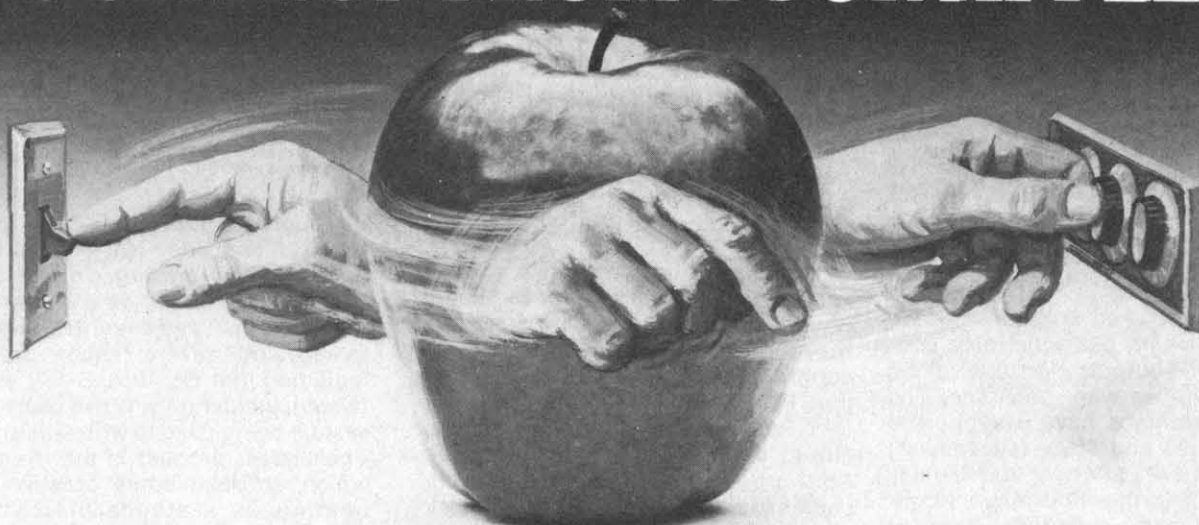


The latest version of the S-100 Speechlab board.

Many of Heuristic's Speechlab (S-100) and Speechlink (Apple) boards find their way into industrial applications. They offer a lightweight headset boom microphone for voice input while an operator is busy performing some chore with his or her hands. They've also developed a new standalone voice control unit, the Model 1600 Controller, which can control up to 12 devices.

The H-2000 Speechlink for the Apple has a suggested retail price of

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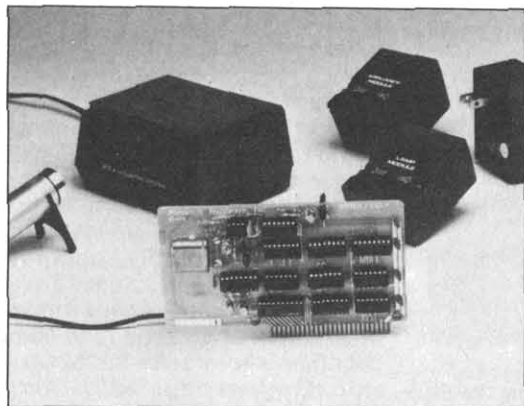
The Introl Controller board plugs into a peripheral slot of your Apple. With an ultrasonic transducer it transmits control signals to the BSR/X-10 Command Console which may be plugged into any convenient AC outlet near your computer. On command, signals are sent to remote modules located at the devices you wish to control. Up to 16 remote module addresses may be controlled from your Apple.

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CIRCLE 168 ON READER SERVICE CARD

Ramblings, con't...



The Corvus 10 megabyte hard disk system allowing itself to be photographed next to the relatively "puny" mini-floppy of the TRS-80.

\$259. It can be used with the Model 70 controller which has four relay contact-closure outputs for controlling external devices with the Apple. The S-100 Speechlabs have a suggested retail of \$399 and \$599, respectively, for 64 and 255 word vocabulary models. For further information, contact your local computer store or Heuristics, Inc., 1285 Hammerwood Ave., Sunnyvale, CA 94086.

Newsflash! Solution to the Hard Disk Backup Problem

Several Winchester technology hard disk systems have been announced recently. They have undoubtedly opened up new business markets because of their relatively low cost and high capacity. However, there has been the nagging problem of how to effectively back up one of these little giants. It's possible to assign a person the task of spending several hours to back up a 10 megabyte drive with 8" floppy diskettes (and I wouldn't even consider it with the small 5" diskettes). There have also been a couple of 3M cassette drive systems which cost from \$1900 to \$3000 and can back up a 10 megabyte disk in a matter of minutes. Or, you could buy a second hard disk for backup and spend 3 or 4 thousand extra dollars in the process.

Corvus Systems, Inc., has come up with a unique, practical and low-cost solution to the problem. They've developed additional hardware and firmware, which sells for approximately \$790 and works in conjunction with their controller so that a video tape recorder (VTR) can be interfaced to the hard disk. The entire 10 megabyte hard disk can be dumped to the VTR in 10 minutes. So there you have a fast, and presumably reliable, backup system which consists of \$790 worth of hardware and a \$700 VTR for a total cost of about \$1500.

Corvus has been running ads for some time which depict their 10

megabyte IMI-7710 Winchester hard disk sitting next to an Apple. As a result, I was left with the impression their drive was for the Apple and missed the point that it was also available for the TRS-80, S-100 (CP/M) and LSI-11 systems. Therefore, we took a photo of the drive sitting next to a TRS-80 to help make that point in case you missed it too. The system sells for \$5350 (with an add-on drive for \$2990) and runs under the operating system of the host computer. Corvus Systems, Inc., 900 S. Winchester Blvd., San Jose, CA 95128.

More Than Just A TRS-80?

Without a doubt, there's a lot of software floating around for the Radio Shack TRS-80. However, I don't feel there is a significant amount of sophisticated business software for the TRS-80 compared to that available for CP/M systems. Structured Systems Group, Graham-Dorian and Peachtree Software are just a few of the companies that have developed some very good business packages that I wouldn't be afraid to implement in a business of my own. And, that's not intended as a disparagement toward the people who have put together

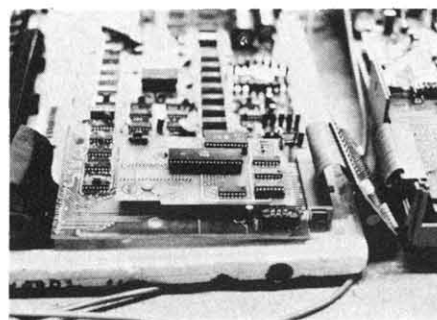
The installation of the boards is as easy as changing a tube in a TV. However, that statement can be misleading.

business packages for the TRS-80. It's just that those programs have been designed to work within the constraints of the system. Even Radio Shack realized the shortcomings of the Model I for business applications and that's the reason they came out with the Model II with standard-sized floppies.) Now, thanks to Parasitic Engineering, serious TRS-80 based business systems can be put together with 8" drives and CP/M.

Howard Fullmer and Gene Nardi started Parasitic Engineering way back



The Parasitic Engineering Maxi-Disks working in a "mixed & match" configuration with the TRS-80 minis... running TRS-DOS or CP/M.



The Shuffleboard which makes it all possible. Plugs right into the TRS-80 Z80 socket.

in the early MITS Altair days by developing a clock-fix board for the erratic Altair. They saw themselves as "parasites" jumping on the S-100 "bandwagon" (they have a sense of humor, too). They eventually went on to develop several other products including the Equinox S-100 system (which, incidentally, is the heart of the system being used to write this article). Their latest product is the Maxi-Disk which, through some creative engineering, is a standard-sized disk system running CP/M.

The problem confronting Parasitic in designing this adaption was that the TRS-80 uses iower memory for several things, such as the memory-mapped video, and CP/M also operates in lower memory. Quite simply, they designed a board, called the "Shuffleboard," which plugs into the TRS-80's Z80 socket and causes the lower 16K to be released for use as RAM. Another "piggy-back" board contains a new disk controller chip and plugs into the disk controller socket in the expansion interface. This allows for running mini-drives, with TRS-DOS, along with standard (Maxi) drives and CP/M, or just one or the other. In both cases, the installation of the boards is as easy as changing a tube in a TV. However, that statement can be misleading. A friend of mine "simply" plugged the boards in and has had some difficulty in getting the system up. Parasitic has been extremely helpful but there is only so much that can be done over the phone. At last word, my friend was getting together with fellow TRS-80 owners to do some swapping around to determine if the problem is in his expansion interface, the boards or the TRS-80 itself. It is hoped the problem will turn out to be something simple — it usually is.

The Maxi-Disk drive sells for \$995, which includes a Siemens FD 100-8 drive, power supply, cabinet and interface board. Additional drives are \$845 and the Shuffleboard with a copy of CP/M on 8" diskette (and complete documentation) sells for \$249. Parasitic Engineering, 1201 10th St., Berkeley, CA 94710. □



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CIRCLE 151 ON READER SERVICE CARD



Quotations and ‘Quotation’ Marks



Quotations and ‘Quotation’ Marks

In writing directions for the use of a program suppose you want to say:

For help, type “HELP”.

Standard grammatical convention would place the period inside the quotation marks. However, the command you wish to be typed into the computer is HELP without a period and indeed the period could alter the command. What to do? The obvious solution is to depart from standard convention and type it as in the example above. Another solution is to recast the sentence, for example:

Type “HELP” if you need help.

Another possibility, if the material is going to be typeset, is to show input and output to the computer in a different typeface:

For help, type **HELP**.

Sometimes that approach isn't all that helpful. For instance, can you easily tell if the period is bold (and part of the command) or not?

Furthermore, for showing computer input and output together in a sample program run, it is frequently desirable to differentiate input from output. The easiest way to do this is with an underline.

```
HI! I'M ELIZA.  WHAT'S YOUR PROBLEM?
? YOU
WE WERE DISCUSSING YOU-- NOT ME.
? BUT YOU ATR THE PROBLEM
OH, I ATR THE PROBLEM
? SO I MISSPELLED A WORD
SAY, DO YOU HAVE ANY PSYCHOLOGICAL PROBLEMS?
? NO DO YOU
YOU'RE NOT REALLY TALKING ABOUT ME, ARE YOU?
? ONLY BEHIND YOUR BACK
WHY ARE YOU CONCERNED ABOUT MY BACK
? BECAUSE I'M AFRAID TO CON FRONT YOU
DID YOU COME TO ME BECAUSE YOU ARE AFRAID TO
CON FRONT I
? YOU SPEAK WIERD ENGLISH
WE WERE DISCUSSING YOU-- NOT ME.
? AM I GETTING THE BEST OF YOU
OH, I
? WHAT IS THAT SUPPOSED TO MEAN
WHY DO YOU ASK?
? WHY NOT
```

In this example perhaps the input was clear enough without an underline because it always followed a question mark, however if GET statements had been used or the input prompt had not been printed, then an underline or other differentiation would have been vital.

Quotations

Indirect quotations and paraphrases are treated no differently from one's own thoughts and do not require quotations marks. Of course, the other source should be acknowledged.

Direct quotations, on the other hand, call for special treatment. A quotation of average length (fewer than 50 words) is generally worked into the regular text. It is included in a line begun or ended by one's own words and marked by quotation double marks. If the excerpt is a sentence by itself, the first word is capitalized and separated from other text by a comma or colon.

If the excerpt completes a sentence, the capital and punctuation are omitted. To omit a part of the quotation, suspension points — also called ellipsis points — mark the omission. These are three consecutive spaced periods and can mark the omission of one word or several sentences. If the omission is at the end of a sentence, four spaced points are used. For example:

As noted in the Hart article, the random number generator “starts a new sequence . . . and returns the next random number in the sequence with a positive argument.”

Quotations more than 50 words long are generally set apart from the regular text. The excerpt is preceded and followed by a blank line and quotation marks are not used. As an example of this, *The New York Times Manual of Style and Usage* states:

The period and comma should be placed inside quotation marks . . . The colon and the semicolon are placed outside: *He defined “work-week”: the average number of hours worked weekly by the men in his factory.* Question marks and exclamation marks may come before or after the quotation marks, depending on the meaning: *The crowd shouted, “Long live the king!”* Just imagine, he was afraid of “elephants without trunks”! “Who are these ‘economic royalists’?” he asked. Have you read “Lord Jim”?

In continuous quoted matter that is more than one paragraph long, place a quotation mark at the beginning of each of the paragraphs and at the end of the last paragraph only.

Other Uses of Quotation Marks

Quotation marks are also used to denote words used in a special way and slang when it is introduced into formal writing. Two examples follow. One of the PC boards was “decruddled” with ammonia and rubber cement solvent. “Quotes” is slang for quotation marks.

Quotation marks are used to enclose titles of short poems, short stories, articles, lectures, chapters of books (but not book titles), songs, and radio and TV programs. “Don’t Bother Me, I’m Learning” was an excellent special recently aired on PBS.

Quotation marks may be used to denote letters, numbers, words, and phrases used apart from their meaning. For example, loop the “9” more distinctly, cross the “t,” omit “very.”

Lastly, quotation marks have begun to be used to show disdain. This use is not discussed in any style guide as far as I know. Henry L. Trehwhitt of The Baltimore Sun calls these “cop-out quotation marks” — when a writer uses a bit of jargon or a colloquialism and encloses it in quotes to show he really knows better. A related use is to put a “sneer” connotation on a word. Thus, the terrorists at the U.S. Embassy in Iran are referred to as “students.” World Book Dictionary editor Sol Steinmetz thinks that “disbelieving quotation marks” first became popular during the Nazi era, and then were given a boost in the Vietnam years, especially around the word “advisors.”

Last but not least, avoid clichés like the plague; seek viable alternatives and “avoid overuse of ‘quotation marks.’” □



Heathkit WH-89 (All-in-One) Computer

Randy Heuer

Heathkit has long been known as a manufacturer of quality electronic kits. Several years ago, Heath brought out their first two computer kits. Frankly, I found these initial machines somewhat disappointing. Perhaps being familiar with the innovative features introduced by Heath in many of their other electronic kits I expected too much from their first computers.

I'm happy to report that Heath has once again introduced an innovative electronic component and this time it is a computer. The WH-89 is a Z-80 based microcomputer in the same class as TRS-80, Apple and PET with the potential to give these systems a run for the money.

Hardware

The WH-89 is nicknamed the "All-in-One," since the keyboard, video display and disk drive are all contained in the same cabinet. The unit is nicely styled and, after getting used to multiple wires and cables hanging out all over the place on other computers, the single wire to the wall socket was a refreshing change.

The unit is probably the most professional looking of any of the popular microcomputers on the market today.

Actually, it would be incorrect to lead people to believe that all one has to do is plug the unit in and start programming. The WH-89 is the assembled form of the computer, but the accessories (additional memory, serial I/O board and cassette interface) come in separate boxes and



require various degrees of assembly. Additional memory is simply plugged into the logic board and a few jumpers are changed. On the other hand, the cassette interface requires soldering and assembly of cables. Although no major construction is necessary to install these accessories, some people may feel put-out to have to do this work.

The unit itself is probably the most professional looking unit of any of the popular microcomputers on the market today. Housed in a heavy plastic shell, the unit looks more like a mainframe console terminal than a home computer. The keyboard is of professional quality, featuring a full, standard typewriter keyboard and a numeric keypad. Each time a key is pressed, the speaker inside the cabinet clicks providing a confirmation of each entry.

The video monitor is one of the finest available on any microcomputer today. The screen is easy on the eyes and the characters are very sharp. It measures 12" diagonally and displays 25 rows of 80 characters. Each character is formed by a 5 x 7 dot matrix

except for some graphic characters and lower case characters which employ descenders and use a 5 x 9 matrix.

The disk drive is a Wangco 82, 5 1/4" drive. It is mounted in the cabinet adjacent to the monitor. Each diskette holds 102K bytes of information on 40 tracks.

What makes the WH-89 different from most other microcomputers is that instead of having a single microprocessor, the WH-89 has two. One Z-80 functions as the main processor would in any computer. The other Z-80 controls the terminal functions, thus making it a "smart terminal." As a result, the CPU is not burdened with the task of handling screen functions. The Z-80 in the terminal handles cursor addressing, character insert and delete, graphics and video inverse. Among many other special purpose functions are two unique screen functions, cursor memory and a 25th line.

Cursor memory allows the terminal to "remember" the position of the cursor from a previous time. This function is implemented by moving the cursor to the desired location and then entering an escape character via the keyboard or the program. Then at a later time, after the cursor has been moved elsewhere any number of times, another escape character can be entered to restore the cursor to the memorized location.

The 25th line is another interesting and unique feature. Normally only 24 lines of text are presented on the screen. The bottom (25th) line is not used. This bottom line can be activated and printed on. However, unlike the other 24 lines, this line does not scroll but remains at the bottom of the screen. Thus special instructions, help statements, etc. can be written on this

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Heathkit, cont'd...

line and will remain at the same position on the screen regardless of what other screen formatting is done. The 25th line can be erased by a special escape character.

Hardware is only one part of a computer system. The other important component is the software. Since the combination of these two parts determines the quality of the system as a whole, let's take a good look at the software presently available for the WH-89.

Software

Another one of the differences between the WH-89 and other popular microcomputers is the amount and usage of Read Only Memory (ROM). In the Apple, PET and TRS-80, as much as 12K of the memory is ROM and contains the higher level language, Basic. Not so in the WH-89. Only 6K of memory is ROM and this is used for the bootstrap program, system monitor and other special functions. Thus all of the higher level features must be provided by the software as opposed to the firmware in ROM.

Hardware is only one part of a computer system. The other important component is the software.

This arrangement has advantages and disadvantages. The major advantage is that the user is no longer confined to doing most of his programming in the language provided, but may use any language which can be loaded into the computer RAM and supported by the system. The major disadvantages are that the operating system and higher level languages (Basic) take up a significant amount of RAM and that you are very dependent on the quality of this software. Since most people don't have the ability to write their own systems software, they have to rely on software provided by the manufacturer or other sources.

Heath provides system software for the "All-in-One" in two forms. One is for the simpler, cassette-based system. For \$20 you can receive a package containing Benton Harbor Basic, Heath Assembly language, text editor and console debugger. This certainly seems adequate for getting started on the "All-in-One."

Most users of the "All-in-One" will probably prefer to use the disk-based systems software. The "All-in-One"



The Heath Data Systems WH89 is a totally integrated microcomputer system contained in a compact, desk-top terminal that supplies all of the computing power needed for most small business or professional tasks. It is shown here with cover removed.

uses the Heath operating system called HDOS. Developed for the Heath H-8 computer, this software has been adapted for use in the WH-89, HDOS bears a greater resemblance to the CP/M operating system than the operating systems of TRS-80 or Apple.

With the system disk, which costs \$100, you receive Benton Harbor Basic, an assembler routine, text editor, console debugger, a set of utility programs, and manual. HDOS is fairly complete and easy to use. The first chapter of the manual leads the user through the process of initializing and SYSGENing new diskettes, using the one drive copy utility, and writing and saving programs. It's intended for the first time user and should help the novice understand how to get started with the WH-89.

Users will probably want a higher level language than assembly language for most programming tasks. While Benton Harbor Basic may be adequate in some cases, most people will prefer the more popular and powerful Microsoft Basic (MBasic). This language is available on diskette for an additional \$100. This is the same diskette sold for the H-8 system and therein lies a deficiency with this release. There's a lack of easy and direct access to the smart terminal functions and graphics from this language. These special features can be accessed only in a roundabout way by use of ASCII codes and the CHR\$ function. For example, to clear the

screen one must write a statement such as PRINT CHR\$(27);CHR\$(69). This is not as easy as the CLS or PRINT AT features of the TRS-80.

In addition, there apparently exists a memory allocation problem between HDOS and MBasic such that memory protection for machine language subroutines cannot be guaranteed. As a result, Heath recommends that the USR function not be used with this release of MBasic. Heath has promised that all registered purchasers of this version of MBasic will receive the update that corrects this problem in early 1980. So perhaps by the time this article runs this problem will have been solved.

It would be in Heath's best interest to "tailor" their Basic to the "All-in-One." Most users of the WH-89 will not be able to make maximum usage of graphics and the terminal functions with the present form of MBasic. If Heath really wants to compete with the machines popular with the home and general user market (TRS-80, Apple, etc.), they'd be very wise to update MBasic to "fit" the WH-89. Users with all levels of programming skills would appreciate an easy method for interacting with the special features of the machine as those features are generally superior to other small computers.

What Does It Cost?

Well, it depends on what you want to buy. Basically there are three ways to purchase the "All-in-One." One is the kit version without the floppy disk system (H-88). A 16K machine with a cassette interface sells for \$1195. Of course you'll need to invest an additional \$20 for the system software and probably will want an additional 16K of memory for \$150. Total \$1365.

It would be in Heath's best interest to "tailor" their Basic to the "All-in-One."

If you want a disk-based system and are willing to do a bit of assembly, a 16K kit with a Wangco disk drive costs \$1595. This kit (H-89) includes the cassette interface. In addition, you'll need the disk-based system software (\$100) and at least 16K additional memory (\$150). If you intend to write large programs using the optional Microsoft Basic (\$100), you'll need another 16K expansion kit (\$150) as in a 32K machine only 6K of memory remains after loading Basic and HDOS. Total \$1845 to \$2095.

Heathkit, cont'd...

Finally, the fully-assembled version of the disk-based system (WH-89) costs \$2295. This version is an assembled H-89 minus the cassette interface. The additional costs for software and memory expansion for the WH-89 are the same as the H-89. Total \$2545 to \$2795.

The only other accessory available for the "All-in-One" is a two port serial I/O board for \$85. An H-88 without a disk drive can later be upgraded to a disk-based system with the purchase of a disk drive for \$450 and the appropriate software.

The best buy of this group is probably the H-89. This system entails a fair amount of assembly (although the CPU is completely wired and tested), but if you can take the time and care to assemble a kit, the savings of \$700 (plus a cassette interface) certainly seem justified. If I were purchasing the system, I would add 32K more of memory (\$300), the serial I/O board (\$85), the HDOS systems software (\$100) and Microsoft Basic (\$100). Thus the total price of the system is \$2190. This may seem like a lot of money, but it compares favorably to a TRS-80 or Apple with similar features.

Is The "All-In-One" For You?

As with any computer system, the answer depends upon what you want in a computer. If you are looking for a machine with a large amount of software presently available and geared mainly toward personal use, then perhaps you'd do better to look elsewhere. However, if you are interested in acquiring a computer with a great potential for sophisticated applications, it would be worth your while to take a good look at the "All-in-One."

If you are interested in acquiring a computer with a great potential for sophisticated applications, it would be worth your while to take a good look at the "All-in-One."

Based on a comparison with other systems, the "All-in-One" is one of the finest pieces of complete computer hardware in the less than \$3000 class available today. This system combines the ease of use of the home computer with some of the features found in the more complex, S-100 based systems.

However, there is very little provision for expansion outside of the peripherals available now, so users wishing to add accessories such as music boards and color graphics should probably consider another system. Basically the "All-in-One" is intended to be a single disk drive, 48K machine with provisions for a printer and a cassette unit. A large percentage of users and potential users of a small computer system will find this amount of hardware adequate for their needs.

The "All-in-One" has an excellent start toward becoming a major force in the small computer market. Its sophisticated hardware gives it an advantage over most other small computers. The key for making it a complete winner is the development of equally sophisticated software. The HDOS systems software is good. The Microsoft Basic available for the "All-in-One" is adequate but needs to be specifically tailored to the "All-in-One" before most users will be able to take full advantage of the hardware. If Heath or some other software source develops another high level language (such as Pascal) and perhaps a screen-oriented word processing system (a la Electric Pencil) for the "All-in-One," this computer can have a major impact on the small computer market. □

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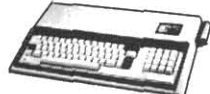
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Atari In Perspective

Len Lindsay

Since I own and use both an old and new style PET, and have just acquired an Atari 800, a question I often hear is "Which computer is the best?" A good reply is "Best for what?" Note that this article is not titled Atari vs. PET, for this is not a contest, but a comparison. It is up to you to pick out the qualities you think are important for your future uses. I used a 32K PET 2001 new ROM with large graphic keyboard and a 24K Atari 800 for this comparison.

Conflicting information here and there prompted this comparison. I hope others will compare other computers, for it will help put a perspective on home computers. (How about Apple and Atari compared?) I will describe some significant aspects of each computer, and report results of similar test programs run on each. At times it may seem that I include a bit more about the Atari or leave out some PET qualities. This is because I wish to focus on Atari using the PET as a comparison (there is a lot already printed about the PET, while the Atari is a newcomer and not familiar to many). Also, I am sure that many differences and similarities are missed due to lack of space to say it all. Your comments are welcome.

The PET is one unit, designed as an all-in-one package theme. The original PET was complete in one unit, while the newer style does require the cassette to plug into the back of the main unit. The Atari is component oriented, with the computer and keyboard as one central unit. It plugs into an ordinary wall socket (there is a small power supply unit half way from the computer to its plug). The cassette player plugs into the wall socket and into the computer. The central unit must then be connected to a TV or video monitor (an RFM adapter is supplied that connects to the antenna terminals of your TV). Thus, the Atari has a few more cables and wires to worry about.

The PET can address up to 32K of RAM. There are built in connectors for the IEEE bus, a parallel port, cassette #2 and memory expansion. Commodore does not supply memory expansion boards but they are available from independent companies.

The Atari can address up to 48K RAM. There are built-in connectors for joysticks and game paddles, video monitor out, power in, peripheral expansion, ROM cartridges and RAM

This is not a contest, it is up to you to pick out the qualities you think are important for your future uses.

modules. 8K and 16K memory expansion modules are available from Atari and there are 3 sockets available for these memory modules. A 10K ROM pak is plugged in front of these memory modules. In front of these are two smaller sockets for other ROM cartridges such as the Basic interpreter, Educational System cartridge, and other software in ROM cartridges.

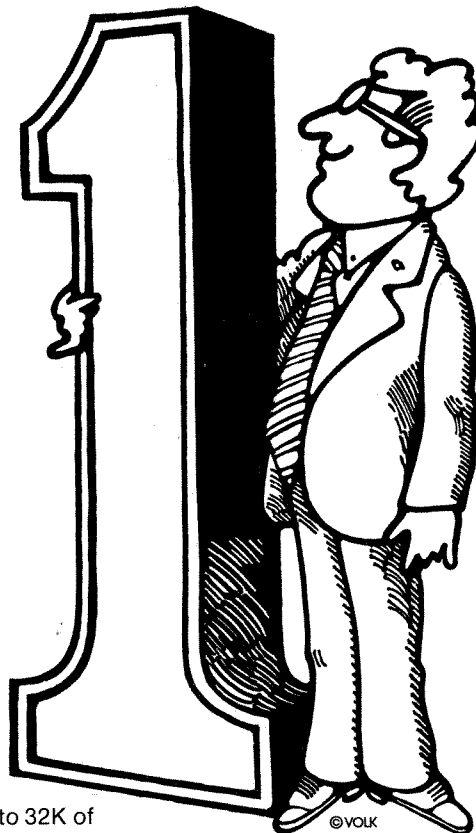
A second tape unit can be added to the PET using the second cassette plug. The cassettes are digital and are preset for optimal performance. IEEE peripherals can be added via the IEEE port, including disk and printer. The parallel port can support joysticks, lightpens, printers, speakers, etc., but these must be added by the user. The memory expansion port can also be

used to connect to a disk system.

Peripherals, including cassette, printer and disk, plug into Atari's peripheral expansion plug in a daisy chain fashion. A video monitor and standard TV can be used simultaneously since there are two separate connections (ideal for a classroom — you can face the class and see your monitor, and have a large TV for the class to see at the same time). The cassette can be used for both digital and audio recording with the volume preset for best results (the audio output comes through your TV speaker and its volume can be adjusted with the TV volume controls). You can load a program as well as use verbal instructions on the tape. The cassette has a 3 digit counter.

The PET has a 74 key keyboard including a numeric keypad. Special keys include REVERSE ON/OFF, SHIFT LOCK, RUN/STOP, HOME CURSOR, CLEAR SCREEN, CURSOR UP, DOWN, LEFT & RIGHT, INSERT and DELETE. The PET can operate in either graphics or lower case mode. Graphics are shifted letters and numbers. When in lower case mode the alphabetic keys become upper and lower with their corresponding graphics unavailable.

The Atari has a 61 key keyboard. Special keys include REVERSE ON/OFF, ESCAPE, BREAK, CONTROL, TAB, TAB SET/CLEAR, CAPS LOCK, CURSOR UP, DOWN, RIGHT & LEFT, CLEAR SCREEN, INSERT CHARACTER/LINE, DELETE CHAR-



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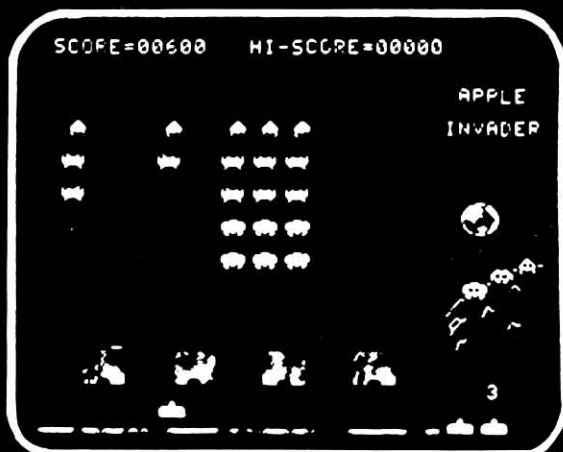
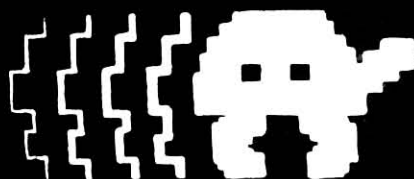
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Atari, cont'd...

ACTER/LINE and BACKSPACE. A similar set of graphics is available from the keyboard as with the PET. However, other graphics are available as well by plotting. Hold a key down for a second and it begins a fast repeat action, excellent for special key functions such as cursor movements. And like a typewriter, the unit will beep when you are almost at the end of the line.

Both the Atari and PET allow special key functions to be written into your program (i.e., your program can move a cursor around, etc.). Both have excellent screen editing. The PET video output is only black and white, while the Atari is in full color. It has 3 different text modes plus 6 graphic modes, including high resolution with many Basic commands for color control and plotting and drawing lines. In text mode 0, text can be displayed normally with 24 lines of 40 characters each. Text mode 1 prints double width characters (24 lines of 20 characters). In text mode 2, the letters are double height as well as double width (12 lines of 20 characters). The text can be in varying colors. A four line text window is also available while in text modes 1 & 2 and all graphic modes. The several graphic modes allow for varying resolution. The higher the resolution, the more memory is used by the operating system to keep track of the screen display. Highest resolution is 320 x 192 (and this mode requires your Atari to have 16K RAM). Atari also has a small beeper built in, and access to sound, 4 voices, almost 5 full octaves, plus tone control (including special effect noises such as a buzzing sound). Joystick and game paddle commands are built into Atari Basic as well as random access disk commands.

There is a lot already printed about the PET, while the Atari is a newcomer and not familiar to many.

PET Basic is by Microsoft, often referred to as the industry standard. Atari Basic is not by Microsoft, but is Shepardson Basic, supposedly by those who brought you Cromemco Basic. Both are similar in many aspects, and I will leave benchmark timings to someone else. Both use the question mark "?" as an abbreviation for PRINT. Both allow you to OPEN and CLOSE files to various devices.

Having a Basic interpreter done by Microsoft is a real convenience since most program listings in maga-

zines or books are most compatible with it.

Variable Names

Now on to my comparative test programs and their results. I will begin by testing what names can be used for variables. Here is the first program I tried on both computers:

```
10 AZAZAZ=12
20 PRINT AZ
30 PRINT AZAZAZ

PET RESULTS : 12
12

ATARI RESULTS:0
12
```

The PET video output is only black and white, while the Atari is in full color.

Both let one use a six character variable name. The difference is that only the first two characters are significant to the PET, while every character is significant to the Atari.

Next I tested numeric characters as part of the variable name with this program:

```
10 A1=10
20 A12=20
30 PRINT A1,A12

PET RESULTS : 20 12
(the ' ' denotes a space)

ATARI RESULTS:10 12
(the ' ' denotes a space)
```

Both accepted numeric characters, and note that PET once again only used the first two as significant. Also note that they both have set tab points used when printing items to the screen separated with a comma. Then I tested the & symbol within the variable name:

```
10 A&=12
```

Neither computer accepted this. The PET accepted the line when entered, but when a RUN was attempted gave this message:

```
?SYNTAX ERROR IN 10
```

The Atari rejected it immediately after I hit RETURN with this message:

```
10 ERROR- A&=12
(the & was in reverse field)
```

This points out a significant difference between PET Basic and Atari Basic. PET allows you to enter lines contain-

ing anything you wish. It only rejects a line as incorrect when it attempts to execute it. The Atari checks each line as it is entered and will immediately tell you if it finds an error.

How about lower case characters in the variable name? I tried this:

```
10 a=12
```

Neither accepted this. The Atari rejected it immediately with an error message. The PET gave its error message when it was RUN. However, the PET did accept AAa=12 with no apparent problem, indicating that it must have ignored the characters after the first two significant ones.

Now to test another area of conflict, can Basic keywords be used within variable names? The PET always gave a SYNTAX ERROR for the following programs, but the Atari varied in its response:

```
10 SCORE=20
20 PRINT SCORE
30 POINTS=12
```

```
ATARI RESULTS:20
```

```
30 ERROR- POINTS=12
```

It accepted SCORE as a variable and printed its value of 20 fine. But when I added line 30 to the program it rejected it with the error. Both of the next one line programs resulted in an error message:

```
1 END=12
```

and

```
1 LIST=12
```

The following program illustrates the danger of using Basic keywords, even if Atari Basic lets you:

```
10 B=0
20 NOTB=2
30 PRINT NOTB
```

The Atari printed 1 as the answer. Thus you see that the Atari accepts Basic keywords **sometimes!** And then again, other times it just might not. My advice would be — **never use Basic keywords as part of a variable name** (it's safer that way).

From these tests we can say both allow more than one character to be used, but the first character must be upper case alphabetic and the rest must be either numeric or upper case alphabetic. Neither safely allows the use of Basic keywords as part of a variable name. The Atari accepts every character in your variable name as significant, while the PET only uses the first two characters as significant (and ignores the following ones).

Subscripted Variables

I then compared the use of subscripted variables. Both accepted

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Atari, cont'd...

A(1)=12. The Atari accepted A(12)=24 while the PET gave a BAD SUBSCRIPT ERROR (any subscript over 10 must be DIMed first). The Atari accepted A(12,12)=234 (PET once again gave the error message). The PET accepted A(1,1,1)=123 while the Atari gave the message: ERROR A(1,1,1)=123 (with the second comma in reverse field). However, the PET did not accept A(1,1,1,1)=123 and gave an OUT OF MEMORY error (I did a PRINT FRE(0) and had 31706 free bytes).

Thus, I would conclude that the PET will allow up to a triple subscript. All must be DIMed if any of the subscripts will be over 10. The Atari will allow up to a double subscript, and the DIM question needs further investigation.

Variables Cleared With A Run?

While we are looking at variables, I tried this program on both computers:

```
10 DIM A(3,3), B(4)
15 DIM D$(4) : REM (this line needed for the ATARI only)
20 PRINT A(3,3), B(4), C, D$
30 A(3,3)=5 : B(4)=5 : C=6 : D$="TEST"
```

The first time the program was run, both computers gave the same results:

0 0 0

However, a second RUN, done immediately after the first, gave these results with the Atari:

5 6 0

Neither safely allows the use of Basic keywords as part of a variable name.

PET still gave all zeros. This means that when a program is RUN all variables are cleared in the PET. Arrays are not cleared in the Atari, however, and this must be kept in mind.

Get One Character

Although both Atari and PET have the GET command, there is a distinct difference in its use. For example:

```
10 GET A
20 PRINT A
```

Atari gives an error, while the PET prints 0 (it looks at the keyboard for a blink of an eye, sees nothing, and thus goes to line 20 and prints a 0, for it hasn't assigned a value yet). The following program shows correct use of GET for the Atari:

```
10 OPEN#2,4,0,"K:"
20 GET#2,A
30 PRINT A
```

When run on the Atari, it waits until you hit a key, then prints the coded value of the key hit. For example, I hit T and it printed 84. I hit U and it printed 85. This is very different from the PET which looks only once at the keyboard and, if a key was hit, it gets the character itself rather than the coded value of it.

Wait Till A Key Is Hit Program: Both computers can be programmed to wait till a key is hit and then continue. A possible PET code is:

```
10 GET A$ : IF A$="" THEN 10
```

Possible Atari code is:

```
10 IF PEEK(764)=255 THEN 10
```

Keyboard Buffer: This brings up the keyboard buffer. As a test I ran this program:

```
10 FOR X=1 TO 9999 : NEXT X
```

Immediately after it was run I hit some keys. As soon as the loop is done the computer prints what is in the keyboard buffer. The PET could remember up to the last 9 keys I hit. However, if I hit a 10th key it forgot all of them, including the 10th key, and began over again as if no keys were hit. The Atari remembered only the last one.

Numeric Representation

PET and Atari use different methods of representing and printing numbers on the screen. (Did you notice the difference in output for the previous test on numeric characters within variable names?) I ran this program:

```
10 A=1
20 B=2
30 C=-3
40 D=-4
50 PRINT A;B;C;D
```

The semicolons mean that the cursor remains where it is after printing rather than executing a carriage return. Thus the values of A, B, C and D will be printed one after another.

```
PET RESULTS : 1 2 -3 -4
               (the ' ' indicates a space)
ATARI RESULTS: 12-3-4
```

The Atari appears to represent the number as we would: 1, is 1, if a negative sign is needed, it is included. The PET, however, appears to have a different strategy. It seems to represent a number thus: The first character is the sign (a - is printed if negative, or else a space is printed). Next, the number is printed. Finally, a cursor right is printed and the PET is done.

This would explain the difference in the printed output. Change the semicolons in line 50 to commas and these results are seen:

```
PET RESULTS : 1 2 -3 -4
```

```
ATARI RESULTS: 1 2 -3 -4
```

Both acknowledge the comma to mean skip to the next default tab position.

Next I tested how very large numbers would be printed with this program:

```
10 A=1234567891
20 B=1234567899
30 C=123456789123456789
40 PRINT A
50 PRINT B
60 PRINT C
```

```
PET RESULTS : 1.23456789E+09
              1.2345679E+09
              1.23456789E+17
```

```
ATARI RESULTS: 1234567890
              1234567890
              1.23456789E+17
```

Both computers use scientific notation and have 9 digit accuracy, with the PET rounding the last significant digit, and the Atari truncating it.

Looping — A Quick Look

I then tested how many nested FOR . . . NEXT loops each machine could handle:

```
1 FOR A=1 TO 99
2 FOR B=1 TO 99
3 FOR C=1 TO 99
4 FOR D=1 TO 99
5 FOR E=1 TO 99
6 FOR F=1 TO 99
7 FOR G=1 TO 99
8 FOR H=1 TO 99
9 FOR I=1 TO 99
10 FOR J=1 TO 99
11 FOR K=1 TO 99
12 FOR L=1 TO 99
13 FOR M=1 TO 99
14 FOR N=1 TO 99
15 FOR O=1 TO 99
16 FOR P=1 TO 99
17 FOR Q=1 TO 99
18 FOR R=1 TO 99
19 FOR S=1 TO 99
20 PRINT S,T
```

21

program would continue here with NEXTs as needed, but are not necessary for this test.

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Atari, cont'd...

PET RESULTS: ?OUT OF MEMORY ERROR IN 11

ATARI RESULTS: 1 0

The PET appears to only allow 10 levels of nested loops, while the Atari may be unlimited. Other tests showed that the PET will allow a simple NEXT while the Atari will not, requiring NEXT X (the loop variable must be specified). PET also allows NEXT X,Y (a multiple NEXT) while the Atari will not.

Variable GOTO, GOSUB and LIST

The Atari allows the use of variables for target lines in a GOTO, GOSUB, or LIST statement as shown with this program:

```
10 HERE=200
20 GOTO HERE
30 PRINT "NOT HERE"
200 PRINT "HERE AT LINE 200"
210 HERE=400 GOTO 20
400 PRINT "HERE AT LINE 400"
```

PET RESULTS : ?UNDEF'D STATEMENT
ERROR IN 20

ATARI RESULTS: HERE AT LINE 200
HERE AT LINE 400

Slight modifications will show that GOSUB responds likewise. Then I tried:

```
LIST HERE
```

The Atari listed line 400, since after running the program HERE contains 400. Not bad at all. This capability should prove to be a lot of fun.

The Atari clears out any program presently in memory when it encounters the command CLOAD, while the PET does not.

Video Screen Line Lengths

Line lengths are similar on both computers. The PET has 25 lines of 40 characters per line and allows two lines to be used consecutively for an 80 character logical line.

The Atari has 24 lines with a default of 38 characters per line and allows three lines as a logical line. However, it also allows the user to change the line length. With two POKE commands you can change your line length to 40, or 36, or 38, for example. Thus, the logical line would be 120,

108 and 99, respectively, with 114 as default logical line length.

The PET requires the cursor to be on one of the characters in the logical line when RETURN is hit to take effect. The Atari allowed me to hit return with the cursor on the fourth line accepting the previous three (one logical line), but only if the cursor was on the fourth line due to typing past the end of the third line.

Atari allows the line lengths to vary within a program. For example, I tried this program:

```
10 PRINT "ONE"
20 POKE 82,5:REM SET LEFT MARGIN TO 5
30 PRINT "TWO"
40 PRINT "THREE"
The results when RUN were:
```

```
ONE
TWO
THREE
READY
```

Note that the change in left margin did not occur when the POKE was issued, but rather after the next carriage return was issued following printing TWO.

Cursor: In case you were wondering, a cursor is the marker that indicates your present location on the screen. The PET cursor is a blinking white box. If a character is beneath the cursor it alternates reverse field on and off. The Atari cursor also is a white box, although it does not blink. Any character beneath it is reverse field.

Loading and Saving Programs

Load: The PET loads a program from tape in this manner: You type in LOAD "PROGRAM NAME" (or simply LOAD) and hit RETURN. The PET then checks if the PLAY (or REWIND or FASTFORWARD) button is depressed. If not, it prompts you with PRESS PLAY ON TAPE #1. Once PLAY is pressed, it replies OK and SEARCHING. When it finds a program it prints FOUND FILENAME and checks if it is the one you asked for. If not, it continues searching. If it is correct, it prints LOADING and loads the program. When finished, the Basic pointers are adjusted and it prints READY.

The Atari appears to load a program like this: You type in CLOAD and hit RETURN (no file name is allowed). It beeps at you once and you then press play on your tape recorder and hit RETURN once again. It will load the program and print READY when done.

As you can see, the procedures are very different. Another difference is that the Atari clears out any program presently in memory when it encoun-

ters the command CLOAD, while the PET does not. For example: You type CLOAD (or LOAD) and hit RETURN. The Atari beeps. The PET prints PRESS PLAY ON TAPE #1. Now you decide to use the program presently in the computer instead, so hit BREAK (on the Atari) or STOP (on the PET) and try LIST. The PET will still list your old program. The Atari shows no program in memory.

Save a Program: PET saves a program in this manner: Type SAVE "PROGRAM" (or simply SAVE) and hit RETURN. The PET replies PRESS PLAY & RECORD ON TAPE #1 (unless the buttons are already down). Press them and it says OK WRITING PROGRAM. When done it says READY.

The PET allows you to VERIFY that a tape just SAVED is correct, while Atari apparently doesn't have this feature.

The Atari saves a program like this: Type CSAVE (no file name is allowed) and hit RETURN. It beeps twice. You must then press record and play on the tape unit, hit RETURN again and the Atari saves the program. It replies READY when done.

The procedural differences are again apparent here. Also note that the PET allows you to VERIFY that a tape just SAVED is correct, while Atari apparently doesn't have this feature.

With the usual SAVE or CSAVE the program is saved in its memory efficient token form. You can save it in its ASCII or untokenized form like this:

```
PET: type OPEN 1,1,1 : CMD1 : LIST
then PRINT#1 : CLOSE 1
```

```
ATARI: type LIST"C1:"
```

To load programs saved this way into the PET, some trickery is involved. With the Atari it is rather simple using the Basic command ENTER. When through loading it is ready to RUN.

The difference in the two methods is that the program is normally saved in tokenized form (the first method). The second method (LIST) saves the program in its untokenized form.

Input

For the Atari, using the INPUT command is limited only to the amount that fits into one logical line (three screen lines). Let's look closer at this using this test program:

```
10 INPUT A
20 PRINT A
```

When it is RUN a question mark is printed as your prompt. I just typed in

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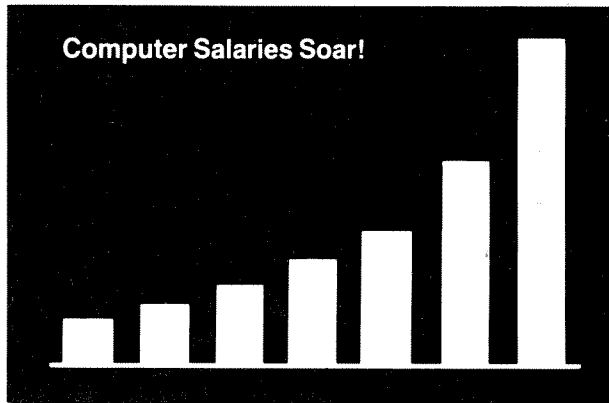
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Atari, cont'd...

1234567890123456... etc. past the end of the logical line. The PET and Atari treated this differently. Suppose we type a 7 at the end of the logical line and continue on the next line with 89 and then hit RETURN?

The PET prints 89 as the answer, ignoring the first logical line typed. The Atari prints 1234567890123456...567 as the answer. It accepts the first full logical line and ignores everything after that. This could use further testing, and I welcome comments.

Both allow string manipulation but in different ways.

There is another significant difference with the INPUT statement. The PET allows a "prompt" to be included such as:

```
10 INPUT"ENTER NAME PLEASE";N$
```

The Atari does not allow this. A PRINT statement must first be used such as:

```
10 PRINT"ENTER NAME PLEASE";
```

```
20 INPUT N$
```

Atari also does not allow you to INPUT into an array (PET does). You must first input into a dummy variable and then set the array element equal to that variable.

Restore

Both computers use the command RESTORE to allow DATA statements to be read again. Both start reading DATA from the first DATA line after a RESTORE. However, the Atari also lets you restore DATA lines beginning at whatever line you wish. For example:

```
10 DATA 10
20 DATA 20
30 DATA 30
40 READ A, B, C
50 PRINT A, B, C
70 GOTO 40
```

The above program produces an error on both computers since it can only read DATA once, and runs out of DATA when we GOTO 40. However, if we add:

```
60 RESTORE
```

Both computers continue printing:

```
10      20      30
10      20      30
10      20      30
etc.
```

The Atari will also allow you to RESTORE DATA beginning with any line, say line 30 in our example. I tried this:

```
10 DATA 10
20 DATA 20
30 DATA 30
40 READ A, B, C
50 PRINT A, B, C
60 RESTORE 30
70 READ A
80 PRINT A
```

The Atari gave this result:

```
10      20      30
30
READY
```

Notice that after RESTORED to line 30, it did not start with DATA in lines 10 or 20, but began at 30, as we instructed it. The PET does not have this feature.

And a Few More Differences

This is only supposed to be a partial comparison, not a book (and I need my time to write the books on Atari and PET that I am doing) so I will quickly mention a few more differences that may be significant.

Strings: One major difference is how each Basic treats strings. Both allow string manipulation, but in different ways, and Atari is a bit more complicated in my opinion. PET dynamically allocates strings as they are needed, and their lengths may vary throughout a program. However, Atari requires that all strings used be DIMed first, defining the maximum number of characters to be allowed in the string. Atari also doesn't allow string arrays, while PET does.

Adding strings together (concatenating) is very easy with a standard Microsoft Basic. Thus, the PET would allow you to add two strings together to get a third in this manner:

```
100 A$="TESTING"
110 B$="1234"
120 C$=A$+B$
130 PRINT C$
```

The result is: TESTING1234

To do the same thing on the Atari requires some tricky maneuvering as follows:

```
10 DIM C$(20), B$(20), A$(20)
100 A$="TESTING"
110 B$="1234"
120 C$=A$
130 C$(LEN(C$)+1)=B$
140 PRINT C$
```

The result is: TESTING1234

Most general Basic program listings will use the A\$+B\$ method.

Error Messages: If either computer hits an error, it will let you know (unless it is locked out — then the PET must be turned off and back on, while the Atari lets you hit SYSTEM RESET to get back, program intact). The PET prints a message such as BAD SUBSCRIPT ERROR, while the Atari only prints an

error number. You then must look up that error number in the manual to see what went wrong.

Error Trapping: The Atari allows you to TRAP errors as they occur during a RUN of your program if you wish. For example:

```
100 TRAP 200
```

If an error occurs, control will be transferred to line 200. This gives you a chance to plan ahead with error handling routines. Different traps can be set throughout the program. PET doesn't have anything like this.

Conclusion

Both seem to be excellently designed, the PET for its all-in-one packaging, and the Atari for its modular approach including ROM, RAM, SOFTWARE and LANGUAGE cartridge modules. Both units are good looking and designed for ease of use. For example, the Atari SYSTEM RESET key is protected from accidental depression by thin plastic walls on two sides. I like that! The Atari has a convenient POWER ON indicator light. Since your TV screen can be ruined by leaving the same image on it for too long, the Atari keeps track of how long the unit has not been accessed. If several minutes go by it begins a color change routine and every few seconds all the color registers are changed.

Both computers seem to be very flexible and expandable units, and I am very happy with both. If high resolution and color graphics are important to you, then the Atari should catch your eye. It also has sound control built into its Basic. However, one voice sound capability is easily added to the PET with only two wires and an amplifier/speaker.

If several minutes go by it begins a color change routine and every few seconds all the color registers are changed.

Over the last two years a lot has been written about the PET, and a lot of software is commercially available for it. The Atari is a newcomer, but I am sure it also will become quite popular. Software is already popping up from second sources and user groups are forming. I hope this comparison was useful and I welcome comments. Remember that this article focused on the Atari, and many excellent advantages of the PET are not mentioned. It is hoped that seeing the Atari compared to a popular computer already well known will help your understanding of the new kid in town. □

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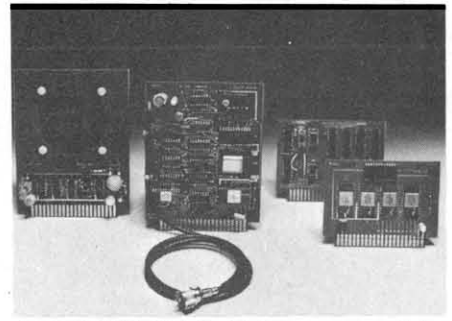


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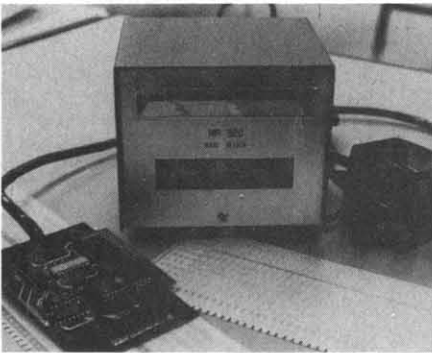
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CIRCLE 188 ON READER SERVICE CARD



Chatsworth Data Mark Sense Card Reader

Keith Schlarb



Shown are the interface, card reader and AC/DC adapter.

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1	2	3	4	5	6	7
&	&	&	&	&	&	&
—	—	—	—	—	—	—
0	0	0	0	0	0	0
1	1	1	1	A J /	A J /	A J /
2	2	2	2	B K S	B K S	B K S
3	3	3	3	C L T	C L T	C L T
4	4	4	4	D M U	D M U	D M U
5	5	5	5	E N V	E N V	E N V
6	6	6	6	F O W	F O W	F O W
7	7	7	7	G P X	G P X	G P X
8	8	8	8	H Q Y	H Q Y	H Q Y
9	9	9	9	I R Z	I R Z	I R Z

Figure 1. Sample of the first 7 columns of a mark sense programming card. The cards have a total of 40 columns.

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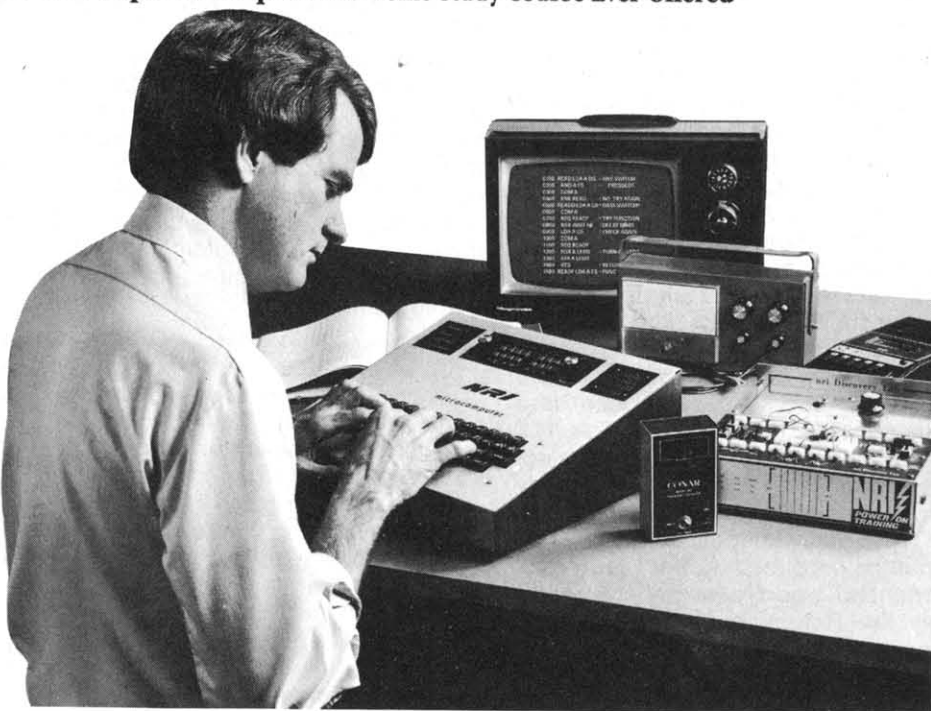
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Chatsworth, cont'd...

ditional advantage to educators is using the card reader to grade multiple choice tests. A special test scoring card is used which allows for 100 questions, each with 5 possible answers. Students shade in the appropriate answer on the card as they take the test. The cards are then fed through the reader and are graded by using a test scoring program which is furnished by Chatsworth Data on request, at time of purchase.

The Chatsworth Card Reader is compact in size, 4.6"(width) x 4.3"(height)x4.5" depth, and weighs only 4 pounds. It is composed of the main reader housing, with motor to drive the reader, an AC/DC converter and an interface board and all are included in the purchase of the reader.

It was a simple task to get the reader up and running with my Apple Plus II. The interface board was plugged into slot 4 of the Apple and the other end of the interface cord was attached to the reader. The AC/DC adapter was plugged into an electrical outlet and the reader was ready for its first performance. The computer was ready to accept information from the card reader after the "IN#4" command was typed and the return key hit. Returning to keyboard use was accomplished by marking a card with the "IN#0" command and feeding it through the reader. The "IN#4" and "IN#0" commands may also be used within programs to enter data from the reader.

Marking Programming Cards

Figure 1 shows a portion of a programming card, drawn to an enlarged size. When marking a program, columns 1-4 are used for the line number. Columns 5-40 are marked for the Basic statement. The cards are marked using the standard Hollerith Code and a #2 pencil. Figure 2 shows the card symbols, symbol location within the boxes and the appropriate marking for the symbols. The following are a few

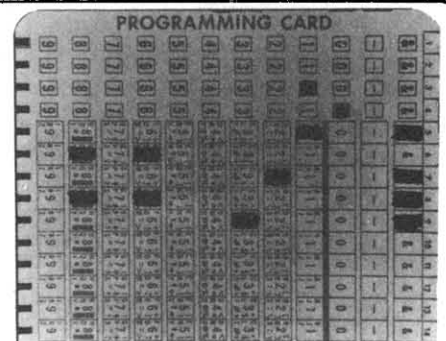
examples of the correct markings required to enter data by card: To enter 0-9 numbers simply shade in the appropriate box of the number. Letters A-I are marked by shading the (&) box plus the box containing the letter. Examples are letter C marked by (&3), and F by (&6). Letters J-R are marked by the (-) box and the corresponding letter. Letter K is (- 2) with Q being a (- 8). Letters S-Z are marked in a similar way, shown in Figure 2. The symbols appearing at the bottom center of the boxes, below the numbers, are marked by a combination of (8) and the appropriate box. An equal sign, for example, is a (6 8) mark combination. The symbols to the right of the boxes are marked by combinations of one of the following (& - 0) plus (8) and the appropriate box containing the desired symbol. See Figure 2 for the exact combinations.

Entering Data

Entering a program is a simple procedure. Using the "IN#4" command the computer looks for information from the reader. Input all the cards, with the last being the "IN#0" command to return to the keyboard, and the program is ready to run. If it is desired to run the program by using the reader, then do not use the "IN#0" card and enter instead the "RUN" statement.

Several methods are available for entering variables into an existing program. I have found the easiest method to input a long list of variables is through the use of data statements. Mark the variables on a card, always using the same program line, so as not to accidentally destroy another line of the program. Enter the data statement before running the program. This procedure can easily be adapted for programs you already have by changing "INPUT" statements to "READ" statements through the program.

A second method of using the reader to input variables is to use the "IN#4" and "IN#0" commands



Shown is the correct marking for the statement 10 A = B + C.

within the program. The variables are entered through the reader when requested. If the program statement "INPUT A.B.C.D.E" is used, then an equal number of variables may be entered on a single card. However, each variable must be separated by a comma.

A third method to input variables is the use of a FOR-NEXT loop, again with the "IN#4" and "IN#0" commands within the program. See Figure 3 for a sample program using the FOR-NEXT loop. Use of the loop, however, requires that only one variable be marked on each card. This could lead to using a large number of cards.

```
400 IN#4
410 FOR I= 1 TO 10
420 PRINT "INPUT CARD"
430 INPUT A(I)
440 NEXT I
450 IN#0
```

Figure 3.

The FOR-NEXT loop above can be used to input variables into a program. The IN#4 command allows the computer to accept data from the reader and line 450 returns control to the keyboard.

Cost

Chatsworth Data is presently advertising the card reader, AC/DC converter and interface at \$750. The cost of programming cards is \$15/1000.

Thus far I have had no problems with the reader. It is a fantastic piece of computer equipment. Obviously I still use the keyboard to enter programs, but the card reader has made it possible for one microcomputer to handle programs from a full classroom of students. So, unless your school system can afford a dozen microcomputers, or you don't mind having 25 students waiting in line, you may want to join me as a rejoicing owner of a Chatsworth Data MR-500 Mark Sense Card Reader. □

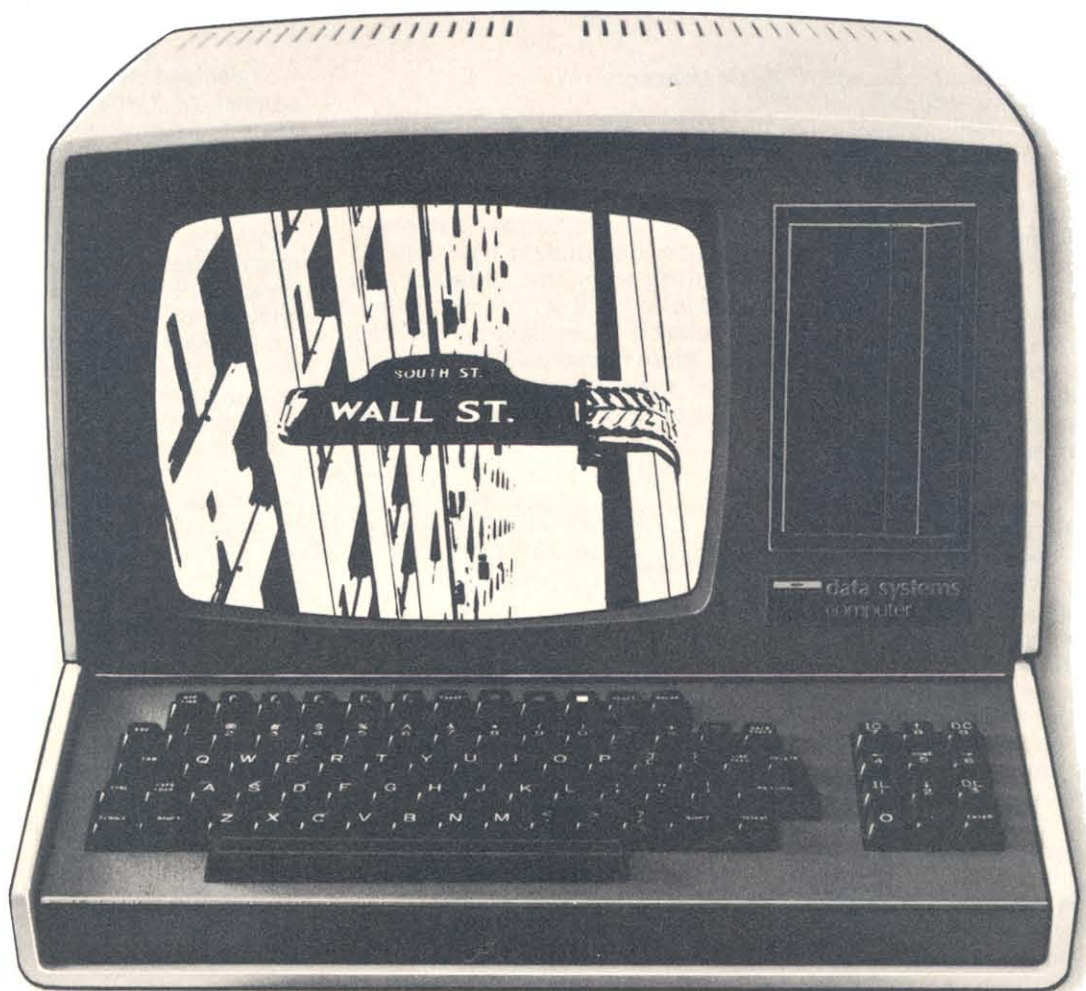
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(213) 341-9200

SYMBOL LOCATION	SYMBOLS	MARKING
Center of Box	1 2 3 4 5 6 7 8 9 0	appropriate box
Top Left of Box	A B C D E F G H I	appropriate box plus (&)
Center Left of Box	J K L M N O P Q R	appropriate box plus (-)
Bottom Left of Box	/ S T U V W X Y Z	appropriate box plus (0)
Bottom Center of Box	: # @ = "	appropriate box plus (8)
Top Right of Box	[. < { + !	appropriate box plus (&) plus (8)
Center Right of Box] \$ *) ; ↑	appropriate box plus (-) plus (8)
Bottom Right of Box	/ ' % ← > ?	appropriate box plus (0) plus (8)
Carriage Return & 5 8 9		
Line feed 0 5 9		

Figure 2. Other ASC II characters can also be marked on the cards. An entire list with the correct marking codes are furnished with the reader instructions.

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Reading Comprehension For The SOL-20

Randy Heuer

When writing a software package for use by those in the educational community, the program author is faced with three very real problems. First, the program must appeal in some way to the student. Without this, the students may become bored and spend more of his/her time trying to defeat the purpose of the software rather than devoting this time to learning. Second, most educators who must use the programs are rarely familiar with computers and are often quite afraid of them. Thus the software must be written so these fears can be overcome and user mistakes will be forgiven. Finally, and perhaps most difficult, the programmer must try to solve these two problems within the limitations of whatever computer system is chosen (microcomputer or otherwise). This problem may severely limit the extent to which the first two problems can be solved.

These were the major obstacles I foresaw when I undertook a reading comprehension project for a school district client of Creative Computing Software. The objective was to develop a student's reading comprehension through the use of a computer (in this case a SOL-20 with 32K of memory). Cassette based files were to be used so the teachers could create their own data tapes and the students could use them interchangeably.

Basic Concepts

The following approach was taken toward developing basic reading comprehension skills! The student is presented with a brief short story which may take as long as he wants to read. After the student has finished reading the story, the program presents the student with several multiple choice questions about the story. At the teacher's option, the student may be given a limited amount of time to answer the questions.

I decided that the package would consist of three BASIC programs. Two of the programs would be used by the instructors to create the data tapes. The first, entitled TEXT, would be used to create, edit and copy the short story files. The second program, called QUES, would be used to create, edit and copy the question and answer file. The final program, QUIZ, would use the data tapes created with the first two programs to present the student with the exercise. (See Figure 1 to see how the three programs interact.)

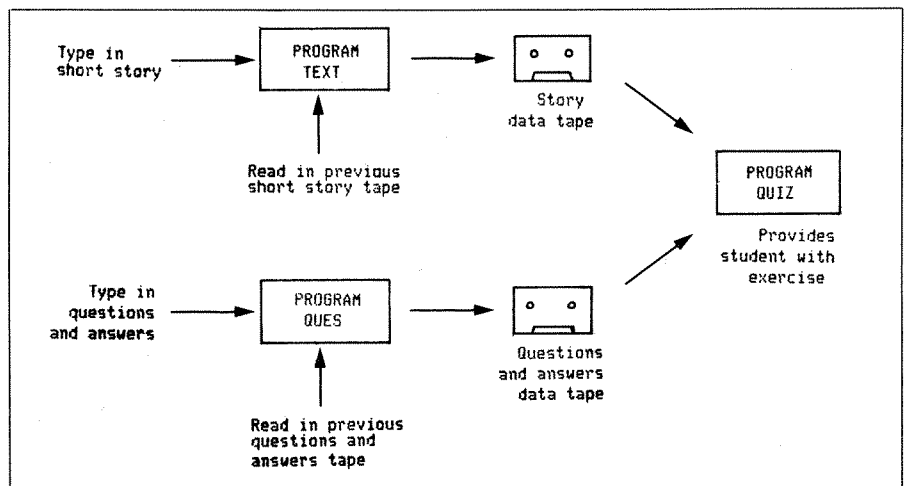


Figure 1

The long, hot summer was coming to an end. August was a scorcher. There was no rain for almost three weeks. The heat was unbearable. The grass had turned from a bright green color to a light shade of tan.

The circus was swinging around toward home now, working back toward a good place to cross the river into New Jersey. With the heat, the river was a lot shallower than it usually was at this time of the year. The circus caravan would have no trouble crossing the river.

The wind blew across the travelers like a blast

Are you ready to go on?

Example from QUIZ program - the first "page" of a story as presented to the student. To turn the page, the student presses the "Y" key.

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MICROSOFT \ OS	CP/M	ISIS-II	TRSDOS	TRSDOS Md II	TEKDOS
BASIC-80 INTERPRETER	●	●	■	■	●
BASIC COMPILER	●	●	□	●	
FORTRAN-80 COMPILER	●	●	□	■	●
COBOL-80 COMPILER	●	●		●	
muMATH/muSIMP muLISP	●		□		
MICROSEED DBMS	●				
EDIT-80 TEXT EDITOR	●		□	■	
MACRO-80 ASSEMBLER	●	●	□	■	●

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We set the standard.

Comprehension, cont'd...

When was the circus heading toward home?

1. In the spring
 2. At the beginning of the summer
 3. Near the end of the summer
 4. In the winter
-

TIME REMAINING 2 MINUTES 0 SECONDS YOUR ANSWER?

Example from QUIZ program - typical question as presented to the student.

The long, hot summer was coming to an end. August was a scorcher. There was no rain for almost three weeks. The heat was unbearable. The grass had turned from a bright green color to a light shade of tan.

The circus was swinging around toward home now, working back toward a good place to cross the river into New Jersey. With the heat, the river was a lot shallower than it usually was at this time of the year. The circus caravan would have no trouble

Do you want to continue Displaying?

TEXT program - using the display mode, the first ten lines of the story are displayed. If the user asks to insert a line after line 3 the computer will display...

How The Software Works

Designing software to accomplish the tasks outlined in Figure 1 is not particularly difficult, however, remember that these programs are to be used by people unfamiliar with computers. Thus the programs must be forgiving to incorrect input and self-instructing. These are the features that separate poor software from people-oriented software.

As outlined earlier, the extent to which these tasks can be accomplished is often dependent on the computer system used. For this project, a 32K SOL-20 was employed. Processor Technology's Extended Cassette BASIC requires approximately 15K of this memory. String variables for the data files and editing features occupy another 8K, leaving about 9K to store code and other variables.

With such stringent memory limitations, it was decided that extensive instructions would not be included in the programs. Instead the bulk of this free memory would be devoted to making the programs as user oriented (or "idiot-proof") as possible. In this way, users could press almost any key on the keyboard during prompts and the program would forgive any incorrect input. In addition, if the user wishes to make major changes to the file, the program will visually verify the changes requested and allow the user to change his mind. This feature keeps both experienced and inexperi-

enced users from making silly mistakes and damaging their work.

The first program, TEXT, is used by the teacher to create, edit, and copy the short story data tapes. The short stories may be entered from the keyboard or loaded from an existing short story tape. When stories are entered from the keyboard, they are typed in just as they would be on a normal typewriter. Any mix of upper and lower case letters or numbers is permitted.

After the story is entered, the program proceeds to the editor routine. This part of the program allows the teacher to modify the story. The three edit operations allowed are DELETE, INSERT and CHANGE.

Regardless of which edit operation the teacher wishes to make, the first step is to display a group of ten lines. The story can be stepped through ten lines at a time until the teacher finds the line he wants to edit. At this point, the program will request the teacher to specify the type of edit operation desired (INSERT, DELETE or CHANGE), and ask which of the displayed lines is to be altered. After this information is entered, the program removes the line to be deleted or changed from the screen, or for the insert mode, placing a blank line where the teacher requested to insert a new line. The program then asks,

IS THIS THE LINE?

If the teacher has mistakenly chosen the wrong edit operation or

the wrong line, the program now offers the user a way out without modifying any of the story. This is done by responding 'NO' to this inquiry. A 'YES' response will allow the desired modification to be made.

After all desired editing is accomplished, the program branches to the routine for saving the short story on cassette tape. This routine allows the user to make as many copies of the short story as needed.

The second program, QUES, is used by the teacher to create the question and answer data tape. Similar to the TEXT program, the questions and answers can be entered from the keyboard or from an existing data tape. Questions are of the multiple choice variety where each may have up to four possible answers. True-false questions are also acceptable.

This program also features an editor routine which allows the teacher to change either the questions, any of the answers or the number of the correct answers. Similar to the TEXT program, any part of the questions or answers the user requests to change, is displayed prior to the changes actually being made in memory. This feature helps prevent the user from accidentally making undesirable changes.

The teacher also specifies at this time whether to place a time limitation for the student to answer the questions. If a time limit is chosen, the student will be required to answer

Comprehension, cont'd...

all the questions within the specified amount of time. Otherwise the student will have an indefinite amount of time to answer the questions.

After the teacher has completed the short story data tape and the question and answer data tape using the TEXT and QUES programs, the student can be presented the exercise using the QUIZ program. After reading both data files, the program first presents the student with the short story. The story is displayed twelve lines at a time, much as if the student was reading a book. The student "turns the page" by pressing the 'Y' key. Unlike a book, the student cannot turn back the page to review what he has read. Thus the student is required to try to comprehend what he is reading.

After the student has completed reading the story, he is presented with the multiple choice questions. The student is informed before he starts if there is a time limit to answer. Each question is displayed on the screen with its four possible answers and the time remaining. To answer the question, the student presses the key of the answer he thinks is correct. The computer will inform the student if he has chosen the correct answer.

If the student chooses the correct answer, the computer will proceed to the next question, otherwise the student must keep attempting the same question until he selects the correct

answer. When all of the questions are answered, or if the student takes too much time, the program provides a numerical and descriptive evaluation of the student's results.

Did I Accomplish What I Wanted?

Now that the software is completed, did I solve the three problems I outlined at the beginning of the project? Let's look at them one at a time.

First, is the program enjoyable to use by the student? To an extent, I suppose this depends upon the individual using the program. I haven't attempted to make the subject of reading comprehension a game. The purpose of the program is a reading comprehension exercise. Some students will not find any exercise fun, no matter how it is done, but I believe most students will find the program challenging and will try to do the best they can. I'll have to wait for reports from the educational community to see if this is true.

The second problem was to make the programs easy to use, particularly for the teachers. In this area I feel the programs accomplish all that can be expected. Each of the programs has been designed to accept any user input and provide help when receiving incorrect input. Major modifications to the user's work are first verified by features that display the changes the user requested before permanent changes are made. This helps eliminate making undesired changes acci-

dentally.

The final problem to overcome was to solve the previous two problems within the limitations of the chosen computer system. Obviously, this has been accomplished. Other features such as disk based files and more memory for larger data files would be desirable, but were not included due to the limitations imposed. However, within these limitations this seems to be an effective method of strengthening reading comprehension skills.

A Reading Comprehension Package for the SOL-20 is available from Creative Computing Software. CS-8201 is a five cassette package designed for developing reading comprehension skills.

The package uses cassette based files to present a short story and accompanying multiple choice questions on the screen. Two of the programs are used for creating, copying and editing these files. Two other programs use these files to present the story and the quiz. The final tape contains a sample short story and questions. A 32-page instruction manual is included in the package.

This package requires a SOL-20 with a minimum of 32K of memory and Processor Technology's Extended Cassette BASIC. The retail price of this package is \$50.00. □

The long, hot summer was coming to an end. August was a scorcher. There was no rain for almost three weeks. The heat was unbearable. The grass had ? turned from a bright green color to a light shade of tan.

The circus was swinging around toward home now, working back toward a good place to cross the river into New Jersey. With the heat, the river was a lot shallower than it usually was at this time of the year. The circus caravan would have no trouble

HERE?

ANSWER # 1

In the spring

ANSWER # 2

At the beginning of the summer

ANSWER # 3

Near the end of the summer

ANSWER # 4

In the winter

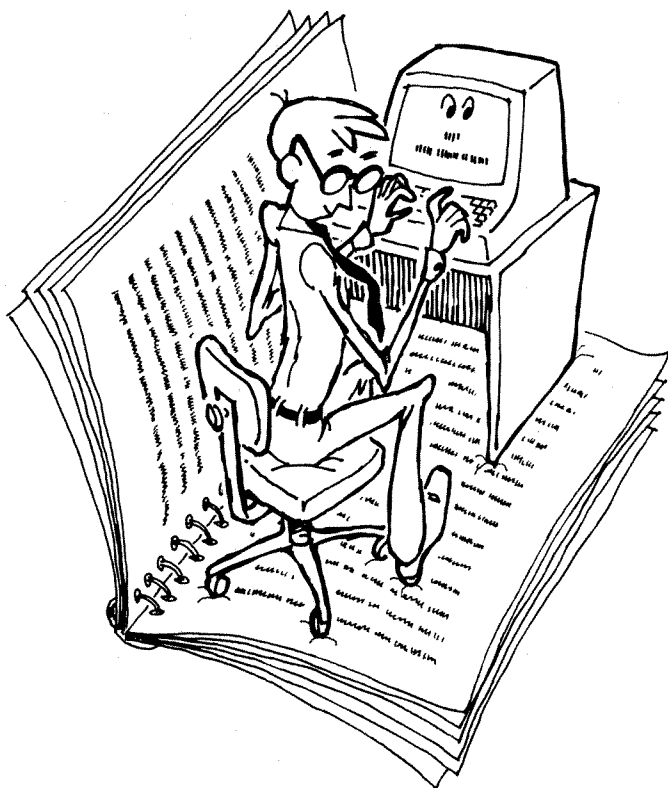
Do you want to make any changes?

...A blank line after the third line and an opportunity to back out of the insert mode. If the user responds "No" to the Here? Prompt, no changes will be made to the story. A "Yes" response will allow the desired changes to be made.

Example from QUES program - editing routine allows the user to view the present answers before making any changes.

DO IT

University Software gives you

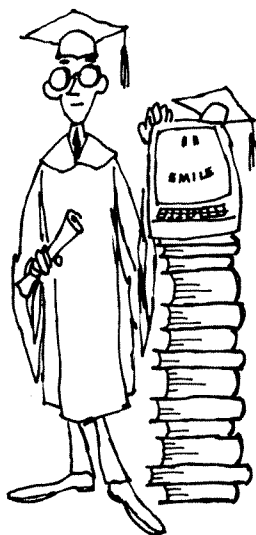


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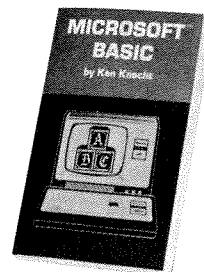
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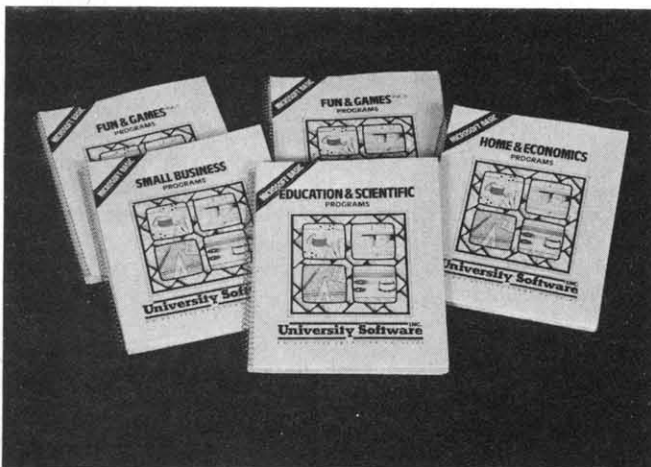
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Ancient Literature With Modern Computers

An Interview with Dia Philippides

By Mary Nicolopoulos

Dia Philippides, a doctoral student at Princeton University, was among the classical scholars attending the computer colloquium at the 1976 annual meeting of the American Philological Association held in New York December 28-30. I asked Miss Philippides to explain the link up between computers and the classics.

Q. How do computers help classical scholars in their work?

A. Computers can cut years off the time it would take to complete certain projects. Once a text is put on computer tape, computer programs can be applied to the text and time-saving miracles are performed. The computer can be programmed to analyze metric verse as one would analyze music for its structure and form. This is the type of work I am involved with—I am working on a project which will provide a better understanding of the meter used by the Greek tragedians in their spoken dialogue. The computer can also verify the authorship of a text through stylistic analysis by checking for a variety of factors such as the position of the verb in the line or the type and frequency of particles the author uses. The compilation of concordances, indices and dictionaries can be tremendously facilitated by the use of programs which instruct the computer to scan a text for a particular word and print it out along with the sentence or line in which it occurs.

Q. Are classical texts readily available on computer tape now?

A. Yes. The Thesaurus Linguae Graecae Project, headed by Ted Brunner of the University of California at Irving, has undertaken to put all of Greek literature on computer tape. So far they have computerized 18.5 million words of text and their goal is 90 million words. The availability of the computerized texts saves years of time for a scholar who would otherwise have to prepare and proofread his own tapes before beginning his analysis. If I were to sit down now and keypunch the 33 tragedies which my work in-

volves, I would be here, three years from now still punching. At present these tapes must be purchased rather than rented or borrowed and they are costly for an individual's budget. Eventually I foresee that certain universities will have the complete collection of Greek literature available in tape libraries.

Q. How long have classicists been using computers in their work?

A. I would say that the field is approximately ten years old. A. Q. Morton is one of the first in the field. With the help of monks in Scotland as volunteer keypunchers, he computerized Homer to facilitate his research. Since then other scholars have computerized various other works. Stephen Waite at Dartmouth College created a centralized repository for the American Philological Association to collect whichever Greek and Latin texts have been computerized and make them available to all interested scholars.

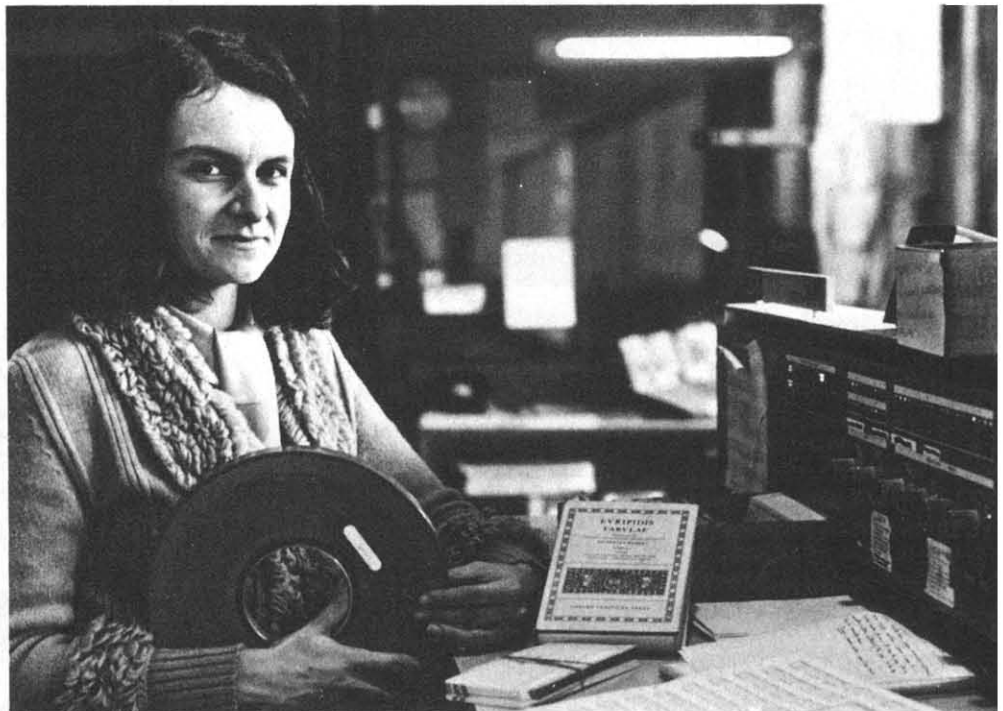
Q. Where is the main work being done in this field?

A. One of the leaders in this field in the United States is David Packard who is at the University of North Carolina at Chapel Hill. I have already mentioned Ted Brunner at Irving and Stephen Waite at Dartmouth. Now there are a couple of us in the New York area who are starting and a few in eastern Canada.

In Liege, Belgium, the Laboratory for the Statistical Analysis of Ancient Languages carries out much work of this nature. Several distinguished scholars are permanently in residence there while others take part on a visiting basis. The Laboratory has been publishing a quarterly periodical for ten years. The collaboration found at Liege is something which we do not have yet in the United States. The great distances between Chapel Hill, Irving, Dartmouth, etc., have caused efforts up to now to be largely individual ones.

Continued on page 45

Miss Dia Philippides with her computers.



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†CP/M for Heath and TRS-80 Model I are modified and must use specially compiled versions of system and applications software.

††Recommended system configuration consists of 48K CP/M, 2 full size disk drives, 24 x 80 CRT and 132 column printer.

*Modified version available for use with CP/M as implemented on Heath and TRS-80 Model I computers.

*User license agreement for this product must be signed and returned to Lifeboat Associates before shipment may be made.

*This product includes/excludes the language manual recommended in Sundries and Notions.

Orders must specify disk systems and formats e.g. North Star single double or quad density, IBM single or 2D/256, Altair, Helios II, Micropolis Mod II or II, 5 1/4" soft sector (Micro COM/SD Systems Dynabyte), etc.

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Q. I want to ask you about your own research but first tell us something about your Greek background since you seem to be one of the very few Greeks in this field.

A. My father is Greek, born in Athens. My mother is American and a classical archaeologist. She has a deep love for Greece, too. I was born in America but we moved to Greece when I was eight. My parents still live in Athens. I had the benefit of Greek schooling in Athens. I attended three different schools all of which were very good. Not knowing any Greek at the outset I managed, with the help of these schools, to graduate with the full credentials of any other Greek high school student. I am proud of the excellent school preparation that I had in Athens. The background that was given to me by my teachers both in math and in classics has enabled me to reach the stage that I am at now. I really would commend the Greek high school program for the preparation it gives one on which to base further training.

Q. How did you become interested in combining computers with classics?

A. I studied computer science as an undergraduate at Radcliffe. I have long been fascinated by the possibility of putting my computer background to work in a new and worthwhile application such as in the studies of Greek. The combination of the two fields requires a solid background in both. Developing the necessary skills took time. I had to study Greek and Latin for six or seven years before I could come back the full circle to using a computer in the study of Greek. Before the computer can be applied to anything one must have an idea of what is permissible and what is feasible in order to come up with valid results.

I attended the 1972 meeting of the Thesaurus Linguae Graecae in Athens. The discussion there of the project to put all of Greek literature on computer tape kindled my interest even further.

When I was faced with the decision of choosing a thesis topic I flew down to Chapel Hill to seek guidance from David Packard. It seemed possible to work with computer in classics but I had to determine which area to work in. From the topics that David Packard suggested, I chose to study the meter of the three Greek tragedians. He had advised me that although many computer-assisted studies had been made of the metrics of Homer, there were few of the spoken dialogue of the Greek tragedians. I have decided to examine more closely the meter used by Euripides since work has already

been done on the meter of Aeschylus and Sophocles. I would like to be able to bring out elements which others can use in the future in discussions of Euripides and of tragedy in general.

Q. Can you explain your research in more detail?

A. The goal of the study is to examine closely the differences in style among the three tragedians and to investigate chronological progression and possibly development from the early works of an author to the late works. This may provide additional data to be considered in dating the plays.

To analyze the iambic trimeter used by the Greek tragedians will be quite a bit more complicated than the analyses which have already been done on the hexameter of Homer and of other Greek and Latin works. For the hexameter each line represents one of 32 possible metrical patterns while for the iambic trimeter there are 240 possible patterns. The computer will give me precise data on the structure of the trimeter. It will be able to provide figures on both 'outer' and 'inner' metric. Inner metric takes into consideration the breaks in the line and the words and their actual shapes.

In the total of tragedy, counting only the trimeter and not the choruses, there are 28,000 lines. So to do this by hand might be the work of several years. The most rational method of working it out is the computer. At times the computer will not be able to diagnose a syllable as either long or short since the three ambiguous vowels, alpha, iota and upsilon, can be either long or short. In such cases the computer will print a question mark and with the help of a dictionary I will assign the proper or the statistically more frequent value which also fits an acceptable trimeter pattern. One of the examples I have tried out is the word δάκρυ, "tear", which has two ambiguous syllables. I found that Euripides does not always use the same syllabic length when he employs this word. I would like to determine whether there is something which motivates his use of the word in one length in one context and then in another length in another. This might be indicative of development.

Q. Would you like to try something like this in Greece? Would it appeal to you?

A. It would be very exciting. Greece would be a natural place to work because it is Greek material that is being worked on, it is the Greek heritage—and Greek scholars of necessity would be most interested in it.

Reprinted from GREEK WORLD

Computerized Testing For Readability

Donald Goodman
Sandra Schwab

We got to the point where we had to coax the paraprofessionals down off the walls about once a week by tossing them Valiums and promising to give them severance pay if they separated from their minds. It was a bad situation, but we really couldn't blame them since we had put them in that situation in the first place. We had all learned to tolerate a little moderate hysteria in our Personalized Achievement Lab, and even permitted screams if they were in good taste.

The problem was Flesch. Not the flesh that leads to corruption of the soul, but the Flesch that leads to a Readability Level. The road to hell may be paved with good intentions, but the road to insanity in a reading lab is paved with syllables: syllables that must be counted by the hundreds.

The road to hell may be paved with good intentions, but the road to insanity in a reading lab is paved with syllables: syllables that must be counted by the hundreds.

For a number of years the instructors in the Muskegon Community College Reading Lab had offered to run readability checks on text books which instructors in academic areas were either currently assigning or were considering adopting. However, we didn't advertise the service very widely because no one really wanted to do it. We were using the Flesch Readability Formula, an excellent



Paraprofessional Kathy Schrader counting out syllables using her fingers, just prior to uncontrolled outburst.

device for giving a fairly accurate grade level on material which contains at least a hundred running words in each sample. But the formula requires that someone count the words in each sentence and count the syllables in the hundred words. Moreover, one passage is hardly an adequate sample. We felt that at least five or six were needed to accurately measure the readability of each text book. And damned if the instructors were going to do it. We gave it to the paraprofessionals.

Picture them: already harried from a phone that rings incessantly, earnestly trying to count out syllables in six samples of 100 words each from a stack of Nursing texts (how many syllables in vasodilation?) while a sad-eyed student is standing by confessing, "I've turned the knob the wrong way on the EDL machine and jammed the film all in the gears."

No wonder they climbed the walls. Obviously something had to be done. That something sat coolly in the Math Lab on a confident green table, a placid, silent alternative to the mental

storms erupting elsewhere. The para's called it Wanda Wang. The business office calls it a Wang 2200. We call it a computer.

The Training of Wanda

All we had to do was teach Wanda to count sentences and count syllables. She could then give us the average number of words per sentence and the total number of syllables per 100 words. We would plot that information on the Flesch chart, draw a line between the two numbers, and intersect the "grade level" markers telling the readability level. We could probably use it for the Fry Readability formula as well.

It was easy enough to teach Wanda to count words: every space indicates the end of a word.

She could easily note sentences: Periods, question marks, or exclamation marks indicate a sentence. We



Paraprofessional Kathy Schrader being told she no longer has to count syllables.

could have included semi-colons but we didn't.

Counting syllables gave us the greatest challenge. After all, there are many not-very-good rules used to teach people how to break words into syllables: Noting certain prefixes and suffixes; watching for vowel-con-

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BASIC Compiler. With TRS-80 BASIC Compiler, your Level II BASIC programs will run at record speeds! Compiled programs execute an average of 3-10 times faster than programs run under Level II. Make extensive use of integer operations, and get speeds 20-30 times faster than the interpreter.

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BASIC Compiler runs on your TRS-80 Model I with 48K and disk drive. The package includes BASIC Compiler, linking loader and BASIC library with complete documentation. \$195.00.

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Symbolic mathematics is muMATH's power. For the first time, algebra, trigonometry, calculus, integration, differentiation and more can be performed on a system smaller than an IBM 370. And in a fraction of the time you could do them manually.

Yet for all its power, muMATH is simple to use.

To perform a differentiation you could enter: ?DIF (A*X ↑ 3 + SIN(X ↑ 2),X);

In almost no time, the computer would reply with: @2*X*COS(X ↑ 2) + 3*A*X ↑ 2.

Or to add fractions: ?1/3 + 5/6 + 2/5 + 3/7;

The instantaneous answer: 419/210.

Or to perform a more difficult trigonometric expansion you enter: SIN(2*Y)*(4*COS(X)↑3-COS(3*X) + SIN(Y)*(COS(X+Y+PI) - COS(X-Y));

Just a few seconds later, the computer replies: @4*SIN(Y)*COS(X)*COS(Y).

muMATH has virtually infinite precision with full accuracy up to 611 digits.

If you use math, you'll find countless ways to save time and effort with muMATH. It's a professional tool for engineers and scientists. A learning tool for students at any level from algebra to calculus.

And if you want to expand your capabilities even beyond the standard muMATH, the option is open. muSIMP, the programming language in which muMATH is written, is included in the muMATH package. A superset of the language LISP, muSIMP is designed especially for interactive symbolic mathematics and other artificial intelligence applications.

muMATH and muSIMP were written by The Soft Warehouse, Honolulu, Hawaii. Priced at \$74.95, the package includes muMATH, muSIMP and a complete manual. It requires a Model I TRS-80 with 32K and single disk. muMATH for the Apple II Computer will be available later this year.

You can buy muMATH and BASIC Compiler at computer stores across the country that carry Microsoft products. If your local store doesn't have them, call us. 206-454-1315. Or write Microsoft Consumer Products, 10800 Northeast Eighth, Suite 507, Bellevue, WA 98004.

MICROSOFT
CONSUMER PRODUCTS

Testing, cont'd...

sonant-vowel groupings, and vowel-consonant - consonant - vowel patterns. Keeping an eye peeled for exceptions signaled by le, ck, ch, th, sh, gh and ph was another technique.

We couldn't teach Wanda to break words into syllables, obviously. She could only count them. But count what?

We were explaining to each other one day why it couldn't be done when the idea flashed upon us. A syllable is a vowel.

There are exceptions, but they are fairly regular and we can control them. There are exceptions to the exceptions, but we had faith that our beloved erratic English would sin as much on one side as another.

We tried many pairing-patterns, and made many arbitrary decisions, some of which had to be changed when we tested - and re-tested - the program.

But now it works. It includes words as well as abbreviations; it works well on long or short words, simple or difficult. A work-study student or paraprofessional can sit down at Wanda, load the program, type out 100 words, and wait for it all to happen.

All we had to do was teach Wanda to count sentences and count syllables.

Rules of the Road

There are six simple rules for the program: (The line numbers refer to the program instructions fed to Wanda)

1. The vowels are (Line Nos. 520 - AEIOU and Y 610) except at the (Line 525 & 600 & beginning of a 610) word.

Each individual vowel is a syllable except these combinations are one syllable:

AA	EA	IA	OI	UA
AE	EE	IE	OO	UE
AI	EU	II	OU	UI
AU	EY	IY	OY	UU
AY		ION		UY

(Lines 520 - 610)

This means, by default, that the following combinations count as two syllables:

OE	AO
OA	EO
IO	IU
EI	UO

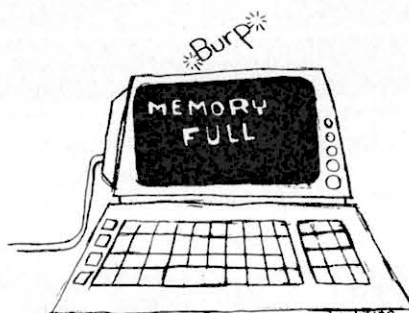
3. When E is (Lines 575 - 578) found at the end of a word it is not a syllable except when it follows L or (Line 579) when it is the only vowel.
4. ED is not a syllable unless it is the only syllable possible (No other counted vowel appears in the word) (Lines 580 - 589)



"That something sat coolly in the Math Lab on a confident green table."

5. ES, by default, is a syllable.
6. Every word has a syllable (This gives THE, as well as TV, PBB, 1979 and similar abbreviations and number clusters one syllable) (Lines 500-517)

In addition we have the following typing directions: Type as Follows:



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ONLY type to the end of the viewing screen (width of 64 characters). The cursor will automatically jump to the next line if you type in the 64 position. You must use the backspace key to erase any characters that appear on the screen's next line. Press the return (exec) key - the cursor will disappear for a few seconds (it's counting the number of words you have entered); when it reappears a question mark will appear on the screen. Continue typing your information and repeat until the computer tells you that you have entered at least 100 words.

When typing look for the following:

1. commas - DO NOT enter any commas that appear in your text.
2. .!? Must be entered to signify the end of sentence. DO NOT use the period except at the end of the sentence. All other punctuation can be inserted or omitted at the typist's discretion. (; / ())
3. Hyphens - If used, Wanda will count the hyphenated word as one word. If the hyphen is omitted and replaced with a blank the separated words will be counted as two.
4. Apostrophes - Should not be used when a letter has been omitted. "Does not" when typed as "doesn't" will be counted as one word, two syllables. "Does not" will be counted as two words, three syllables.
5. Numbers and Abbreviations (without vowels) will be counted as one word and one syllable. DO NOT use periods unless you are at the end of the sentence. Abbreviations with vowels will follow the rules for the vowel syllable count.

We were explaining to each other one day why it couldn't be done when the idea flashed upon us. A syllable is a vowel.

The Doubtful Pairs

As we set up our paired-vowel rules, we found ourselves making tentative decisions, gambling that we would end up with the table odds. In some cases (calling ES a syllable but ED not a syllable) our decision was an out-and-out swap. In most cases we listed all the words we could think of containing those vowel combinations and made rational choices based on the likelihood of one over the other.

For instance, should OE be one syllable as in doe, foe, toe; or two as in poet, coerce, coefficient? Should

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Testing, cont'd...

OA be one syllable as in boat or coach; or two as in coagulate and coaxial? Should EI be one as in reign and sleigh; or two as in reinstate and reinvestigate?

In these cases we chose to consider the CO and RE as likely candidates for prefixes. In college-level material prefixes and suffixes abound. So, in all three cases we picked two syllables over one.

The IO combinations gave us trouble. Should we choose one as in notion, dominion, ration; or two as in bibliography, biology, biorhythm?

In this case we could have our cake and eat it, too. We called IO two syllables but ION one.

EO was interesting, since a word like **theory** is given either one or two, depending on which dictionary you read. We gave it two.

Like the amazing pedal- powered airplane, people may not like the way it looks or operates but the son-of-a-gun flies.

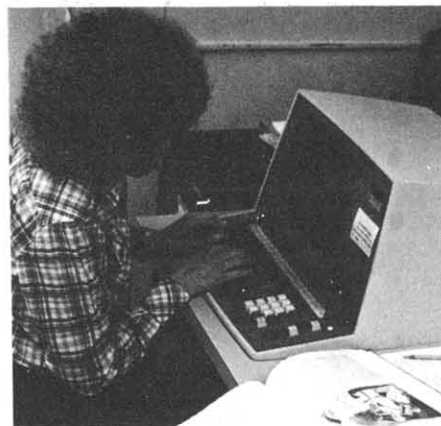
On the other hand we chose UA-1 over UA-2 (qualify over truant), IA-1 over IA-2 (partial over bias), UI-1 over UI-2 (quit over tuition) and IE-1 over IE-2 (belief over scientific).

Summary

What amazed us was that as we tacked the parts of the program together and tore them apart again

things worked fairly well at all stages. The combination vowels threw the count off a little as we experimented, but not as much as we had anticipated.

Like the amazing pedal-powered airplane, people may not like the way it looks or operates but the son-of-a-gun flies.



"A paraprofessional can sit down at Wanda, load the program, type out 100 words, and wait for it all to happen."

We urge the reader to feed the program which follows into any computer of the sophistication level of the Wang 2200 and then compare the results with a "manual" or mental count. The results will be surprisingly close. We would also welcome refinements with open arms, and criticism with civility.

It is truly gratifying to know that in America today two people concerned with finding a way to get out of work, and armed with sincerity, dumb luck and a small computer, can conquer new worlds and keep the paraprofessionals off the walls. □

```
1 DIM T$(15)64
5 REM PROGRAM BY DONALD J. GOODMAN & SANDRA SCHWAB
10 PRINT :PRINT HEX(03),TAB(16),"FLESCH READABILITY SCALE"
12 PRINT "WHEN THE ? APPEARS ON THE LEFT OF THE SCREEN YOU MAY
TYPE IN THE 100 WORD PASSAGE. WHEN YOU HAVE ENTERED AT LEAST 100
WORDS":
14 PRINT "WAIT & THE COMPUTER WILL COUNT THE AVERAGE NUMBER OF S
ENTENCES WITHIN APPROXIMATELY 30 SECONDS, AND THE SYLLABLES COU
NT WITHIN ONE MINUTE"
16 PRINT "DO NOT TYPE BEYOND ONE WIDTH OF THE SCREEN"
18 REM C ALLOWS UP TO 15 LINES OF TEXT TO BE ENTERED. USUALLY 10
0 WORDS WILL BE COUNTED BEFORE THE END OF THE 15 LINES
19 REM IF THE TEXT IS VERY DIFFICULT INCREASE C--BEWARE OF OVERF
LOW
20 FOR C= 1 TO 15
21 REM T$(C) IS USED FOR STORING EACH LINE OF YOUR TEXT
30 INPUT T$(C)
39 REM M IS SET EQUAL TO 64(FULL LENGTH OF SCREEN) UNTIL IT FIND
S THE 100TH WORD & Q= COUNTER FOR THE CHARACTERS IN EACH LINE
40 M=64
100 FOR Q=1 TO M
110 IF STR$(T$(C),Q,1)=" " THEN 150
111 IF STR$(T$(C),Q,1)="." THEN 140
112 IF STR$(T$(C),Q,1)="?" THEN 140
113 IF STR$(T$(C),Q,1)="!" THEN 140
115 IF Q>M THEN 250
120 NEXT Q
130 GOTO 250
139 REM S= NUMBER OF SENTENCES
140 S=S+1
```


Testing, cont'd...

```

145 GOTO 115
150 IF STR(T$(C),Q+1,1) <> " " THEN 190
160 FOR K=Q TO 64
170 IF STR(T$(C),K,1) <> " " THEN 190
180 NEXT K
185 Q=K
189 REM W= NUMBER OF WORDS
190 W=W+1
210 IF W<100 THEN 115
220 PRINT :PRINT TAB(9); "YOU HAVE ENTERED MORE THAN 100 WORDS LE
T THE",TAB(15); "COMPUTER DO THE CALCULATIONS"
230 GOTO 430
250 NEXT C
430 IF S>=1 THEN 450
440 PRINT "YOU DO NOT HAVE A COMPLETE SENTENCE WITHIN YOUR 100 W
ORDS." :GOTO 499
450 PRINT "AVERAGE NUMBER OF WORDS IN EACH SENTENCE = ",100/S
490 REM J= COUNTER FOR THE NUMBER OF LINES USED FOR YOUR 100 WOR
DS
499 M=64
500 FOR J=1 TO C
501 FOR Q=1 TO M
505 IF STR(T$(J),Q,1) <> " " THEN 520
506 IF Q= 1 THEN 530
507 IF STR(T$(J),Q-1,1) = " " THEN 530
508 FOR N=1 TO 10: IF Q-N<=0 THEN 700
509 IF STR(T$(J),Q-N,1) = " " THEN 700
510 IF STR(T$(J),Q-N,1) = "A" THEN 517
511 IF STR(T$(J),Q-N,1) = "E" THEN 517
512 IF STR(T$(J),Q-N,1) = "I" THEN 517
513 IF STR(T$(J),Q-N,1) = "O" THEN 517
514 IF STR(T$(J),Q-N,1) = "U" THEN 517
515 IF STR(T$(J),Q-N,1) = "Y" THEN 517
516 NEXT N:GOTO 710
517 N=10:GOTO 516
520 IF STR(T$(J),Q,1) = "A" THEN 540
521 IF STR(T$(J),Q,1) = "E" THEN 575
522 IF STR(T$(J),Q,1) = "I" THEN 550
523 IF STR(T$(J),Q,1) = "O" THEN 560
524 IF STR(T$(J),Q,1) = "U" THEN 540
525 IF STR(T$(J),Q,1) = "Y" THEN 600
530 NEXT Q:GOTO 720
540 IF STR(T$(J),Q+1,1) = "I" THEN 620
541 IF STR(T$(J),Q+1,1) = "A" THEN 620
542 IF STR(T$(J),Q+1,1) = "E" THEN 620
543 IF STR(T$(J),Q+1,1) = "O" THEN 620
544 IF STR(T$(J),Q+1,1) = "U" THEN 620
545 GOTO 700
550 IF STR(T$(J),Q+1,1) = "E" THEN 620
551 IF STR(T$(J),Q+1,2) = "ON" THEN 620
552 IF STR(T$(J),Q+1,1) = "A" THEN 620
553 IF STR(T$(J),Q+1,1) = "I" THEN 620
554 IF STR(T$(J),Q+1,1) = "Y" THEN 620
559 GOTO 700
560 IF STR(T$(J),Q+1,1) = "I" THEN 620
561 IF STR(T$(J),Q+1,1) = "O" THEN 620
562 IF STR(T$(J),Q+1,1) = "Y" THEN 620
563 IF STR(T$(J),Q+1,1) = "U" THEN 620
565 GOTO 700
575 IF STR(T$(J),Q+1,1) = "." THEN 579
576 IF STR(T$(J),Q+1,1) = "!" THEN 579
577 IF STR(T$(J),Q+1,1) = "?" THEN 579
578 IF STR(T$(J),Q+1,1) <> " " THEN 580
579 IF STR(T$(J),Q-1,1) = "L" THEN 700:GOTO 582
580 IF STR(T$(J),Q+1,1) <> "D" THEN 541
582 FOR N=1 TO 10: IF Q-N<=0 THEN 700
583 IF STR(T$(J),Q-N,1) = " " THEN 700
584 IF STR(T$(J),Q-N,1) = "A" THEN 595
585 IF STR(T$(J),Q-N,1) = "E" THEN 595
586 IF STR(T$(J),Q-N,1) = "I" THEN 595
587 IF STR(T$(J),Q-N,1) = "O" THEN 595
588 IF STR(T$(J),Q-N,1) = "U" THEN 595
589 IF STR(T$(J),Q-N,1) = "Y" THEN 595
590 NEXT N:GOTO 710
595 N=10:GOTO 590
600 IF Q=1 THEN 710
610 IF STR(T$(J),Q-1,1) = " " THEN 710
619 REM Q IS A COUNTER FOR DETERMINING THE END OF A LINE OR THE
END OF THE 100TH WORD
620 Q=Q+1
699 REM A IS THE COUNTER FOR THE NUMBER OF SYLLABLES
700 A=A+1
710 IF Q<M THEN 530
720 IF J<C-1 THEN 740
730 M=L
740 NEXT J
800 PRINT "TOTAL NUMBER OF SYLLABLES IN YOUR 100 WORDS IS",A
810 PRINT :PRINT :PRINT TAB(9); "IF YOU WISH TO ENTER ADDITIONAL
PASSAGES PRESS:",TAB(16); "RUN AND THE RETURN(EXEC) KEYS"

```

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Sentence Construction With A Computer

Robert L. Williams



The program described in this article, Abecedarian, is more a demonstration of some advanced techniques for natural language construction on a computer than a practical application. It's an interesting and worthwhile effort in its own right, but you may enjoy experimenting with the program. It's also a nice start in developing English CAI software (although the author points out that "Context is a massive problem in English CAI. Many folks just aren't aware of it.")

The program was designed for narrow screens and "standard" Basic so conversion shouldn't be too difficult. Note that the code uses string arrays and "&" as a string concatenation operator.

— SN

Abecedarian is a Basic program which attempts to show a portion of the English finite verb system at work. Abecedarian writes sentence-like constructions that show some of the ways a cluster of six closely related transitive lexical verbs, four modal verbs and two auxiliary verbs may appear separately or together.

1. A lexical verb alone:
Sue *helps* her teacher.
2. The modal verb *will* added:
Sue *will* help her teacher.
3. The auxiliary verb *have* added:
Sue will *have* helped her teacher.
4. The auxiliary verb *be* added:
Sue will have *been* helping her teacher.
5. An additional *be* added:
Sue's teacher will have *been being* helped by her.

The last sentence-like construction may have tweaked your ear. If so, you've probably already determined that by the time you get the program into your processor your leg will have been being pulled far too long by

Abecedarian. At that time it certainly should feel as if it had been being pulled. "Enough," you cry, "I have been being led astray by this paragraph!"

Actually, not one of the sentence-like constructions above is an "acceptable" sentence. They don't ap-

pear in contexts that allow them to be accepted as "live" sentences by you. A context is needed for the first sentence as much as one is needed for the last. For example, who is Sue? She hasn't been introduced. I'll do so now: Sue is a friend of mine. Now, assuming we both know of her and

Example 1

```

1 >> JOE ANSWERS HIS LIBRARIAN.
      A SECOND FORM OF 1 IS:
      JOE DOES ANSWER HIS LIBRARIAN.

HAD SUE AND JOE'S CLASSMATES BEEN ANGERED BY THEM?
26 >> YES, THEY HAD.

HAD MY CLASSMATE BEEN ANSWERED BY ME?
26 >> YES, SHE HAD.

23 >> WERE YOU BEING HELPED BY YOUR CLASSMATES?

25 >> HAD JOE QUESTIONED HIS FRIENDS?

ARE YOU ANGERED BY YOUR FRIEND?
2 >> YES, I AM.

HAD JOE'S LIBRARIANS BEEN HELPING HIM?
28 >> YES, THEY HAD.

HAS JOE HELPED HIS LIBRARIANS?
8 >> YES, HE HAS.

DID WE HELP OUR TEACHERS?
16 >> YES, WE DID.

27 >> HAD YOU BEEN ANSWERED BY YOUR LIBRARIAN?

DO I AID MY LIBRARIAN?
0 >> YES, YOU DO.

1 >> YOU QUESTION YOUR CLASSMATES.
      A SECOND FORM OF 1 IS:
      YOU DO QUESTION YOUR CLASSMATES.

23 >> WAS JOE BEING ANSWERED BY HIS CLASSMATE?

DID SUE AND JOE'S HALL GUARDS QUESTION THEM?
14 >> YES, THEY DID.

3 >> IS MY TEACHER QUESTIONED BY ME?

29 >> HAD SUE'S VISITORS BEEN AIDING HER?

9 >> HAS JOE ANSWERED HIS FRIEND?

23 >> WERE YOUR VISITORS BEING AVOIDED BY YOU?

7 >> IS SUE'S HALL GUARD BEING QUESTIONED BY HER?

ARE YOU BEING AVOIDED BY YOUR TEACHERS?
6 >> YES, I AM.

21 >> WERE SUE AND JOE'S HALL GUARDS ANGERING THEM?

19 >> WERE YOUR LIBRARIANS AVOIDED BY YOU?

23 >> WERE WE BEING ANGERED BY OUR FRIEND?

HAVE SUE AND JOE BEEN AIDED BY THEIR TEACHER?
10 >> YES, THEY HAVE.
    
```

Robert L. Williams, Ed.D. Assistant to the Academic Vice President, St. John's University, New York, Jamaica, NY 11439.

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Construction, cont'd . . .

that we know she has just one teacher—not more—would I say to you, “Sue helps her teacher?” Not likely. I might say “Sue *often* helps her teacher” or “Sue *sometimes* helps her teacher.” Or I could say “Sue helps her teacher *whenever she can*.” In this instance, an adverb of frequency like *often* or an additional clause is needed. When we utter or write sentences we usually do so with understood contexts, contexts that give a point in time, a set of characters and a set of facts and events that we share with our listener or reader.

ABE doesn't offer appropriate contexts that include all of these features. Consequently, many of her sentence-like constructions may seem to offend your ear. All of them should.¹

In one of her tantrums before she was three days old, ABE randomly rambled:

(Refer to Example 1)

At that time she was only happy with a 64 character screen. Here is a view of adolescent ABE conversing with a helpful friend with a smaller screen:

```

ABE          17 AUG 79  10:25

MY FIRST NAME IS ABECEDARIAN.
WHAT IS YOURS ? TOM

TOM, LET'S WRITE SOME
SENTENCES ABOUT OURSELVES
AND TWO OTHERS, SUE AND JOE.

I NEED TO ASK SOME QUESTIONS.
ANSWER WITH NUMBERS.

HERE ARE SOME VERBS AND
NOUNS WE'LL USE:

1 AID          1 FRIEND
2 ANGER        2 CLASSMATE
3 AVOID        3 VISITOR
4 QUESTION    4 HALL GUARD
5 HELP        5 TEACHER
6 ANSWER      6 LIBRARIAN

CHOOSE A VERB (1-6) ? 1
CHOOSE A NOUN (1-6) ? 5

SHOULD 'TEACHER' BE
1 SINGULAR OR 2 PLURAL ? 1
SHOULD 'TEACHER' BE
1 FEMALE OR 2 MALE ? 2

WHO SHOULD OUR SENTENCE
BE ABOUT?

1 SUE          4 YOU
2 JOE          5 YOU AND ME
3 SUE AND JOE  6 ME

CHOOSE A NUMBER (1-6) ? 3

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?

1 THE TEACHER
OR 2 SUE AND JOE ? 2

CHOOSE ANY NUMBER 0-159 ? 1
  
```

```

SUE AND JOE
AID THEIR TEACHER.
A SECOND FORM IS:
SUE AND JOE
DO AID THEIR TEACHER.
  
```

CHOOSE A VERB (1-6) ? 2

CHOOSE A NOUN (1-6) ? 1

```

SHOULD 'FRIEND' BE
1 SINGULAR OR 2 PLURAL ? 2
  
```

WHO SHOULD OUR SENTENCE
BE ABOUT?

```

1 SUE          4 YOU
2 JOE          5 YOU AND ME
3 SUE AND JOE  6 ME
  
```

CHOOSE A NUMBER (1-6) ? 6

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?

```

1 THE FRIENDS
OR 2 ME ? 1
  
```

CHOOSE ANY NUMBER 0-159 ? 32

```

WILL MY FRIENDS
ANGER
ME?
32 >> YES, THEY WILL.
  
```

CHOOSE A VERB (1-6) ? 3

CHOOSE A NOUN (1-6) ? 3

```

SHOULD 'VISITOR' BE
1 SINGULAR OR 2 PLURAL ? 1
SHOULD 'VISITOR' BE
1 FEMALE OR 2 MALE ? 1
  
```

WHO SHOULD OUR SENTENCE
BE ABOUT?

```

1 SUE          4 YOU
2 JOE          5 YOU AND ME
3 SUE AND JOE  6 ME
  
```

CHOOSE A NUMBER (1-6) ? 5

WHO IS TO BE THE GRAMMATICAL
SUBJECT OF THE SENTENCE?

```

1 THE VISITOR
OR 2 US ? 1
  
```

CHOOSE ANY NUMBER 0-159 ? 16

```

DID OUR VISITOR
AVOID US?
16 >> YES, SHE DID.
  
```

CHOOSE A VERB (1-6) ?

As you've noted, whenever you converse with ABE she asks you to choose the lexical verbs and nouns she's to gossip with. She then insists that you tell her whether the chosen noun is to be singular or plural. If the noun is to be singular, she asks whether it's to be a female or male person. ABE likes to satisfy her friends. She then asks who else is to be gossiped about, other friends, you, herself, or the two of you. Being precisely persistent, she then asks

you to designate who's to be the grammatical subject. But in the end, she's all heart: she composes the predicates by herself. After all, she wouldn't want you to walk away saying that your leg had been being pulled. What ABE does do by herself is to string verb constructions together in a manner to suggest the extensiveness and some of the complexities of just a portion of the finite verb system.

You've probably already determined that by the time you get the program into your processor your leg will have been being pulled far too long by Abecedarian.

ABE's six lexical verbs are transitive ones, those that may be followed by objects.

Subject	Verb	Object
Sue	helps	her teacher(1)

Transitive verbs permit constructions that "reverse" subjects and objects.

Subject	Verb	Object (Agent)
Sue's teacher	is helped	by her(3)

Many of the verb constructions that ABE writes assume this reversal. You may enjoy selecting some other lexical verbs to teach a clone of ABE's. If you do, keep in mind that all of the subjects and objects are human.

What little grammar ABE has learned is to be found in a small portion of Martin Joos' *The English Verb: Form and Meaning*.² Joos postulates a binary schema that assigns either/or "values" to several features of finite verb predications. In turn, these values can be expressed in decimal numbers. His schema shows that all finite predications (verbs) may be described or coded with a five-place binary number.

ABE accepts decimal numbers. The numbers that describe verb constructions range from 1 through 159.3 ABE analyzes these numbers in the subprogram 2610 through 2860. Essentially, she first strips off the modal values, if there are any, in lines 2660 through 2720, assigning a modal code. The remainder of the number (31-0) is then passed through a loop that assigns "binary" values to tense, phase, aspect, voice and function, terms and features far too complex to discuss here but to be found in Joos' book. ABE makes numerous other decisions to handle "number" agreement between the verbs and subjects

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Construction, cont'd . . .

chosen. Among others, for example, 5 may produce these constructions:

Sue *is* helping her teacher.
You *are* helping your teacher.
I *am* helping my teacher.
Sue's teachers *are* helping her.

In these sentences, the *be* verb forms must agree in number with their subjects.

With the exceptions of 1 and 17, ABE writes her sentence-like constructions in yes/no question forms:

Whenever you converse with ABE she asks you to choose the lexical verbs and nouns she's to gossip with.

With the exceptions of 1 and 17, ABE writes her sentence-like constructions in yes/no question forms:

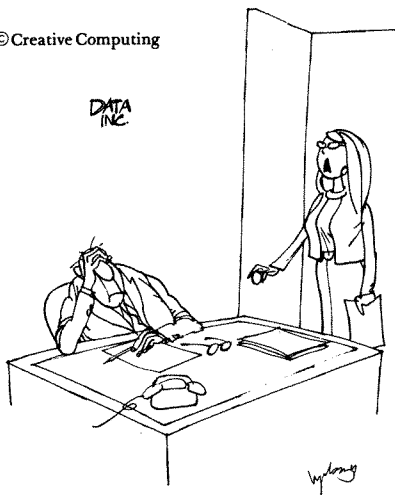
Is Sue helping her teacher? (5)
Is Sue being helped by her teacher? (7)

All odd numbers cause ABE to write "full" verb constructions—like *is helping* and *is being helped* above. Assuming the sentence characters are contextually "accepted" by you, questions seem to help lessen other context needs somewhat. But they also serve another purpose.

In Joos' schema even numbers account for "propredicates," features that most of us have traditionally called elliptical verbs.

Is Sue helping her teacher? (5)
4 Yes, she is. (helping her teacher)

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"The supervisor eloped with the programmer..."

The yes response is followed only by a restatement of the subject—in pronoun form—and the auxiliary *is*. Since the lexical verb *helping* and the object *her teacher* don't appear, the verb construction in the response isn't "complete;" it's elliptical, or, as Joos notes, it's a *propredicate*, in the manner of a *pronoun* standing in place of a noun. When an even numbered predicate is given to ABE, she writes the appropriate odd numbered question first and then writes a response to represent the even numbered elliptical or propredicate form. If 32 is given to ABE, she may write the following:

Will Sue help her teacher? (33)
32 Yes, she will.

You and ABE herself are sometimes characters when ABE writes, first and second persons. Whenever you determine ABE to be the subject

In the end, she's all heart: she composes the predicates by herself.

of a sentence, she will produce a question about herself, sometimes in this form:

Am I helping my teacher? (5)

As the person being addressed, you may find yourself thinking "If you don't know, who does!" or "How stupid to ask!" This is a problem of context, of sorts. However, if you give ABE the number 4, she may do the following:

Am I helping my teacher? (5)
(ABE asks about herself)
4 Yes, you are.
(As if you are replying)
Are you helping your teacher? (5)
(ABE asks about you)
4 Yes, I am.
(As if you are replying)

Thus, whenever ABE is given *you* or *me* to write about, she assumes first person in asking a question and you then in turn are assumed to be a first person giving a response.

Let's note some aspects of ABE's personality in the event you wish to clone her. First, she seems to be content to write on a 32 or 40 character screen. Second, she concatenates at times: lines 750, 1050, 1070 and 1150. Your clone may require minor surgery in these instances. Third, ABE learns her vocabulary by loop reading. If your clone is to MAT READ, you will need to rearrange some of her data dictionary. And, fourth, ABE doesn't understand ON...GO TO or ON...GO SUB:

she loves to *IF* herself silly. Should your clone prefer not to be so iffy, there are some places ON's would prove helpful; but you should perform such microsurgery carefully.

Although ABE knows few words, she does seem to write a great deal, even though she always writes tongue out of context, not in cheek. □

Although ABE knows few words, she does seem to write a great deal, even though she always writes tongue out of context, not in cheek.

Footnotes

1. The "be-being" and "been-being" forms toyed with earlier pose euphonic problems for most speakers. But they sometimes do occur in spoken utterances, though very rarely. Most likely you've never read one before in print: they do require a courageous editor.
2. The University of Wisconsin Press, Madison and Milwaukee, 1964.
3. ABE's vocabulary has been stunted. Joos includes the additional modals must, ought to, dare and need. These, if ABE were to learn them, would extend her range from 159 to 223. Indeed, the quasi-auxiliaries be to, be going to, be about to, and have to might well be taught to ABE, with considerable patience of course.

```
100 DIM A$(6), D$(6), E$(6), F$(6)
110 DIM H$(6), B$(8), G$(9), C$(18), L(5)
120 FOR X=1 TO 6
130 READ A$(X)
140 READ D$(X)
150 READ E$(X)
160 READ F$(X)
170 READ H$(X)
180 NEXT X
190 FOR X=1 TO 8
200 READ B$(X)
210 NEXT X
220 FOR X=1 TO 9
230 READ G$(X)
240 NEXT X
250 FOR X=1 TO 18
260 READ C$(X)
270 NEXT X
280 PRINT "MY FIRST NAME IS ABCEDARIAN."
290 PRINT "WHAT IS YOURS "
300 INPUT Z$
310 IF Z$=G$(1) THEN 350
320 IF Z$=G$(2) THEN 350
330 LET Z=0
340 GO TO 360
350 LET Z=3
360 PRINT
370 PRINT Z$;" LET'S WRITE SOME"
380 PRINT "SENTENCES ABOUT OURSELVES"
390 PRINT "AND TWO OTHERS, ";G$(Z+3);". "
400 PRINT
410 PRINT "I NEED TO ASK SOME QUESTIONS."
420 PRINT "ANSWER WITH NUMBERS."
430 PRINT
440 PRINT "HERE ARE SOME VERBS AND"
450 PRINT "NOUNS WE'LL USE:"
460 PRINT
470 FOR X=1 TO 6
480 PRINT X;E$(X);TAB(13);X;F$(X)
490 NEXT X
500 FOR X=1 TO 25
510 PRINT
520 PRINT "CHOOSE A VERB (1-6) ";
530 INPUT V
```


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1084

Construction, cont'd...

```

540 IF V<1 THEN 520
550 IF V>6 THEN 520
560 PRINT
570 PRINT "CHOOSE A NOUN (1-6) ";
580 INPUT F
590 IF F<1 THEN 570
600 IF F>6 THEN 570
610 PRINT
620 PRINT "SHOULD ";F$(F);"; BE"
630 PRINT " 1 SINGULAR OR 2 PLURAL ";
640 INPUT N
650 IF N<1 THEN 620
660 IF N>2 THEN 620
670 IF N=2 THEN 750
680 PRINT "SHOULD ";F$(F);"; BE"
690 PRINT " 1 FEMALE OR 2 MALE ";
700 INPUT R
710 IF R<1 THEN 680
720 IF R>2 THEN 680
730 LET F1$=F$(F)
740 GO TO 770
750 LET F1$=F$(F)&"S"
760 LET R=3
770 PRINT
780 PRINT "WHO SHOULD OUR SENTENCE"
790 PRINT " BE ABOUT?"
800 PRINT
810 FOR X=1 TO 3
820 PRINT X;G$(X+Z);TAB(15);X+3;G$(X+6)
830 NEXT X
840 PRINT
850 PRINT "CHOOSE A NUMBER (1-6) ";
860 INPUT C
870 IF C<1 THEN 850
880 IF C>6 THEN 850
890 PRINT
900 PRINT "WHO IS TO BE THE GRAMMATICAL"
910 PRINT "SUBJECT OF THE SENTENCE?"
920 PRINT
930 PRINT "1 THE ";F1$
940 PRINT " OR 2 ";
950 IF C>3 THEN 980
960 PRINT G$(C+Z);" ";
970 GO TO 990
980 PRINT C$(C+6);" ";
990 INPUT S
1000 IF S<1 THEN 930
1010 IF S>2 THEN 930
1020 PRINT
1030 IF S=2 THEN 1110
1040 IF C>3 THEN 1070
1050 LET C1$=G$(C)&"'S "&F1$
1060 GO TO 1080
1070 LET C1$=C$(C+12)&" "&F1$
1080 LET C2$=C$(C+6)
1090 LET C3$=C$(R)
1100 GO TO 1170
1110 IF C>3 THEN 1140
1120 LET C1$=G$(C)
1130 GO TO 1150
1140 LET C1$=C$(C)
1150 LET C2$=C$(C+12)&" "&F1$
1160 LET C3$=C$(C)
1170 PRINT
1180 PRINT "CHOOSE ANY NUMBER 0-159 ";
1190 INPUT Y
1200 PRINT

```

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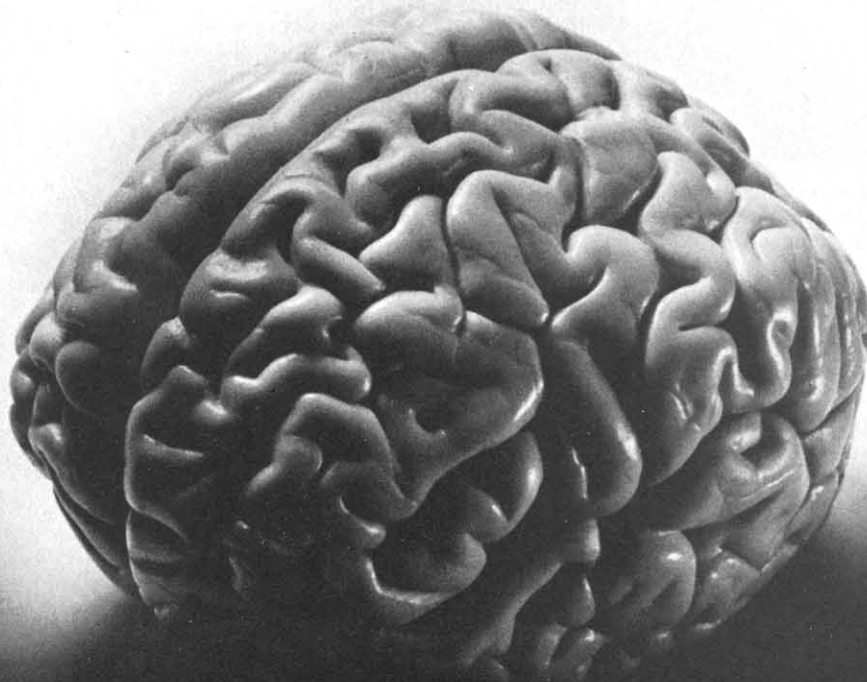
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```

1210 IF Y<0 THEN 1180
1220 IF Y>159 THEN 1180
1230 GO SUB 2610
1240 IF S=1 THEN 1280
1250 IF C=6 THEN 1330
1260 IF C<3 THEN 1290
1270 GO TO 1310
1280 IF N=2 THEN 1310
1290 LET A=1
1300 GO TO 1340
1310 LET A=3
1320 GO TO 1340
1330 LET A=5
1340 LET A=A+D
1350 IF Y<2 THEN 1500
1360 IF Y=16 THEN 1500
1370 IF Y=17 THEN 1500
1380 IF M=0 THEN 1400
1390 LET M=M+D
1400 GO SUB 1630
1410 GO SUB 1680
1420 GO SUB 1760
1430 GO SUB 1830
1440 GO SUB 1890
1450 GO SUB 1950
1460 GO SUB 1990
1470 IF E=1 THEN 1570
1480 GO SUB 2130
1490 GO TO 1570
1500 IF Y=0 THEN 1560
1510 IF Y=16 THEN 1560
1520 GO SUB 1600
1530 GO SUB 2340
1540 GO SUB 2570
1550 GO TO 1570
1560 GO SUB 2450
1570 PRINT
1580 NEXT X
1590 STOP
1600 PRINT C1$
1610 PRINT TAB(2);
1620 RETURN
1630 IF M=0 THEN 1670
1640 PRINT B$(M);" ";
1650 GO SUB 1600
1660 LET J$=B$(M)
1670 RETURN
1680 IF H=0 THEN 1750
1690 IF M=0 THEN 1710
1700 LET A=3
1710 PRINT H$(A);" ";
1720 IF M>0 THEN 1750
1730 GO SUB 1600
1740 LET J$=H$(A)
1750 RETURN
1760 IF M=0 THEN 1820
1770 IF H=1 THEN 1820
1780 IF B=0 THEN 1800
1790 GO TO 1810
1800 IF G=0 THEN 1820
1810 PRINT "BE ";
1820 RETURN
1830 IF H=0 THEN 1880
1840 IF B=0 THEN 1860
1850 GO TO 1870
1860 IF G=0 THEN 1880
1870 PRINT "BEEN ";
1880 RETURN
1890 IF M>0 THEN 1940
1900 IF H=1 THEN 1940
1910 PRINT A$(A);" ";
1920 GO SUB 1600
1930 LET J$=A$(A)
1940 RETURN
1950 IF G=0 THEN 1980
1960 IF B=0 THEN 1980
1970 PRINT "BEING ";
1980 RETURN
1990 PRINT E$(V);
2000 IF B=1 THEN 2060
2010 IF G=1 THEN 2040
2020 IF H=1 THEN 2030
2030 GO TO 2070
2040 PRINT "ING";
2050 GO TO 2070
2060 PRINT "ED";
2070 PRINT
2080 PRINT TAB(2);
2090 IF B=0 THEN 2110
2100 PRINT "BY ";
2110 PRINT C2$;"?";
2120 RETURN
2130 IF C<4 THEN 2260
2140 IF C=5 THEN 2260
2150 IF S=1 THEN 2260
2160 IF C=4 THEN 2220
2170 LET C3$="YOU"
2180 IF M>0 THEN 2260
2190 IF H=1 THEN 2260
2200 LET J$=A$(A-2)
2210 GO TO 2260
2220 LET C3$="I"
2230 IF M>0 THEN 2260
2240 IF H=1 THEN 2260
2250 LET J$=A$(A+2)
2260 PRINT Y;">>> YES, ";C3$;" ";J$;
2270 IF M=0 THEN 2320
2280 IF H=0 THEN 2320
2290 IF B=1 THEN 2310
2300 IF G=0 THEN 2320
2310 PRINT " HAVE";
2320 PRINT " ";
2330 RETURN
2340 PRINT E$(V);
2350 IF D=1 THEN 2420
2360 IF S=1 THEN 2390
2370 IF C>2 THEN 2430
2380 GO TO 2400
2390 IF N=2 THEN 2430
2400 PRINT "S";
2410 GO TO 2430
2420 PRINT "ED";
2430 PRINT " ";C2$;" ";
2440 RETURN
2450 PRINT D$(A);" ";C1$
2460 PRINT TAB(2);E$(V);" ";C2$;"?";
2470 IF S=1 THEN 2550
2480 IF C=4 THEN 2530
2490 IF C<6 THEN 2550
2500 LET C3$="YOU"
2510 LET A=A-2
2520 GO TO 2550
2530 LET C3$="I"
2540 LET A=A+2
2550 PRINT Y;">>> YES, ";C3$;" ";D$(A);" ";
2560 RETURN
2570 PRINT " A SECOND FORM IS:"
2580 GO SUB 1600
2590 PRINT D$(A);" ";E$(V);" ";C2$;" ";
2600 RETURN
2610 LET W=128
2620 LET M=0
2630 LET Q=16
2640 LET U=Y
2650 IF Y<32 THEN 2730
2660 FOR P=7 TO 1 STEP -2
2670 IF U<W THEN 2710
2680 LET M=P
2690 LET U=U-W
2700 GO TO 2730
2710 LET W=W-32
2720 NEXT P
2730 FOR P=5 TO 1 STEP -1
2740 IF U<Q THEN 2780
2750 LET L((6-P)=1
2760 LET U=U-Q
2770 GO TO 2790
2780 LET L((6-P)=0
2790 LET Q=Q/2
2800 NEXT P
2810 LET D=L(1)
2820 LET H=L(2)
2830 LET G=L(3)
2840 LET B=L(4)
2850 LET E=L(5)
2860 RETURN
2870 DATA IS,DOES,AID,FRIEND,HAS
2880 DATA WAS,DID,ANGER,CLASSMATE
2890 DATA HAD,ARE,DO,AVOID,VISITOR
2900 DATA HAVE,WERE,DID,QUESTION
2910 DATA HALL GUARD,HAD,AM,DO
2920 DATA HELP,TEACHER,HAVE,WAS
2930 DATA DID,ANSWER,LIBRARIAN
2940 DATA HAD,WILL,WOULD,SHALL
2950 DATA SHOULD,CAN,COULD,MAY
2960 DATA MIGHT,SUE,JOE,SUE AND JOE
2970 DATA ANN,SAM,ANN AND SAM,YOU
2980 DATA YOU AND ME,ME,SHE,HE
2990 DATA THEY,YOU,WE,I,HER,HIM
3000 DATA THEM,YOU,US,ME,HER,HIS
3010 DATA THEIR,YOUR,OUR,MY
3020 END

```


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Reading Level Difficulty

Ronald Carlson

There are several formulas, such as Fog Index or Flesch Scale, used to estimate the reading level of text books. Most of these formulas count the number of words, syllables, sentences and polysyllabic words. Other formulas tally the occurrences of certain key words from a specific list of words.

If you have a large quantity of samples to determine the reading level or if you need to find the reading level only on occasion, this program will calculate the approximate grade level of the material.

The Fog Index, developed by Robert Gunning, is based on the following formula:

$$\text{Grade Level} = .4 * (W + L)$$

W = number of words with 3 or more syllables

L = average sentence length

There are exceptions involving words that end with -ing or -ed or capitalized words.

In my BASIC program there is a slight variation from the original formulas, inasmuch as counting syllables is a formidable task. I've used an approximation, that any word that is nine letters or longer will be three or more syllables. I also count the number of words with three or more distinct vowels and average it with the approximation by length.

So far in all of the samples I've tested, this estimation is within .5 of the grade level stated for the material. It is suggested that you take several passages, about 100 words long, throughout the book to receive an accurate measure of the grade level of that book.

Ronald Carlson, 44825 Kirk Ct., Canton, MI 48187

```

10REM
20REM READING LEVEL DIFFICULTY
30REM R. CARLSON
40REM CANTON, MICH.
50REM
60DIM A$(100)
70R1=0
80N=0
90D=0
100PRINT "DIRECTIONS"
110PRINT
120PRINT"PLEASE DELETE ALL PUNCTUATION EXCEPT AT THE END OF A SENTENCE ."
130PRINT"PLEASE TYPE A SPACE BEFORE THIS PUNCTUATION .THE ACCURACY"
140PRINT"WILL BE INCREASED IF YOU CHOOSE SEVERAL PASSAGES THROUGHOUT"
150PRINT"THE BOOK ."
160PRINT
170INPUT "HOW MANY LINES OF TEXT ",A
180PRINT"TYPE IN THE PASSAGE,ONE LINE AT A TIME."
190PRINT
200S=0
210W=0
220L=0
230T=0
240T1=0
250V=0
260FOR B=1 TO A
270INPUT A$
280X=LEN(A$)
290IF A$(X,X)="," THEN 420
300IF A$(X,X)="!" THEN 420
310IF A$(X,X)="?" THEN 420
320A$=A$+" "
330REM T IS NUMBER OF 3 SYLLABLE WORDS
340REM T1 IS THE NUMBER OF THREE SYLLABLE WORDS USING VOWELS
350REM L IS THE NUMBER OF LETTERS IN A WORD
360REM S IS THE NUMBER OF SENTENCES
370REM W IS THE NUMBER OF WORDS
380REM V IS THE NUMBER OF VOWELS /WORD
390REM D IS AN INDICATOR FOR DIPHTHONGS
400REM N IS THE NUMBER OF SAMPLES
410REM R1 IS THE RUNNING TOTAL OF THE READING LEVELS
420FOR C=1TO LEN(A$)
430T$=A$(C,C)
440 IF T$="," THEN 600
450 IF T$="!" THEN 600
460 IF T$="?" THEN 600
470IF T$=" " THEN 620
480REM TRIPPING THE VARIOUS COUNTERS
490L=L+1
500IF T$="A" THEN 570
510IF T$="E" THEN 570
520IF T$="I" THEN 570
530IF T$="O" THEN 570
540IF T$="U" THEN 570
550D=0
560GOTO 680
570 D=D+1
580IF D=1 THEN V=V+1
590GOTO680
600S=S+1
610GOTO680
620W=W+1
630D=0
640IF L>=9 THEN T=T+1
650L=0
660IF V>=3 THEN T1=T1+1
670V=0
680NEXT C
690NEXT B
700T=INT((T+T1)/2)
710R=.4*(T+W/S)
720PRINT
730PRINT"THE READING LEVEL FOR THIS PASSAGE IS APPROXIMATELY "R
740PRINT T;" THREE SYLLABLE WORDS"
750PRINT W;" WORDS IN THIS PASSAGE"
760PRINT S;" SENTENCES"
770INPUT"DO YOU HAVE MORE MATERIAL ? ",A$

```


Reading, cont'd...

```
780N=N+1
790R1=R1+R
800IF A$="YES" THEN 170
810PRINT
820PRINT"THE OVERALL READING LEVEL IS GRADE "#R1/N
830END
READY
```

RUN

DIRECTIONS

PLEASE DELETE ALL PUNCTUATION EXCEPT AT THE END OF A SENTENCE .
PLEASE TYPE A SPACE BEFORE THIS PUNCTUATION .THE ACCURACY
WILL BE INCREASED IF YOU CHOOSE SEVERAL PASSAGES THROUGHOUT
THE BOOK .

HOW MANY LINES OF TEXT 10
TYPE IN THE PASSAGE,ONE LINE AT A TIME.

?WE FEEL THIS IS MUCH TOO LITTLE COMING MUCH TOO
?LATE .IN THAT SENSE WE FEEL HIS PROGRAM IS NOT SUFFICIENTLY
?STRONG ENOUGH .WE FEEL HE SHOULD PROPOSE TO CUT DOWN
?BY AT LEAST 10 PERCENT IN TWO MONTHS RATHER THAN 50
?PERCENT IN 10 YEARS .NOW HE CAN CUT THE DEMAND BY 10
?PERCENT IN TWO MONTHS WE FEEL WITH A PROGRAM OF EDUCATING
?AMERICANS .WE CALL ON HIM TO ALLOCATE \$100 MILLION
?FROM THE DEPARTMENT OF ENERGY TO EDUCATE THE AMERICAN
?PEOPLE HOW TO CONSERVE ENERGY HOW NOT TO USE
?THEIR CARS TAKE ONE MINUTE HOT SHOWERS .

THE READING LEVEL FOR THIS PASSAGE IS APPROXIMATELY 10.72
7 THREE SYLLABLE WORDS
99 WORDS IN THIS PASSAGE
5 SENTENCES
DO YOU HAVE MORE MATERIAL ? NO

THE OVERALL READING LEVEL IS GRADE 10.72
READY

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Reading Practice with the TRS-80 Voice Synthesizer

"Reading, Riting, and Rithmetic" — the "Three R's." Without the first "R," a person can have much difficulty in this Age of Information. If a child is having reading troubles, perhaps a little extra drill would be appropriate. The program "Reading Practice with the TRS-80 Voice Synthesizer" may be suitable for such extra drill.

The Radio Shack TRS-80 Voice Synthesizer gives your microcomputer the ability to speak. (See "Phonetically Speaking," June 1979, *Creative Computing*.) This program utilizes that ability to give a student drill in reading and saying the basic words that should be known at a given age.

The Dolch Basic Sight Word List contains 212 words that the average third grade child should recognize. (You should be able to get a copy of the Dolch List from your nearby primary school.) By listing those words which comprise 50% to 75% of all reading matter in a DATA statement along with their Voice Synthesizer phonetic spellings, you can give a student drill in retaining those words in his reading and speaking vocabularies.

Program REMarks

The program is written in Radio Shack Level II Basic, but it can be adapted to Level I or to other Basics.

Lines 20-100 give the student instructions in how the drill will proceed. Both written and spoken instructions are given throughout the program.

Lines 110-155 present the words that are to be spoken by the student. Subroutine 500 actually writes the word on the screen and gives the correct pronunciation. For emphasis, the word blinks inside a graphics rectangle.

In lines 170-200, the computer asks the student to repeat the word once more along with the computer.

Subroutine 400 outlines the screen — a "dress-up" to set off the written instructions.

Subroutines 1000 and 1100 send the phonetic spellings of words to be spoken to the Voice Synthesizer.

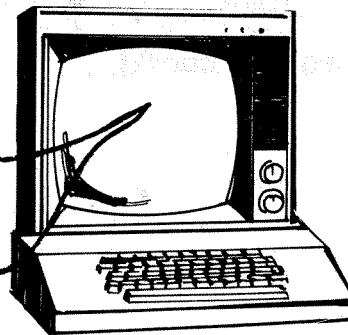
Subroutine 2000 is used by the programmer to check the pronunciations of words to be listed in the DATA statements to ensure clarity and correctness. (Just enter RUN 2000.)

Lines 300 and following contains the DATA statement listings of the words to be read and spoken. The numbers are important for correct execution of the program. □

John F. Rogers, 600 Seventh St., Morgan City, LA 70380.

The First "R"

John F. Rogers

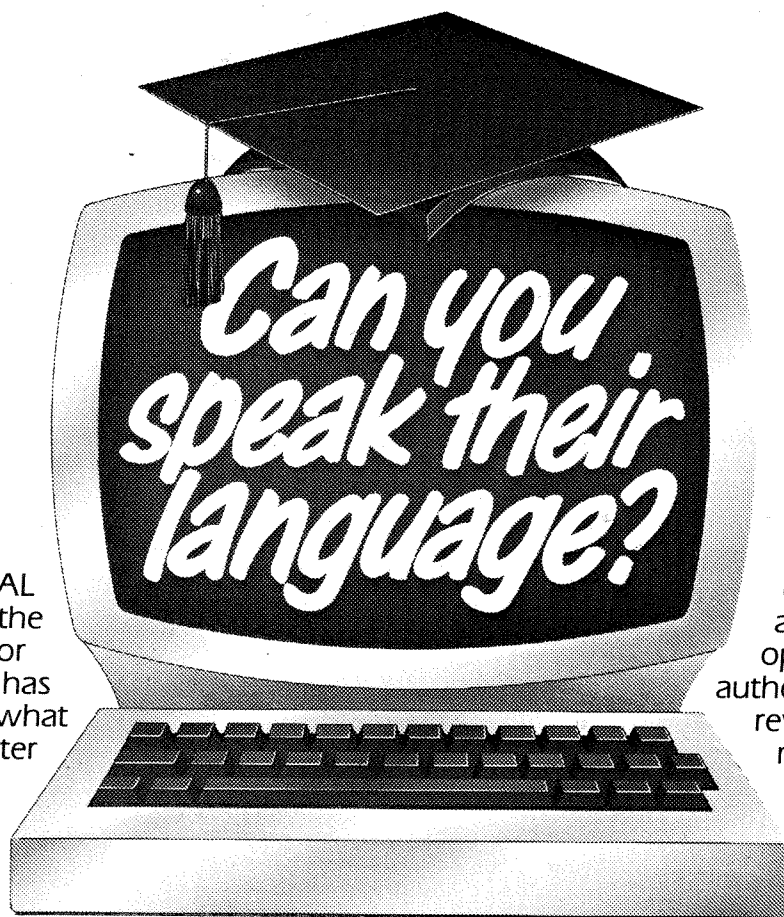


```

1 REM ***      READING PRACTICE      ***
2 REM ***      WITH THE TRS-80      ***
3 REM ***      VOICE SYNTHESIZER      ***
4 REM ***      PROGRAM BY      ***
5 REM ***      JOHN F. ROGERS      ***
6 REM ***      600 SEVENTH ST.      ***
7 REM ***      MORGAN CITY.      ***
8 REM ***      LOUISIANA 70380      ***
9 REM ***      ***

10 CLS:GOSUB 400
20 PRINT@150,"H E L L O -";:VO$="H3L8U":GOSUB 1000:FOR K=0 TO 600:NEXT
30 PRINT@270,"TODAY YOU WILL PRACTICE";:VO$="TUD@*Y'UN'ILLPR9KT'IS":GOSUB 1000
35 FOR K=0 TO 960:NEXT
40 PRINT@404,"SAYING WORDS I SHOW YOU.":VO$="S@E+W/RDZ;5#&>00WY'U":GOSUB 1000
50 FOR I=0 TO 1500:NEXT
60 CLS:GOSUB 400
70 PRINT@140,"I WILL FLASH A WORD ON THE SCREEN.":
75 VO$=";5#&W'ILLFL79>>66W/RD":GOSUB 1000:FOR K=0 TO 800:NEXT
80 VO$=";ANN<675KR ENN":GOSUB 1000:FOR K=0 TO 600:NEXT
85 PRINT@280,"THEN YOU WILL SAY IT.":VO$="<<35NY'UN'ILLS@&IT":GOSUB 1000:FOR K=0 TO 1200:NEXT
90 PRINT@404,"THEN I WILL SAY THE WORD.":VO$="<<35N0;5#&W'ILLS@&<67W/RD":GOSUB 1000
95 FOR K=0 TO 1400:NEXT:PRINT@520,"FINALLY, WE'LL SAY THE WORD TOGETHER.":
100 VO$="F;#&N8LE&W.&8LS@&<67W/RD":GOSUB 1000:FOR K=0 TO 1040:NEXT:VO$="TUG35<<R":GOSUB 1000
105 FOR K=0 TO 1500:NEXT
110 CLS:GOSUB 400:PRINT@217,"R E A D Y ?":VO$="R345DE&":GOSUB 1000:FOR K=0 TO 1000:NEXT
120 CLS:GOSUB 400
130 PRINT@140,"THE FIRST WORD IS.":VO$="<F/RSTW/RD!IZZ":GOSUB 1000:FOR K=0 TO 600:NEXT
135 READ Z,S$,WD$:GOSUB 500:GOTO 160
140 CLS:GOSUB 400:ON ERROR GOTO 900:READ Z
150 PRINT@140,"THE NEXT WORD IS.":VO$="<N35KSTW/RD!IZZ":GOSUB 1000
155 READ S$,WD$:GOSUB 500
160 CLS:GOSUB 400
170 PRINT@140,"DID YOU SAY THE WORD CORRECTLY?":
175 VO$="D!IDDY'US@&<67W/RDKOR45KTLE&":GOSUB 1000:FOR K=0 TO 1200:NEXT
180 PRINT@265,"LET'S SAY IT TOGETHER.":VO$="L35T50S@&IT@TUG35<<R":GOSUB 1000
185 FOR K=0 TO 1000:NEXT
190 PRINT@404,"R E A D Y ?":VO$="R345DE&":GOSUB 1000:FOR K=0 TO 600:NEXT
200 PRINT@530,"THE WORD IS.":S$:VO$="<67W/RD!IZZ":GOSUB 1000:GOSUB 1100
210 FOR I=0 TO 1800:NEXT:GOTO 140
300 DATA 1,CLEAN,KLL ENN,2,HURT,HH//RT,3,GREEN,GRR ENN,4,LAUGH,LL99FF
400 FOR I=0 TO 62 STEP 2:PRINT@I,"#":NEXT
405 FOR I=64 TO 832 STEP 64:PRINT@I,"#":PRINT@I+62,"#":NEXT
410 FOR I=896 TO 958 STEP 2:PRINT@I,"#":NEXT
420 RETURN
500 FOR J=35 TO 94:SET(J,11):SET(J,22):NEXT
505 FOR J=11 TO 22:SET(35,J):SET(94,J):NEXT
510 FOR I=0 TO 7:PRINT@348," ":FOR J=0 TO 100:NEXT J:PRINT@348,S$:FOR J=0 TO 600:NEXT
520 PRINT@590,"THE WORD IS PRONOUNCED.":VO$="<67W/RD!IZZPRON:UNST":GOSUB 1000
525 GOSUB 1100:FOR I=0 TO 1600:NEXT:GOSUB 1100:FOR J=0 TO 1500:NEXT
530 RETURN
900 CLS:GOSUB 400
910 PRINT@130,"THE WORD LIST HAS ENDED.":VO$="<77W/RDL!IST@H99Z035ND4D":GOSUB 1000
915 FOR K=0 TO 1000:NEXT
920 PRINT@260,"PLEASE CALL THE INSTRUCTOR.":VO$="PL EZK122LL@< INSTR67KT/":GOSUB 1000
930 RESUME 950
950 FOR I=0 TO 1500:NEXT
960 PRINT@390,"THE DATA LIST OF WORDS":PRINT@479,"HAS BEEN DEPLETED.":
970 PRINT@576,"PRESS 'BREAK' KEY TO GET CONTROL OF THE COMPUTER.":GOTO 970
1000 POKE 16383,63:POKE 16383,32
1010 FOR VX=1 TO LEN(VO$)
1020 POKE 16383,ASC(MID$(VO$,VX,1))
1030 NEXT VX
1040 POKE 16383,32:POKE 16383,63:POKE 16383,32
1050 RETURN
1100 POKE 16383,63:POKE 16383,32
1110 FOR VX=1 TO LEN(WD$)
1120 POKE 16383,ASC(MID$(WD$,VX,1))
1130 NEXT VX
1140 POKE 16383,32:POKE 16383,63:POKE 16383,32
1150 RETURN
2000 CLS
2010 PRINT@0,"THIS IS THE PRONUNCIATION TESTING ROUTINE.":
2020 PRINT@128,VO$
2030 PRINT@192,"ENTER PHONEMES. "
2040 INPUT VO$:GOSUB 1000
2050 GOTO 2000

```

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CIRCLE 142 ON READER SERVICE CARD

**An educational aid for language
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The Word Board

Howard Berenbon



Are you looking for a practical application for your home computer? Are you interested in educational applications or experimenting with new devices that can aid the handicapped? Then the "Word Board" is just the program for you. Using a TRS-80 Level II, Apple or Pet micro-computer, you can turn your system into a language communicator.

Program 1

The "Word Board" accepts keyboard entry of individual letters and displays single words assigned to each letter. Its use is unlimited in educational applications.

The "Word Board" may be used to aid in language instruction by assigning English words to each of the 26 keys, for letters A through Z. For each English word covering a key, its French, German, Italian or Spanish equivalent can be displayed. Program

Howard Berenbon, 2681 Peterboro, W. Bloomfield, MI 48033.

1 allows the French word to be displayed when the English word is depressed. The words are printed towards the center of the video display after the enter key is depressed. It's a handy aid for language students to help in memorizing foreign vocabulary words. After the 26 words are learned, the student can test his memory by covering the keytops and typing through the list to review the vocabulary. (Figure 1a is a sample RUN of Program 1 and Figure 1b is a list of the French words used.)

A variation of this "Word Board" is to place small pictures on the keytops and have the pictures access their foreign meanings. Program lines 600 through 1630 hold the French words in "PRINT" statements. An additional 10 keys, 1 through 0, are used to access their equivalent numbers in French. The " " sign is used to skip 8 lines, with lines 1640 to 1670. The words may be changed for different vocabulary sets and different languages.

Key	English Word	French Word
A	Apple	Pomme
B	Airplane	Avion
C	Cup	Tasse
D	Cow	Vache
E	Coat	Veston
F	Dog	Chien
G	Hand	Main
H	Sun	Soleil
I	Book	Livre
J	Moon	Lune
K	Ear	Oreille
L	Cloud	Nuage
M	Comb	Peigne
N	Eyes	Yeux
O	Ice	Glace
P	Star	Etoile
Q	Spoon	Cuillère
R	Chair	Chaise
S	Horse	Cheval
T	Pencil	Crayon
U	Lamp	Lampe
V	Bird	Oiseau
W	Fish	Poisson
X	Bicycle	Velo
Y	Cat	Chat
Z	Hat	Chapeau
1	One	Un
2	Two	Deux
3	Three	Trois
4	Four	Quatre
5	Five	Cinq
6	Six	Six
7	Seven	Sept
8	Eight	Huit
9	Nine	Neuf
0	Zero	Zero
a	(skip 8 lines)	

WORD BOARD: VOCABULARY-ENGLISH TO FRENCH

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ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS ENTERING AN ' ' WILL SKIP 8 LINES
MAY BE USED AS A LANGUAGE INSTRUCTION AID

ENGLISH	FRENCH
-----	-----
SPOON	CUILLERE
ENGLISH	FRENCH
-----	-----
APPLE	POMME
ENGLISH	FRENCH
-----	-----
HAT	CHAPEAU
ENGLISH	FRENCH
-----	-----
FISH	POISSEN

Figure 1a

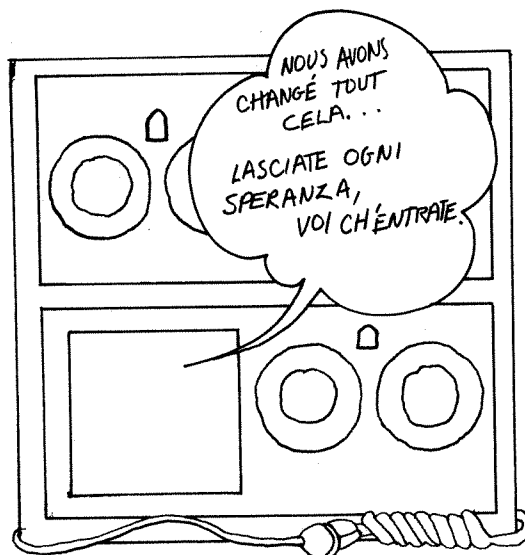


Figure 1b—French Vocabulary Words

Program 2

The second program uses the "Word Board" as a language communicator for the handicapped. A speech handicapped person may communicate using this program. A very limited vocabulary of 26 essential words (see Figure 2) and numbers 1 through 0 are assigned to the keys.

You may also place the foreign meanings of the words on the keytops and have their English equivalents displayed when each key is depressed. Have the student read the word on the keytop and recite the English meaning, then depress the key to find the correct meaning.

The program can be used as a computer dictionary. The meaning of words, assigned to each key, may be stored in sentence form at lines 600 through 1630. Each time a key is depressed, the meaning of the word assigned to the key is displayed.

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CIRCLE 145 ON READER SERVICE CARD

Word Board, cont'd...

Program 1

```

0010 PRINT "WORD BOARD: VOCABULARY-ENGLISH TO FRENCH"
0020 PRINT
0030 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENBON"
0040 PRINT
0050 PRINT "ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS"
0060 PRINT "WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS"
0065 PRINT "ENTERING AN '0' WILL SKIP 8 LINES"
0070 PRINT "MAY BE USED AS A LANGUAGE INSTRUCTION AID"
0100 INPUT A$
0105 PRINT
0110 IF A$="A" THEN 600
0120 IF A$="B" THEN 640
0130 IF A$="C" THEN 670
0140 IF A$="D" THEN 700
0150 IF A$="E" THEN 730
0160 IF A$="F" THEN 760
0170 IF A$="G" THEN 790
0180 IF A$="H" THEN 810
0190 IF A$="I" THEN 840
0200 IF A$="J" THEN 870
0210 IF A$="K" THEN 910
0220 IF A$="L" THEN 940
0230 IF A$="M" THEN 970
0240 IF A$="N" THEN 1010
0250 IF A$="O" THEN 1040
0260 IF A$="P" THEN 1070
0270 IF A$="Q" THEN 1110
0280 IF A$="R" THEN 1140
0290 IF A$="S" THEN 1170
0300 IF A$="T" THEN 1210
0310 IF A$="U" THEN 1240
0320 IF A$="V" THEN 1270
0330 IF A$="W" THEN 1310
0340 IF A$="X" THEN 1340
0350 IF A$="Y" THEN 1370
0360 IF A$="Z" THEN 1410
0370 IF A$="1" THEN 1440
0380 IF A$="2" THEN 1460
0390 IF A$="3" THEN 1480
0400 IF A$="4" THEN 1500
0410 IF A$="5" THEN 1520
0420 IF A$="6" THEN 1540
0430 IF A$="7" THEN 1560
0440 IF A$="8" THEN 1580
0450 IF A$="9" THEN 1600
0460 IF A$="0" THEN 1620
0470 IF A$="0" THEN 1640
0480 GOTO 100
0600 GOSUB 1700
0610 PRINT "APPLE";TAB(20);"POMME"
0630 GOTO 100
0640 GOSUB 1700
0650 PRINT "AIRPLANE";TAB(20);"AVION"
0660 GOTO 100
0670 GOSUB 1700
0680 PRINT "CUP";TAB(20);"TASSE"
0690 GOTO 100
0700 GOSUB 1700
0710 PRINT "COW";TAB(20);"VACHE"
0720 GOTO 100
0730 GOSUB 1700
0740 PRINT "COAT";TAB(20);"VESTON"
0750 GOTO 100
0760 GOSUB 1700
0770 PRINT "DOG";TAB(20);"CHIEN"
0780 GOTO 100
0790 GOSUB 1700
0800 PRINT "HAND";TAB(20);"MAIN"
0805 GOTO 100
0810 GOSUB 1700
0820 PRINT "SUN";TAB(20);"SOLEIL"
0830 GOTO 100
0840 GOSUB 1700
0850 PRINT "BOOK";TAB(20);"LIURE"
0860 GOTO 100
0870 GOSUB 1700
0880 PRINT "MOON";TAB(20);"LUNE"
0890 GOTO 100
0910 GOSUB 1700
0920 PRINT "EAR";TAB(20);"OREILLE"
0930 GOTO 100
0940 GOSUB 1700
0950 PRINT "CLOUD";TAB(20);"NUAGE"
0960 GOTO 100
0970 GOSUB 1700
0980 PRINT "COMB";TAB(20);"PEIGNE"
0990 GOTO 100
0990 GOTO 100
1010 GOSUB 1700
1020 PRINT "EYES";TAB(20);"YEUX"
1030 GOTO 100
1040 GOSUB 1700
1050 PRINT "ICE";TAB(20);"GLACE"
1060 GOTO 100
1070 GOSUB 1700
1080 PRINT "STAR";TAB(20);"ETOILE"
1090 GOTO 100
1110 GOSUB 1700
1120 PRINT "SPOON";TAB(20);"CUILLERE"
1130 GOTO 100
1140 GOSUB 1700
1150 PRINT "CHAIR";TAB(20);"CHAISE"
1160 GOTO 100
1170 GOSUB 1700
1180 PRINT "HORSE";TAB(20);"CHEVAL"
1190 GOTO 100
1210 GOSUB 1700
1220 PRINT "PENCIL";TAB(20);"CRAYON"
1230 GOTO 100
1240 GOSUB 1700
1250 PRINT "LAMP";TAB(20);"LAMP"
1260 GOTO 100
1270 GOSUB 1700
1280 PRINT "BIRD";TAB(20);"OISEAU"
1290 GOTO 100
1310 GOSUB 1700
1320 PRINT "FISH";TAB(20);"POISSEN"
1330 GOTO 100
1340 GOSUB 1700
1350 PRINT "BICYCLE";TAB(20);"VELO"
1360 GOTO 100
1370 GOSUB 1700
1380 PRINT "CAT";TAB(20);"CHAT"
1390 GOTO 100
1410 GOSUB 1700
1420 PRINT "HAT";TAB(20);"CHAPEAU"
1430 GOTO 100
1440 GOSUB 1700
1445 PRINT "ONE";TAB(20);"UN"
1450 GOTO 100
1460 GOSUB 1700
1465 PRINT "TWO";TAB(20);"DEUX"
1470 GOTO 100
1480 GOSUB 1700
1485 PRINT "THREE";TAB(20);"TROIS"
1490 GOTO 100
1500 GOSUB 1700
1505 PRINT "FOUR";TAB(20);"QUATRE"
1510 GOTO 100
1520 GOSUB 1700
1525 PRINT "FIVE";TAB(20);"CINQ"
1530 GOTO 100
1540 GOSUB 1700
1545 PRINT "SIX";TAB(20);"SIX"
1550 GOTO 100
1560 GOSUB 1700
1565 PRINT "SEVEN";TAB(20);"SEPT"
1570 GOTO 100
1580 GOSUB 1700
1585 PRINT "EIGHT";TAB(20);"HUIT"
1590 GOTO 100
1600 GOSUB 1700
1605 PRINT "NINE";TAB(20);"NEUF"
1610 GOTO 100
1620 GOSUB 1700
1625 PRINT "ZERO";TAB(20);"ZERO"
1630 GOTO 100
1640 FOR I=1 TO 8
1650 PRINT
1660 NEXT I
1670 GOTO 100
1700 PRINT "ENGLISH";TAB(20);"FRENCH"
1710 PRINT "-----";TAB(20);"-----"
1720 PRINT
1740 RETURN

```

1=12=23=34=45=56=67=78=89=90=0
 Q=I W=it E=is R=do T=go Y=sleep
 U=here I=please O=yes P=no
 A=he S=you D=are F=want G=drink
 H=speak J=happy K=thank you L=okay
 a=(skip 8 lines) Z=she X=am C=like
 V=to B=eat N=time M=not

Figure 2. A Limited Vocabulary of 26 Essential Words and 10 Numbers

The speech impaired individual may use this "Word Board" to "talk" to others with the aid of the computer. Only two movements are required to use the "Word Board" - typing the word and typing enter to display the word. Sentences may be formed calling for the persons basic needs, such as eating and sleeping. Alternately, sentences may replace the words for more clearly describing the individuals wants and needs. Then depressing a certain key can display a whole sentence, such as "I am hungry, when do we eat?" Of course, the sentence won't fit on the keytop, so the handicapped person will have to choose from a list of letters with assigned sentences.

The home computer system may be less expensive than other devices that are used to aid the handicapped.

Regardless of the "Word Board" version you use, you can see that your home computer may be more useful than you ever imagined. Expand on program 1 for your educational needs. Develop a more detailed language instruction program, with several lists of vocabulary. Use it to increase your English vocabulary by accessing and learn the meanings of 10 new words a week. The microcomputer is a great learning tool, but you have to write the programs to utilize your system.

You may or may not have an application for program 2. But you might want to find organizations in your area that help the handicapped. Show them the "Word Board." They may not know that a home computer system can aid the handicapped, and your application may be useful to them. The home computer system may be less expensive than other devices that are used to aid the handicapped, and you would be doing a service to the community by demonstrating your system. Direct them to your local area computer store and suggest a system. □

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The BASIC Handbook — By Compusoft - While not favoring one computer over another, this book explains over 250 BASIC words, how to use them and alternate strategies. \$14.95

Z-80 & 8080 Assembly Language Programming — By Hayden - Giving an introductory look at assembly language for the Z-80 and 8080 processors, it is intended to provide just about everything the applications programmer needs to get the most out of his/her machine. \$7.95

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(frā'kas) n.l. a noisy dispute or fight; loud quarrel or disturbance; brawl; 2 a fantastic computer adventure challenging any number of players to explore a secret maze packed with hidden treasure, guarded by wily adversaries...

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CIRCLE 124 ON READER SERVICE CARD

Word Board, cont'd...

Figure 2a

WORD BOARD

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ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS
WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS
ENTERING AN '0' WILL SKIP 8 LINES
MAY BE USED AS A HELP TO THE HANDICAPPED

I
WANT
TO
EAT

THANK YOU

IS
IT
TIME
TO
GO

```

0010 PRINT "WORD BOARD"           Program 2
0020 PRINT
0030 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENBON"
0040 PRINT
0050 PRINT "ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS"
0060 PRINT "WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS"
0065 PRINT "ENTERING AN '0' WILL SKIP 8 LINES"
0070 PRINT "MAY BE USED AS A HELP TO THE HANDICAPPED"
0100 INPUT A$
0110 IF A$="A" THEN 600
0120 IF A$="B" THEN 640
0130 IF A$="C" THEN 670
0140 IF A$="D" THEN 700
0150 IF A$="E" THEN 730
0160 IF A$="F" THEN 760
0170 IF A$="G" THEN 790
0180 IF A$="H" THEN 810
0190 IF A$="I" THEN 840
0200 IF A$="J" THEN 870
0210 IF A$="K" THEN 910
0220 IF A$="L" THEN 940
0230 IF A$="M" THEN 970
0240 IF A$="N" THEN 1010
0250 IF A$="O" THEN 1040
0260 IF A$="P" THEN 1070
0270 IF A$="Q" THEN 1110
0280 IF A$="R" THEN 1140
0290 IF A$="S" THEN 1170
0300 IF A$="T" THEN 1210
0310 IF A$="U" THEN 1240
0320 IF A$="V" THEN 1270
0330 IF A$="W" THEN 1310
0340 IF A$="X" THEN 1340
0350 IF A$="Y" THEN 1370
0360 IF A$="Z" THEN 1410
0370 IF A$="1" THEN 1440
0380 IF A$="2" THEN 1460
0390 IF A$="3" THEN 1480
0400 IF A$="4" THEN 1500
0410 IF A$="5" THEN 1520
0420 IF A$="6" THEN 1540
0430 IF A$="7" THEN 1560
0440 IF A$="8" THEN 1580
0450 IF A$="9" THEN 1600
0460 IF A$="0" THEN 1620
0470 IF A$="0" THEN 1640
0480 GOTO 100
0600 PRINT TAB(20); "HE"
0610 GOTO 100
0640 PRINT TAB(20); "EAT"
0650 GOTO 100
0670 PRINT TAB(20); "LIKE"
0680 GOTO 100
0700 PRINT TAB(20); "ARE"
0710 GOTO 100
0730 PRINT TAB(20); "IS"
0740 GOTO 100
0760 PRINT TAB(20); "WANT"
0770 GOTO 100
0790 PRINT TAB(20); "DRINK"
0800 GOTO 100
0810 PRINT TAB(20); "SPEAK"
0820 GOTO 100
0840 PRINT TAB(20); "PLEASE"
0850 GOTO 100
0870 PRINT TAB(20); "HAPPY"

0880 GOTO 100
0910 PRINT TAB(20); "THANK YOU"
0920 GOTO 100
0940 PRINT TAB(20); "OKAY"
0950 GOTO 100
0970 PRINT TAB(20); "NOT"
0980 GOTO 100
1010 PRINT TAB(20); "TIME"
1020 GOTO 100
1040 PRINT TAB(20); "YES"
1050 GOTO 100
1070 PRINT TAB(20); "NO"
1080 GOTO 100
1110 PRINT TAB(20); "I"
1120 GOTO 100
1140 PRINT TAB(20); "DO"
1150 GOTO 100
1170 PRINT TAB(20); "YOU"
1180 GOTO 100
1210 PRINT TAB(20); "GO"
1220 GOTO 100
1240 PRINT TAB(20); "HERE"
1250 GOTO 100
1270 PRINT TAB(20); "TO"
1280 GOTO 100
1310 PRINT TAB(20); "IT"
1320 GOTO 100
1340 PRINT TAB(20); "AM"
1350 GOTO 100
1370 PRINT TAB(20); "SLEEP"
1380 GOTO 100
1410 PRINT TAB(20); "SHE"
1420 GOTO 100
1440 PRINT TAB(20); "1"
1450 GOTO 100
1460 PRINT TAB(20); "2"
1470 GOTO 100
1480 PRINT TAB(20); "3"
1490 GOTO 100
1500 PRINT TAB(20); "4"
1510 GOTO 100
1520 PRINT TAB(20); "5"
1530 GOTO 100
1540 PRINT TAB(20); "6"
1550 GOTO 100
1560 PRINT TAB(20); "7"
1570 GOTO 100
1580 PRINT TAB(20); "8"
1590 GOTO 100
1600 PRINT TAB(20); "9"
1610 GOTO 100
1620 PRINT TAB(20); "0"
1630 GOTO 100
1640 FOR I=1 TO 8
1650 PRINT
1660 NEXT I
1670 GOTO 100

```


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To add even more realism, optional sound effects—phasor and photon torpedo fire, and their resultant explosions—have been included. Trek-X: more than just a game. For the 8K PET. Order No. 0032P \$7.95.

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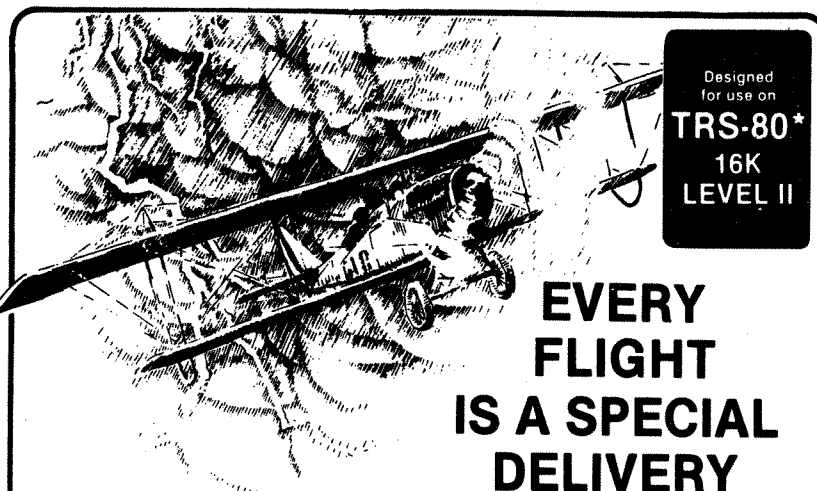
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You can play the game yourself or set up the tournament version, which allows up to six players at a time to compete. Either way, you're sure to find your route to the throne a challenging and rocky one.

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CIRCLE 150 ON READER SERVICE CARD

PERQUACKY

David E. Powers



Perquackey is a word game written in TRS-80 Disk BASIC for a 32K machine. The object of the game is to form as many words as possible from a set of random letters. Scoring depends on the number of letters in the words you form and several other factors which add an extra element of strategy to the game. See the instructions in the program for more details.

Before running the program, you should turn on the display of the realtime clock with the **CLOCK** command in DOS. Note that the sample runs were done on a Radio Shack line printer using **NEWDOS** to print the screen display. ☐

Rabbi David E. Powers, 10 Wilber Ct., New Hyde Park, NY 11040.

IS THE CLOCK DISPLAYED? YES..

00:06:47

00:07:22

PERQUACKY

DO YOU NEED INSTRUCTIONS?

YES..

PERQUACKY

00:07:52

"PERQUACKY" IS THE DIFFERENT WORD GAME, FUN FOR ALL, ESPECIALLY THOSE WHO LOVE TO HUNT FOR WORDS AND MEET THE CHALLENGE OF AN EVER-TICKING CLOCK.

THIS VERSION OF "PERQUACKY" MAY BE PLAYED BY UP TO FOUR PLAYERS. YOU CAN EVEN PLAY IT SOLITAIRE, ALWAYS TRYING TO BETTER YOUR SCORE FROM PREVIOUS GAMES AND ROUNDS. THE COMPUTER WILL SET UP YOUR GAMES, TALLY YOUR SCORES, AND EVEN MAKE SURE THAT YOU ARE PLAYING FAIRLY.

TO CONTINUE, PRESS ANY KEY.

00:08:22

THE OBJECT OF THE GAME IS TO FIND AND SPELL AS MANY WORDS AS POSSIBLE FROM A LIST OF LETTERS THE COMPUTER WILL GENERATE FOR YOU, ALL IN A THREE-MINUTE TIME LIMIT. AT FIRST, THE COMPUTER WILL GIVE YOU TEN LETTERS WITH WHICH TO WORK. AS YOUR SCORE INCREASES AND YOU BECOME "VULNERABLE" YOU WILL BE ALLOTTED THIRTEEN LETTERS. BUT YOU WILL HAVE TO ACHIEVE BETTER SCORES OR BE SET POINTS FOR NON-SUPERIOR PLAY!

TO CONTINUE, PRESS ANY KEY.

00:08:53

THE COMPUTER WILL PROMPT YOU AS YOU GO, IN CASE YOU SHOULD NEED ANY HELP IN THE MECHANICS OF THE GAME. BUT FOR YOUR INFORMATION YOU SHOULD KNOW IN ADVANCE THAT ONLY WORDS IN A STANDARD DICTIONARY ARE ACCEPTABLE. ALL THE PLAYERS SHOULD AGREE ON ONE BEFORE PLAY IS BEGUN. OF COURSE, LIKE MOST WORD GAMES, PROPER NAMES, FOREIGN WORDS, ABBREVIATIONS OR CAPITALIZED WORDS ARE NOT ALLOWED. ALSO, YOU MUST RESIST THE TEMPTATION TO USE PUNCTUATION MARKS. THE COMPUTER WILL NOT ALLOW THEM. THEY ARE NOT PART OF THE PERQUACKY VOCABULARY!

00:09:21

YOU MAY NOT MAKE A WORD ENDING IN "S" IF THAT WORD ALSO APPEARS WITHOUT THE "S" DURING THE SAME TURN.

ALL WORDS MUST BE AT LEAST THREE LETTERS LONG.

YOU MAY NOT ENTER MORE THAN FIVE WORDS CONTAINING THE SAME NUMBER OF LETTERS IN ANY ONE TURN. TO ENTER A WORD, SIMPLY TYPE IT IN.

OF COURSE, YOUR ERRORS CAN BE RECOVERED. TO DELETE THE LAST WORD YOU ENTERED, JUST ENTER 22. TO DELETE ANY OTHER WORD, TYPE 22 FOLLOWED, WITHOUT A SPACE, BY THAT WORD (FOR EXAMPLE, 22BIGBUG WOULD DELETE THE ENTRY "BIGBUG". TO CONTINUE, PRESS ANY KEY.

00:09:53

SCORING IS A LITTLE COMPLICATED, BUT THE COMPUTER HANDLES IT JUST FINE. YOU'LL GET ALL THE DETAILS RIGHT AWAY, BUT UP FRONT YOU SHOULD KNOW ABOUT THE BONUSES, BECAUSE THEY CAN REALLY ADD UP.

TO CONTINUE, PRESS ANY KEY.

00:10:23

REMEMBER, YOU COULD ONLY ENTER FIVE WORDS OF EACH LENGTH? WELL, ONCE YOU DO ENTER FIVE WORDS IN EACH OF TWO ADJOINING CATEGORIES (FOR EXAMPLE FIVE THREE-LETTER WORDS AND FIVE FOUR-LETTER WORDS (AHEM!)), YOU GET A RATHER FAT BONUS.

300 POINTS FOR 5 THREES AND 5 FOURS
500 POINTS FOR 5 FOURS AND 5 FIVES
800 POINTS FOR 5 FIVES AND 5 SIXES
1200 POINTS FOR 5 SIXES AND 5 SEVENS
1850 POINTS FOR 5 SEVENS AND 5 EIGHTS
2700 POINTS FOR 5 EIGHTS AND 5 NINES

TO CONTINUE, PRESS ANY KEY.

00:10:59

NOW, HERE'S THE COMPLICATED PART. SKIP IT IF YOU WISH, BUT IF YOU BECOME A REAL EXPERT, YOU'LL WANT THIS INFORMATION. SO HERE IT IS FOR YOU, ANYWAY.

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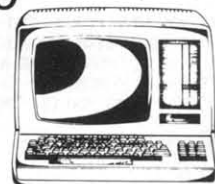
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FOR THE FIRST THREE-LETTER WORD YOU GET 60 POINTS, AND 10 MORE FOR EACH THEREAFTER. 60, 70, 80, 90, 100 POINTS TOTAL FOR 1, 2, 3, 4 OR 5 THREE-LETTER WORDS.

FOR THE FIRST FOUR-LETTER WORD YOU GET 120 POINTS, AND 20 MORE FOR EACH THEREAFTER. 120, 140, 160, 180, 200 POINTS FOR 1, 2, 3, 4 OR 5 FOUR-LETTER WORDS.

TO CONTINUE, PRESS ANY KEY.

00:11:28

AS THE FIVE-LETTER CATEGORY GROWS YOU GET 200, 250, 300, 350 AND 400 POINTS.

SIX LETTER WORDS BRING 300, 400, 500, 600 OR 700 POINTS FOR ONE THROUGH FIVE ENTRIES.

GET SEVEN LETTER WORDS AND YOU'LL WIPE OUT YOUR OPPONENTS. AS THAT CATEGORY FILLS YOU GET 500, 650, 800, 950 AND 1100 POINTS.

BUT LOOK AT THE EIGHTS: 750, 1000, 1250, 1500, 1750 POINTS.

TO CONTINUE, PRESS ANY KEY.

00:11:58

NINE- AND TEN-LETTER WORDS ARE THE SUREST WAY TO DRIVE YOUR OPPONENTS TO DISTRACTION. NINES BRING 1000, 1500, 2000, 2500, OR 3000 POINTS FOR ONE TO FIVE ENTRIES.

AND TENS ? ? ? - - - FORGET THE REST OF THE PLAYERS AND LOOK!

~~~~~ 1500, 3000, 5000, 7500 OR 13000 POINTS  
FOR ONE THROUGH FIVE ENTRIES. JJJJJ

TO CONTINUE, PRESS ANY KEY.

00:12:33

NOW SOME VERY IMPORTANT DETAILS

DON'T SKIP THESE ! !

**W D O T S N I T**

TO CONTINUE, PRESS ANY KEY.

00:13:05

ONCE YOU HAVE ACCUMULATED 2000 POINTS YOU BECOME VULNERABLE! THAT'S FINE, BECAUSE THEN YOU'LL GET 13 LETTERS TO WORK WITH, BUT ALSO YOU MUST SCORE A MINIMUM OF 500 POINTS. IF YOU DON'T SCORE THE MINIMUM, 500 POINTS WILL BE DEDUCTED FROM YOUR SCORE, AND THE POINTS YOU DID MAKE IN THAT ROUND WILL BE DISALLOWED.

WHEN YOU ARE VULNERABLE, YOU MAY NOT MAKE THREE-LETTER WORDS.

THE GAME IS OVER AT THE END OF THE ROUND IN WHICH ANY PLAYER REACHES A TOTAL OF 5000 POINTS.

TO CONTINUE, PRESS ANY KEY.

00:13:33

A WORD ABOUT THE DISPLAY . . .

THE DISPLAY IS SELF-PROMPTING AND WILL HELP YOU A LOT. IT IS ALSO SELF-EXPLANATORY, LISTING YOUR WORDS BY LENGTH.

WORDS ENTERED AFTER THREE MINUTES WILL AUTOMATICALLY BE DISALLOWED, AND THE TURN WILL BE ENDED. TO END YOUR TURN BEFORE THE TIME LIMIT EXPIRES, ENTER XX.

WHEN YOUR TURN IS ENDED, THE COMPUTER WILL EXAMINE ALL THE ENTRIES AND DISALLOW WORDS MADE BY ADDING S TO OTHER ENTRIES, DUPLICATE ENTRIES AND WORDS INCONSISTENT WITH THE LETTER LIST.

TO CONTINUE, PRESS ANY KEY.

00:14:08

DISALLOWED WORDS WILL BE BRACKETED AS IN THE FOLLOWING EXAMPLES.

WORDS MADE BY ADDING S: ++EXAMPLES++S  
DUPLICATE WORDS: ++EXAMPLE++2  
WORDS INCONSISTENT WITH LETTERS: ++EXAMPLE++?



TO CONTINUE, PRESS ANY KEY.

00:14:36

AFTER THE COMPUTER DISALLOWS WORDS, YOUR OPPONENTS MAY DO SO, TOO. THEY MAY CHECK WORDS IN A STANDARD DICTIONARY AND THEN ENTER ANY CHALLENGES WHICH THE COMPUTER WILL BRACKET WITH ++ ++C.

AFTER ALL CHALLENGES ARE MADE, ENTER XX, AND THE COMPUTER WILL CALCULATE AND DISPLAY YOUR SCORE AND THEN DISPLAY A SCOREBOARD FOR ALL PLAYERS.

DURING PLAY, THE LOWER RIGHT CORNER OF THE SCREEN WILL SHOW THE PLAYER'S SCORE UP TO THE END OF HIS LAST TURN. THE UPPER RIGHT WILL DISPLAY THE TIMER.

TO CONTINUE, PRESS ANY KEY.

00:15:13

YOU CAN PROBABLY COME UP WITH ALL SORTS OF REFINEMENTS TO THE BASIC GAME. WHAT WONDERFUL DEVELOPMENTS THEY COULD BE! LIKE THEME GAMES. MAYBE DEVOTE ONE WHOLE GAME ONLY TO COMPUTER-SCIENCE WORDS.

OR SCI FI

OR WHO KNOWS

WHERE YOUR

IMAGINATION

WILL LEAD?

TO CONTINUE, PRESS ANY KEY.

00:16:17

NOW, IF YOU'D LIKE TO REVIEW THAT, JUST KEY AN R.

BUT IF YOU'RE READY TO PLAY, KEY ANYTHING ELSE!.

HOW MANY PLAYERS FOR PERQUACKEY (1-4)? 2

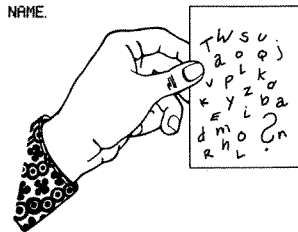
00:17:03

TELL ME PLAYER 1 'S NAME.

==> STEVE

TELL ME PLAYER 2 'S NAME.

==> MR. BILL.



STEVE PLAYING AND NOT VULNERABLE

00:00:02

YOUR LETTERS ARE: P N S B X O K U E A

:3: :4: :5: :6: :7:

:8: :9: :10:

STEVE PLAYING AND NOT VULNERABLE

00:02:44



# "THE CREATOR®"

## By Complete Business Systems, Inc. Software Division

High level language program generator develops complete programs in "Basic".

Enables ANYONE to write complete, running, debugged BASIC LANGUAGE Programs in 35 to 40 minutes with NO PRIOR PROGRAMMING KNOWLEDGE OR ABILITY.

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IF you are one of the many who bought a micro-computer in the belief that with just a little studying you could write your own programs, you now know that you can't.

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"THE CREATOR®" does the work! You answer the simple direct questions and "THE CREATOR®" CREATES . . . AND ALL IN BASIC LANGUAGE.

**Q. After "THE CREATOR®" has produced a program, can it be modified?**

A. Yes, the resulting program is modular, fully documented and readily accessible for alterations or deletions.

**Q. Does the program created use so much disc space that there is very little space left for record storage?**

A. No, the code produced is extremely compact despite complete documentation. If requested "THE CREATOR®" will even "pack" or compress information. You may even delete the "remarks" making it even more space efficient.

**Q. Must I be expert or even conversant with Basic Language?**

A. No, all questions to and answers from the operator require no computer language knowledge, simple every day English will do.

**Q. What about math ability?**

A. If you can count your fingers and toes, you'll have no problems.

**Q. Will the programs which I produce with "THE CREATOR®" be bulky, slow or amateurish?**

A. No, the resulting programs will be sophisticated and extremely fast operating. For example, should you create a mailing list or inventory program, the time for any record to be retrieved and displayed from a full disc would take a maximum of 1 second.

**Q. Must the programs produced conform to a pre-determined format and file length?**

A. No, you determine format and file size to fit your requirements. You may have as many as 22 fields or as few as 1.

**Q. Can I develop my own business programs?**

A. For the most part, yes.

**Q. What are the limitations? What programs can I produce with "THE CREATOR®"?**

A. Your own ingenuity and hardware limitations.

**Q. Will future versions of "THE CREATOR®" make my present copy obsolete?**

A. The purchase price includes your original diskette and user instructions. Your program is registered in your name. For a period of one year from the date of purchase you will be entitled to receive FREE any improvements or modifications. The only expense to you will be a new diskette charge (if applicable), packaging and mailing.

### TECHNICAL ASPECTS

- Record access by a hashing algorithm guaranteeing fast record retrieval.
- Duplicate keys permitted.
- Record deletion automatically supported.
- Record access and file maintenance is user transparent.
- Minimal disc overhead since there is no special assembly language routine called. No "Basic" overhead.
- Programs produced can be transported between 6800, 6502, 8080, Z80, 8085, 8086 and Z8000 based systems.
- Can be used with Micro-Soft Basic and CP/M systems.
- On TRS-80 has automatic blocking for maximum number of records per disc.
- Complete file maintenance including up-date of any record in any field, delete and add new records even with duplicate key.

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Enclosed is my check (or money order) in the amount of \$250.00. Please send me my serial numbered, registered copy of "THE CREATOR®" as soon as my check clears. (No wait for Certified checks, bank checks or money orders.) Sorry, no credit cards accepted.

(Please print) \_\_\_\_\_  
Full name \_\_\_\_\_  
Address \_\_\_\_\_ Apt. # \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Computer make \_\_\_\_\_ Model \_\_\_\_\_

YOUR LETTERS ARE: P N S B X O K U E A

|         |          |     |            |     |
|---------|----------|-----|------------|-----|
| 13: BOX | 14: BASK | 15: | 16: SPOKEN | 17: |
| POX     | BONE     |     |            |     |
| SUN     | PUNK     |     |            |     |
| PUN     | SUNK     |     |            |     |
|         | BAKE     |     |            |     |

00:03:34

\*\* OVERTIME \*\*

ENTER CHALLENGES, THEN XX -

YOUR LETTERS ARE: P N S B X O K U E A

|         |          |     |            |     |
|---------|----------|-----|------------|-----|
| 13: BOX | 14: BASK | 15: | 16: SPOKEN | 17: |
| POX     | BONE     |     |            |     |
| SUN     | PUNK     |     |            |     |
| PUN     | SUNK     |     |            |     |
|         | BAKE     |     |            |     |

00:04:08

\*\* OVERTIME \*\*

SCORE FOR STEVE FOR THIS ROUND: 590

YOUR LETTERS ARE: P N S B X O K U E A

|         |          |     |            |     |
|---------|----------|-----|------------|-----|
| 13: BOX | 14: BASK | 15: | 16: SPOKEN | 17: |
| POX     | BONE     |     |            |     |
| SUN     | PUNK     |     |            |     |
| PUN     | SUNK     |     |            |     |
|         | BAKE     |     |            |     |

00:04:42

TOTAL SCORE, ROUND 1

| PLAYER   | LAST SCORE | TOTAL SCORE | VULNERABLE? |
|----------|------------|-------------|-------------|
| STEVE    | 590        | 590         | NO          |
| MR. BILL | 0          | 0           | NO          |

TO CONTINUE, PRESS ANY KEY.



```

10 REM *** PERQUACKEY, VERSION 2.2 -- 14 MAY 1979
20 REM *** BASED ON "PERQUACKEY" (C) HOLLINGSWORTH BROS., 1956
30 REM *** AND ON "PERQUACKEY, THE DIFFERENT WORD GAME"
   (C) LEISURE DYNAMICS, INC., 1970
40 REM *** PUBLISHED BY LAKESIDE INDUSTRIES, A DIVISION OF
   LEISURE DYNAMICS, INC., MINNEAPOLIS, MINN.
50 REM *** PROGRAM BY DAVID E. POWERS
60 REM *** 10 WILBEN CT
70 REM *** NEW HYDE PARK, NY 11040
80 REM *** 516 437 8320
90 POKE &H40A9,&HFF
100 CLEAR 1000
110 XX$=STRING$(64," ")
120 DEFINT B,E,F,I,L,N,P,R,S,V,W
130 CLS: INPUT "IS THE CLOCK DISPLAYED?";A$
140 IF LEFT$(A$,1)="Y" THEN 170
150 PRINT: PRINT "RETURN TO DOS AND ENTER CLOCK COMMAND."
160 END$S"
170 CLS
180 PRINT CHR$(23)
190 PRINT @ 274, "PERQUACKEY"
200 PRINT @ 700, "DO YOU NEED INSTRUCTIONS?"
210 PRINT
220 LINEINPUT A$
230 IF LEFT$(A$,1)="N" THEN 940
240 CLS
250 PRINT TAB(28) "PERQUACKEY"
260 PRINT:
   PRINT CHR$(34) "PERQUACKEY" CHR$(34) " IS THE DIFFERENT WORD GAME.
   FUN FOR ALL, ESPECIALLY THOSE WHO LOVE TO HUNT FOR WORDS AND MEET THE
   CHALLENGE OF AN EVER-TICKING CLOCK."
270 PRINT
280 PRINT "THIS VERSION OF " CHR$(34) "PERQUACKEY" CHR$(34) " MAY BE

```



PLAYED BY UP TO FOUR PLAYERS. YOU CAN EVEN PLAY IT SOLITAIRE, ALWAYS TRYING TO BETTER YOUR SCORE FROM PREVIOUS GAMES AND ROUNDS. THE COMPUTER "290 PRINT "WILL SET UP YOUR GAMES, TALLY YOUR SCORES, AND EVEN MAKE SURE THAT YOU ARE PLAYING FAIRLY."

300 GOSUB 4050  
310 PRINT:PRINT"THE OBJECT OF THE GAME IS TO FIND AND SPELL AS MANY WORDS AS POSSIBLE FROM A LIST OF LETTERS THE COMPUTER WILL GENERATE FOR YOU. ALL IN A THREE-MINUTE TIME LIMIT. AT FIRST, THE COMPUTER" 320 PRINT "WILL GIVE YOU TEN LETTERS WITH WHICH TO WORK. AS YOUR SCORE" 330 PRINT "INCREASES AND YOU BECOME "CHR\$(34) "VULNERABLE" CHR\$(34) " YOU WILL BE ALLOTTED THIRTEEN LETTERS. BUT YOU WILL HAVE TO ACHIEVE BETTER SCORES OR BE SET POINTS FOR NON-SUPERIOR PLAY!"

340 GOSUB 4050  
350 PRINT "THE COMPUTER WILL PROMPT YOU AS YOU GO, IN CASE YOU SHOULD NEED ANY HELP IN THE MECHANICS OF THE GAME. BUT FOR YOUR INFORMATION YOU SHOULD KNOW IN ADVANCE THAT ONLY WORDS IN A STANDARD" 360 PRINT "DICTIONARY ARE ACCEPTABLE. ALL THE PLAYERS SHOULD AGREE ON ONE BEFORE PLAY IS BEGUN. OF COURSE, LIKE MOST WORD GAMES, PROPER NAMES, FOREIGN WORDS, ABBREVIATIONS OR CAPITALIZED WORDS" 370 PRINT "ARE NOT ALLOWED. ALSO, YOU MUST RESIST THE TEMPTATION TO USE PUNCTUATION MARKS. THE COMPUTER WILL NOT ALLOW THEM. THEY ARE NOT PART OF THE PERQUACKEY VOCABULARY!"

380 GOSUB 4050  
390 PRINT "YOU MAY NOT MAKE A WORD ENDING IN " CHR\$(34) "S" CHR\$(34) " IF THAT WORD ALSO APPEARS WITHOUT THE " CHR\$(34) "S" CHR\$(34) " DURING THE SAME TURN." 400 PRINT  
410 PRINT "ALL WORDS MUST BE AT LEAST THREE LETTERS LONG. YOU MAY NOT ENTER MORE THAN FIVE WORDS CONTAINING THE SAME NUMBER OF LETTERS IN ANY ONE TURN. TO ENTER A WORD, SIMPLY TYPE IT IN.

OF COURSE, YOUR ERRORS CAN BE RECOVERED. TO DELETE THE" 420 PRINT "LAST WORD YOU ENTERED, JUST ENTER ZZ. TO DELETE ANY OTHER WORD, TYPE ZZ FOLLOWED, WITHOUT A SPACE, BY THAT WORD (FOR EXAMPLE, ZZBIGBUG WOULD DELETE THE ENTRY " CHR\$(34) "BIGBUG" CHR\$(34) "."

430 GOSUB 4050  
440 PRINT  
450 PRINT "SCORING IS A LITTLE COMPLICATED, BUT THE COMPUTER HANDLES IT JUST FINE. YOU'LL GET ALL THE DETAILS RIGHT AWAY, BUT UP FRONT YOU SHOULD KNOW ABOUT THE BONUSES, BECAUSE THEY CAN REALLY ADD UP."

460 GOSUB 4050  
470 PRINT "REMEMBER, YOU COULD ONLY ENTER FIVE WORDS OF EACH LENGTH? WELL, ONCE YOU DO ENTER FIVE WORDS IN EACH OF TWO ADJOINING CATEGORIES (FOR EXAMPLE FIVE THREE-LETTER WORDS AND FIVE" 480 PRINT "FOUR-LETTER WORDS (AHEN!)), YOU GET A RATHER FAT BONUS.

300 POINTS FOR 5 THREES AND 5 FOURS  
500 POINTS FOR 5 FOURS AND 5 FIVES  
800 POINTS FOR 5 FIVES AND 5 SIXES"  
1200 POINTS FOR 5 SIXES AND 5 SEVENS  
1850 POINTS FOR 5 SEVENS AND 5 EIGHTS  
2700 POINTS FOR 5 EIGHTS AND 5 NINES"

500 GOSUB 4050  
510 PRINT "NOW, HERE'S THE COMPLICATED PART. SKIP IT IF YOU WISH, BUT IF YOU BECOME A REAL EXPERT, YOU'LL WANT THIS INFORMATION. SO HERE IT IS FOR YOU, ANYWAY."

520 PRINT "  
FOR THE FIRST THREE-LETTER WORD YOU GET 60 POINTS, AND 10 MORE FOR EACH THEREAFTER. 60, 70, 80, 90, 100 POINTS TOTAL FOR 1, 2, 3, 4 OR 5 THREE-LETTER WORDS."

530 PRINT "  
FOR THE FIRST FOUR-LETTER WORD YOU GET 120 POINTS, AND 20 MORE FOR EACH THEREAFTER. 120, 140, 160, 180, 200 POINTS FOR 1, 2, 3, 4 OR 5 FOUR-LETTER WORDS."

540 GOSUB 4050  
550 PRINT "AS THE FIVE-LETTER CATEGORY GROWS YOU GET 200, 250, 300, 350 AND 400 POINTS."

560 PRINT: PRINT"SIX LETTER WORDS BRING 300, 400, 500, 600 OR 700 POINTS FOR ONE THROUGH FIVE ENTRIES. GET SEVEN LETTER WORDS AND YOU'LL WIPE OUT YOUR OPPONENTS. AS 570 PRINT "THAT CATEGORY FILLS YOU GET 500, 650, 800, 950 AND 1100 POINTS. BUT LOOK AT THE EIGHTS: 750, 1000, 1250, 1500, 1750 POINTS."

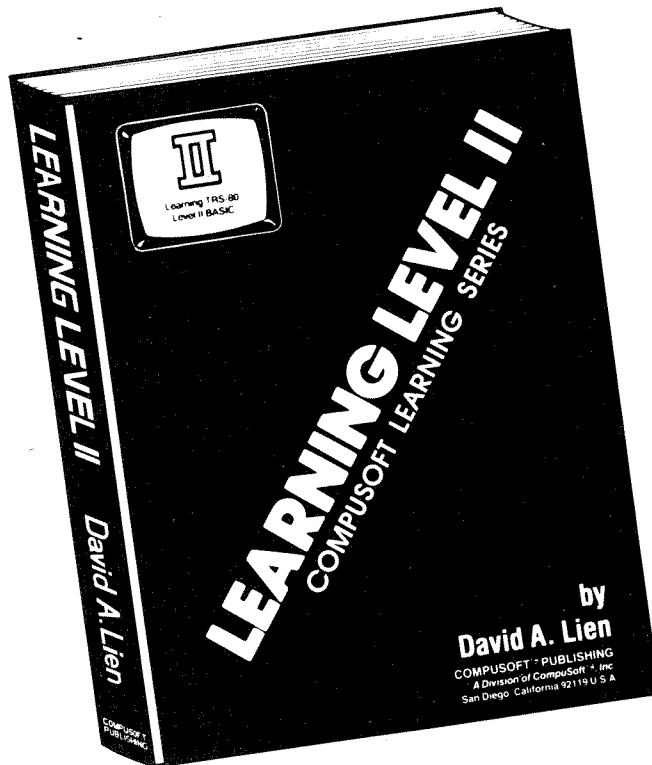
580 GOSUB 4050  
590 PRINT "NINE- AND TEN-LETTER WORDS ARE THE SUREST WAY TO DRIVE YOUR OPPONENTS TO DISTRACTION. NINES BRING 1000, 1500, 2000, 2500, OR 3000 POINTS FOR ONE TO FIVE ENTRIES." 600 PRINT: PRINT "AND TENS ? ? ? - - FORGET THE REST OF THE PLAYERS AND LOOK!" 610 PRINT:PRINT TAB(10) STRING\$(5,CHR\$(94))" 1500, 3000, 5000, 7500 OR 13000 POINTS" 620 PRINT TAB(15) "FOR ONE THROUGH FIVE ENTRIES."

STRING\$(5,CHR\$(93))  
630 GOSUB 4050  
640 PRINT CHR\$(23)  
650 PRINT: PRINT"NOW SOME VERY IMPORTANT DETAILS  
DON'T SKIP THESE ! !"

660 XX\$=STRING\$(32," ")  
670 GOSUB 4050  
680 XX\$=STRING\$(64," ")  
690 PRINT: PRINT "ONCE YOU HAVE ACCUMULATED 2000 POINTS YOU BECOME VULNERABLE! THAT'S FINE, BECAUSE THEN YOU'LL GET 13 LETTERS TO WORK WITH. BUT ALSO YOU MUST SCORE A MINIMUM OF 500 POINTS. IF YOU DON'T" 700 PRINT "SCORE THE MINIMUM, 500 POINTS WILL BE DEDUCTED FROM YOUR SCORE, AND THE POINTS YOU DID MAKE IN THAT ROUND WILL BE DISALLOWED."



# Here's The Second Half . . . . .



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Written by the author of your Level II Users Manual, LEARNING LEVEL II picks right up where the Level I Manual leaves off. It even supplies the changes needed to make the Level I Manual compatible with your Level II TRS-80.

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```

710 PRINT: PRINT "WHEN YOU ARE VULNERABLE, YOU MAY NOT MAKE THREE-LETTER WORDS."
720 PRINT
THE GAME IS OVER AT THE END OF THE ROUND IN WHICH ANY PLAYER
REACHES A TOTAL OF 5000 POINTS.
730 GOSUB 4050
740 PRINT "A WORD ABOUT THE DISPLAY . . . ."
750 PRINT: PRINT "THE DISPLAY IS SELF-PROMPTING AND WILL HELP YOU A LOT.
IT IS ALSO SELF-EXPLANATORY, LISTING YOUR WORDS BY LENGTH.
WORDS ENTERED AFTER THREE MINUTES WILL AUTOMATICALLY BE"
760 PRINT "DISALLOWED, AND THE TURN WILL BE ENDED. TO END YOUR TURN
BEFORE THE TIME LIMIT EXPIRES, ENTER XX.
WHEN YOUR TURN IS ENDED, THE COMPUTER WILL EXAMINE ALL THE"
770 PRINT "ENTRIES AND DISALLOW WORDS MADE BY ADDING S TO OTHER ENTRIES.
DUPLICATE ENTRIES AND WORDS INCONSISTENT WITH THE LETTER LIST."
780 GOSUB 4050
790 PRINT "DISALLOWED WORDS WILL BE BRACKETED AS IN THE FOLLOWING EXAMPLES."
800 PRINT
WORDS MADE BY ADDING S:      ++EXAMPLES++S
DUPLICATE WORDS:             ++EXAMPLE++2
WORDS INCONSISTENT WITH LETTERS: ++EXAMPLE++?
810 GOSUB 4050
820 PRINT "AFTER THE COMPUTER DISALLOWS WORDS, YOUR OPPONENTS MAY DO SO,
TOO. THEY MAY CHECK WORDS IN A STANDARD DICTIONARY AND THEN
ENTER ANY CHALLENGES WHICH THE COMPUTER WILL BRACKET WITH
++ ++C."
830 PRINT
AFTER ALL CHALLENGES ARE MADE, ENTER XX, AND THE COMPUTER WILL
CALCULATE AND DISPLAY YOUR SCORE AND THEN DISPLAY A SCOREBOARD
FOR ALL PLAYERS.
840 PRINT
DURING PLAY, THE LOWER RIGHT CORNER OF THE SCREEN WILL SHOW THE
PLAYER'S SCORE UP TO THE END OF HIS LAST TURN. THE UPPER RIGHT
WILL DISPLAY THE TIMER.
850 GOSUB 4050
860 PRINT "YOU CAN PROBABLY COME UP WITH ALL SORTS OF REFINEMENTS TO THE
BASIC GAME. WHAT WONDERFUL DEVELOPMENTS THEY COULD BE! LIKE
THEME GAMES. MAYBE DEVOTE ONE WHOLE GAME ONLY TO COMPUTER-
SCIENCE WORDS."
870 PRINT
OR SCI FI

```



```

OR WHO KNOWS
WHERE YOUR
IMAGINATION"
WILL LEAD?"
880 PRINT "
890 GOSUB 4050
900 PRINT "NOW, IF YOU'D LIKE TO REVIEW THAT, JUST KEY AN R.
BUT IF YOU'RE READY TO PLAY, KEY ANYTHING ELSE!"
910 A$=INKEY$: IF A$="" THEN 910
920 IF A$="R" THEN 240
930 A$=""
940 RANDOM
950 DEF FNA$(A$)=MID$(A$,RND(6),1)+" "
960 DATA FUNIPT, LTORDN, MUSRIG, BYWOLD, VEJOZK, WOPOMC, BRAHKT,
SRHIFU, AARREE, VSYQMS, FALPBN, JGDKCM
970 READ C1$, C2$, C3$, C4$, C5$, C6$, C7$, C8$, C9$, VA$, VB$,
VC$
980 CLS
990 INPUT "HOW MANY PLAYERS FOR PEROUACKY (1-4)";N
1000 IF N<1 OR N>4 THEN 990
1010 DIM W$(7,5), WT(7), WC(7), WD(7), F(7,5), I$(N), V(N), S(N), S1(N)
1020 FOR LP=1 TO N
1030 PRINT "TELL ME PLAYER" LP "S NAME."
1040 LINEINPUT "==" :I$(LP)
1050 NEXT
1060 P=1
1070 R=1
1080 CLS
1090 PRINT @ 15, I$(P) " PLAYING AND"
1100 IF V(P)=1 THEN PRINT " VULNERABLE"; ELSE PRINT " NOT VULNERABLE";
1110 PRINT @ 1015, S(P);
1120 IF V(P)=1 PRINT @ 323, "NO 3'S"
1130 PRINT @ 261, ":3:";
1140 PRINT @ 272, ":4:";
1150 PRINT @ 283, ":5:";
1160 PRINT @ 296, ":6:";
1170 PRINT @ 309, ":7:";
1180 PRINT @ 648, ":8:";
1190 PRINT @ 663, ":9:";
1200 PRINT @ 679, ":10:";
1210 IF V(P)=0 THEN 1260: REM CHECK FOR VULNERABILITY
1220 V1$=FNA$(VA$)
1230 V2$=FNA$(VB$)
1240 V3$=FNA$(VC$)
1250 LY$=V1$+V2$+V3$
1260 L1$=FNA$(C1$)
1270 L2$=FNA$(C2$)
1280 L3$=FNA$(C3$)
1290 L4$=FNA$(C4$)
1300 L5$=FNA$(C5$)
1310 L6$=FNA$(C6$)
1320 L7$=FNA$(C7$)
1330 L8$=FNA$(C8$)
1340 L9$=FNA$(C9$)

```



```

1350 L0$=FNA$(C0$)
1360 LY$=LY$+L1$+L2$+L3$+L4$+L5$+L6$+L7$+L8$+L9$+L0$
1370 PRINT @ 128, "PRESS ANY KEY WHEN READY.";
1380 FOR LP=0 TO 95: A$=INKEY$: IF A$<>"" THEN 1420ELSE NEXT
1390 PRINT @ 128, XX$;
1400 FOR LP=0 TO 50: A$=INKEY$: IF A$<>"" THEN 1420ELSE NEXT
1410 GOTO 1370
1420 PRINT @ 128, XX$;
1430 POKE &H4041,0
1440 POKE &H4042,0
1450 POKE &H4043,0
1460 PRINT @ 202, "YOUR LETTERS ARE: " LY$;
1470 CMD"R"
1480 PRINT @ 90, " ";
1490 LINEINPUT A$
1500 PRINT @ 64, XX$;
1510 IF PEEK(&H4043)>0 OR PEEK(&H4042)>3 OR (PEEK(&H4042)=3
AND PEEK(&H4041)>0) THEN PRINT @ 0, XX$; ELSE 1540
1520 PRINT @ 22, " * OVERTIME * ";
1530 GOTO 1760
1540 IF LEFT$(A$,2)="XX" THEN 1760
1550 IF LEFT$(A$,2)="ZZ" AND LEN(A$)=2 THEN 3320
1560 IF LEFT$(A$,2)="ZZ" THEN 3340
1570 A1$=A$
1580 L=LEN(A$)-3
1590 IF V(P)=1 AND L<1 THEN 1480
1600 IF L<0 THEN 1480
1610 IF L>7 THEN L=7
1620 W$(L,WC(L))=A$
1630 WC(L)=WC(L)+1
1640 IF WC(L)>5 THEN PRINT @ 64, "CATEGORY FULL. DISALLOWED." ELSE GOTO 1670
1650 WC(L)=WC(L)-1
1660 GOTO 1480
1670 B=64*(WC(L)-1)
1680 IF L=0 PRINT @ 325+B,A$; : GOTO 1480
1690 IF L=1 PRINT @ 335+B,A$; : GOTO 1480
1700 IF L=2 PRINT @ 346+B,A$; : GOTO 1480
1710 IF L=3 PRINT @ 358+B,A$; : GOTO 1480
1720 IF L=4 PRINT @ 371+B,A$; : GOTO 1480
1730 IF L=5 PRINT @ 709+B,A$; : GOTO 1480
1740 IF L=6 PRINT @ 724+B,A$; : GOTO 1480
1750 PRINT @ 740+B,A$; : GOTO 1480
1760 PRINT @ 64, XX$;
1770 PRINT @ 86, "INSPECTING ENTRIES";
1780 FOR LP=0 TO 7
1790 WT(LP)=WC(LP)
1800 IF WC(LP)>4 THEN WC(LP)=4
1810 NEXT
1820 REM CHECKS FOR WORDS MADE BY ADDING S
1830 PP$="++" : PQ$="++S"
1840 FOR LP=1 TO 7
1850 GOSUB 4030
1860 FOR LQ=0 TO WC(LP)
1870 IF RIGHT$(W$(LP,LQ),1)<>"S" THEN 1930
1880 FOR LR=0 TO WC(LP-1)
1890 IF W$(LP-1,LR)<LEFT$(W$(LP,LQ),2+LP) THEN 1920
1900 F(LP,LQ)=1
1910 ON LP GOSUB 3860, 3880, 3900, 3920, 3940, 3960,
3980
1920 NEXT LR
1930 NEXT LQ
1940 GOSUB 4040
1950 NEXT LP
1960 REM ELIMINATES WORDS INCONSISTENT WITH LETTER LIST
1970 PP$="++" : PQ$="++?"
1980 FOR LP=0 TO 7
1990 GOSUB 4030
2000 LX$=LY$
2010 FOR LQ=0 TO WC(LP)
2020 IF W$(LP,LQ)="" THEN 2160
2030 IF F(LP,LQ)=1 THEN 2140
2040 LX$=LY$
2050 FOR LR=1 TO LP+3
2060 T$=MID$(W$(LP,LQ),LR,1)
2070 IN=INSTR(LX$,T$)
2080 IF IN=0 THEN 2110
2090 MID$(LX$,IN,1)=" "
2100 GOTO 2130
2110 F(LP,LQ)=1
2120 ON LP+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940, 3960, 3980
2130 NEXT LR
2140 NEXT LQ
2150 GOSUB 4040
2160 NEXT LP
2170 REM ELIMINATES DUPLICATE ENTRIES
2180 PP$="++" : PQ$="++2"
2190 FOR LP=0 TO 7
2200 GOSUB 4030
2210 FOR LQ=0 TO WC(LP)
2220 IF W$(LP,LQ)="" THEN 2320
2230 FOR LR=0 TO WC(LP)
2240 IF LQ<LR AND W$(LP,LQ)=W$(LP,LR) THEN 2270
2250 NEXT LR
2260 GOTO 2300

```



We have acquired the rights to all TDL software (& hardware). TDL software has long had the reputation of being the best in the industry. Computer Design Labs will continue to maintain, evolve and add to this superior line of quality software.

— Carl Galletti and Roger Amidon, owners.

Software with Manual/Manual Alone

**All of the software below is available on any of the following media for operation with a Z80 CPU using the CP/M\* or similar type disk operating system (such as our own TPM\*).**

**for TRS-80\* CP/M (Model I or II)**  
**for 8" CP/M (soft sectored single density)**  
**for 5¼" CP/M (soft sectored single density)**  
**for 5¼" North Star CP/M (single density)**  
**for 5¼" North Star CP/M (double density)**

## BASIC I

A powerful and fast Z80 Basic interpreter with EDIT, RENUMBER, TRACE, PRINT USING, assembly language, subroutine CALL, LOADGO for "chaining", COPY to move text, EXCHANGE, KILL, LINE INPUT, error intercept, sequential file handling in both ASCII and binary formats, and much, much more. It runs in a little over 12 K. An excellent choice for games since the precision was limited to 7 digits in order to make it one of the fastest around. \$49.95/\$15.

## BASIC II

Basic I but with 12 digit precision to make its power available to the business world with only a slight sacrifice in speed. Still runs faster than most other Basics (even those with much less precision). \$99.95/\$15.

## BUSINESS BASIC

The most powerful Basic for business applications. It adds to Basic II with random or sequential disk files in either fixed or variable record lengths, simultaneous access to multiple disk files, PRIVACY command to prohibit user access to source code, global editing, added math functions, and disk file maintenance capability without leaving Basic (list, rename, or delete). \$179.95/\$25.

## ZEDIT

A character oriented text editor with 26 commands and "macro" capability for stringing multiple commands together. Included are a complete array of character move, add, delete, and display function. \$49.95/\$15.

## ZTEL

Z80 Text Editing Language - Not just a text editor. Actually a language which allows you to edit text and also write, save, and recall programs which manipulate text. Commands include conditional branching, subroutine calls, iteration, block move, expression evaluation, and much more. Contains 36 value registers and 10 text registers. Be creative! Manipulate text with commands you write using Ztel. \$79.95/\$25.

## TOP

A Z80 Text Output Processor which will do text formatting for manuals, documents, and other word processing jobs. Works with any text editor. Does justification, page numbering and headings, spacing, centering, and much more! \$79.95/\$25.

## MACRO I

A macro assembler which will generate relocatable or absolute code for the 8080 or Z80 using standard Intel mnemonics plus TDL/Z80 extensions. Functions include 14 conditionals, 16 listing controls, 54 pseudops, 11 arithmetic/logical operations, local and global symbols, chaining files, linking capability with optional linker, and recursive/reiterative macros. This assembler is so powerful you'll think it is doing all the work for you. It actually makes assembly language programming much less of an effort and more creative. \$79.95/\$20.

## MACRO II

Expands upon Macro I's linking capability (which is useful but somewhat limited) thereby being able to take full advantage of the optional Linker. Also a time and date function has been added and the listing capability improved. \$99.95/\$25.

## LINKER

How many times have you written the same subroutine in each new program? Top notch professional programmers compile a library of these subroutines and use a Linker to tie them together at assembly time. Development time is thus drastically reduced and becomes comparable to writing in a high level language but with all the speed of assembly language. So, get the new CDL Linker and start writing programs in a fraction of the time it took before. Linker is compatible with Macro I & II as well as TDL/Xitan assemblers version 2.0 or later. \$79.95/\$20.

## DEBUG I

Many programmers give up on writing in assembly language even though they know their programs would be faster and more powerful. To them assembly language seems difficult to understand and follow, as well as being a nightmare to debug. Well, not with proper tools like Debug I. With Debug I you can easily follow the flow of any Z80 or 8080 program. Trace the program one step at a time or 10 steps or whatever you like. At each step you will be able to see the instruction executed and what it did. If desired, modifications can then be made before continuing. It's all under your control. You can even skip displaying a subroutine call and up to seven breakpoints can be set during execution. Use of Debug I can pay for itself many times over by saving you valuable debugging time. \$79.95/\$20.

## DEBUG II

This is an expanded debugger which has all of the features of Debug I plus many more. You can "trap" (i.e. trace a program until a set of register, flag, and/or memory conditions occur). Also, instructions may be entered and executed immediately. This makes it easy to learn new instructions by examining registers/memory before and after. And a RADIX function allows changing between ASCII, binary, decimal, hex, octal, signed decimal, or split octal. All these features and more add up to give you a very powerful development tool. Both Debug I and II must run on a Z80 but will debug both Z80 and 8080 code. \$99.95/\$20.

## ZAPPLE

A Z80 executive and debug monitor. Capable of search, ASCII put and display, read and write to I/O ports, hex math, breakpoint, execute, move, fill, display, read and write in Intel or binary format tape, and more! on disk

## APPLE

8080 version of Zapple

## NEW! TPM now available for TRS-80 Model II!

### TPM\*

A NEW Z80 disk operation system! This is not CP/M\*. It's better! You can still run any program which runs with CP/M\* but unlike CP/M\* this operating system was written specifically for the Z80\* and takes full advantage of its extra powerful instruction set. In other words its not warmed over 8080 code! Available for TRS-80\* (Model I or II), Tarbell, Xitan DDDC, SD Sales "VERSAFLOPPY", North Star (SD&DD), and Digital (Micro) Systems. \$79.95/\$25.

## SYSTEM MONITOR BOARD (SMB II)

A complete I/O board for S-100 systems. 2 serial ports, 2 parallel ports, 1200/2400 baud cassette tape interface, sockets for 2K of RAM, 3-2708/2716 EPROM's or ROM, jump on reset circuitry. Bare board \$49.95/\$20.

## ROM FOR SMB II

2KX8 masked ROM of Zapple monitor. Includes source listing \$34.95/\$15.

## PAYROLL (source code only)

The Osborne package. Requires C Basic 2.  
5" disks \$124.95 (manual not included)  
8" disks \$ 99.95 (manual not included)  
Manual \$20.00

## ACCOUNTS PAYABLE/RECEIVABLE (source code only)

By Osborne. Requires C Basic 2  
5" disks \$124.95 (manual not included)  
8" \$99.95 (manual not included)  
Manual \$20.00

## GENERAL LEDGER (source code only)

By Osborne. Requires C Basic 2  
5" disks \$99.95 (manual not included)  
8" disks \$99.95 (manual not included)  
Manual \$20.00

## C BASIC 2

Required for Osborne software. \$99.95/\$20.

## SYSTEM/6

TPM with utilities, Basic I interpreter, Basic E compiler, Macro I assembler, Debug I debugger, and ZEDIT text editor.

Above purchased separately costs \$339.75

Special introductory offer: Only \$179.75 with coupon!!

# \$160.

This Coupon is Worth  
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This is a limited time offer.

## \$160.00

## ORDERING INFORMATION

Visa, Master Charge and C.O.D. O.K. To order call or write with the following information.

1. Name of Product (e.g. Macro I)
2. Media (e.g. 8" CP/M)
3. Price and method of payment (e.g. C.O.D.) include credit card info. if applicable.
4. Name, Address and Phone number.
5. For TPM orders only: Indicate if for TRS 80, Tarbell, Xitan DDDC, SD Sales (5¼" or 8"), ICOM (5¼" or 8"), North Star (single or double density) or Digital (Micro) Systems.
6. N.J. residents add 5% sales tax.

Manual cost applicable against price of subsequent software purchase in any item except for the Osborne software.

**For information and tech queries call**  
**609-599-2146**

**For phone orders ONLY call toll free**  
**1-800-327-9191**  
**Ext. 676**  
(Except Florida)

## OEMS

Many CDL products are available for licensing to OEMs. Write to Carl Galletti with your requirements.

- \* Z80 is a trademark of Zilog
  - \* TRS-80 is a trademark for Radio Shack
  - \* TPM is a trademark of Computer Design Labs. It is not CP/M\*
  - \* CP/M is a trademark of Digital Research
- Prices and specifications subject to change without notice.

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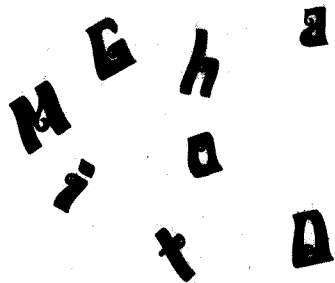
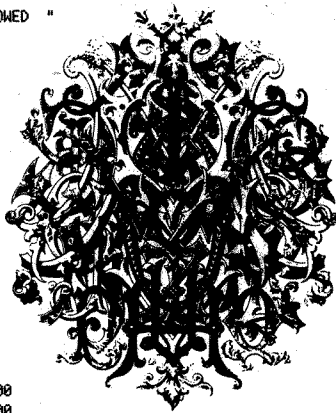
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CIRCLE 127 ON READER SERVICE CARD

```

2270 IF F(LP,LQ)=1 THEN 2300
2280 F(LP,LR)=1
2290 ON LP+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940, 3960, 3980
2300 NEXT LQ
2310 GOSUB 4040
2320 NEXT LP
2330 A$=""
2340 REM ELIMINATES CHALLENGED ENTRIES
2350 PP$="++" : PQ$="++C"
2360 A$=""
2370 PRINT @ 64, XX$;
2380 PRINT @ 64, "ENTER CHALLENGES, THEN XX";
2390 PRINT @ 90, " ";
2400 LINEINPUT A$
2410 PRINT @ 64, XX$;
2420 PRINT @ 99, " ";
2430 IF A$="XX" THEN 2600
2440 IF LEN(A$)<3 THEN 2400
2450 L=LEN(A$)-3
2460 FOR LP=0 TO WC(L)
2470 IF A$=W$(L,LP) THEN 2510
2480 NEXT
2490 PRINT @ 64, "CHALLENGED WORD NOT FOUND"
2500 GOTO 2390
2510 IF F(L,LP)=1 THEN 2580
2520 F(L,LP)=1
2530 LQ=LP
2540 LP=L
2550 ON L+1 GOSUB 3840, 3860, 3880, 3900, 3920, 3940, 3960, 3980
2560 PRINT @ 64, XX$;
2570 GOTO 2390
2580 PRINT @ 64, "ENTRY ALREADY DISALLOWED "
2590 GOTO 2390
2600 PRINT @ 64, XX$;
2610 FOR LP=0 TO 7
2620 WT(LP)=WT(LP)-WD(LP)
2630 NEXT
2640 REM SCORING
2650 IF WT(0)>0 THEN S=50+10*WT(0)
2660 IF WT(1)>0 THEN S=S+100+20*WT(1)
2670 IF WT(2)>0 THEN S=S+150+50*WT(2)
2680 IF WT(3)>0 THEN S=S+200+100*WT(3)
2690 IF WT(4)>0 THEN S=S+350+150*WT(4)
2700 IF WT(5)>0 THEN S=S+500+250*WT(5)
2710 IF WT(6)>0 THEN S=S+500+500*WT(6)
2720 IF WT(7)=1 THEN S=S+1500
2730 IF WT(7)=2 THEN S=S+3000
2740 IF WT(7)=3 THEN S=S+5000
2750 IF WT(7)=4 THEN S=S+7500
2760 IF WT(7)=5 THEN S=S+13000
2770 IF WT(0)=5 AND WT(1)=5 THEN S=S+300
2780 IF WT(1)=5 AND WT(2)=5 THEN S=S+500
2790 IF WT(2)=5 AND WT(3)=5 THEN S=S+800
2800 IF WT(3)=5 AND WT(4)=5 THEN S=S+1200
2810 IF WT(4)=5 AND WT(5)=5 THEN S=S+1850
2820 IF WT(5)=5 AND WT(6)=5 THEN S=S+2700
2830 IF V(P)=1 AND S<500 THEN S=-500
2840 PRINT @ 79, "SCORE FOR " I$(P) " FOR THIS ROUND:" S
2850 S1(P)=S
2860 S(P)=S(P)+S
2870 FOR LP=0 TO 1500 : NEXT
2880 CLS
2890 PRINT
2900 PRINT TAB(20) "TOTAL SCORE, ROUND" R
2910 PRINT
2920 PRINT "PLAYER", "LAST SCORE", "TOTAL SCORE", "VULNERABLE?"
2930 FOR LP=1 TO N
2940 PRINT I$(LP),
2950 PRINT USING " *****; S1(LP),
2960 PRINT USING " *****; S(LP),
2970 IF S(LP)>=2000 THEN PRINT " YES" ELSE PRINT " NO"
2980 IF S(LP)>=2000 THEN V(LP)=1 ELSE V(LP)=0
2990 IF S(LP)>=5000 THEN E=1
3000 NEXT
3010 PRINT : PRINT : PRINT
3020 IF E=1 AND P=N PRINT "GAME OVER AT CONCLUSION OF THIS ROUND"
3030 IF E=1 AND P=N THEN 3250
3040 P=P+1
3050 IF P=N+1 THEN R=R+1
3060 IF P=N+1 THEN P=1
3070 GOSUB 4050
3080 PRINT "STAND BY, PLEASE.";
3090 FOR LP=0 TO 7
3100 WT(LP)=0
3110 WC(LP)=0
3120 WD(LP)=0
3130 FOR LQ=0 TO 4
3140 W$(LP,LQ)=" "
3150 F(LP,LQ)=0
3160 NEXT LQ, LP
3170 LX$=""
3180 LY$=""
3190 S=0

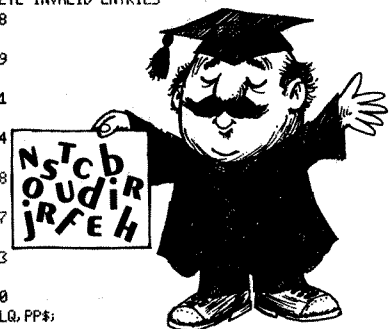
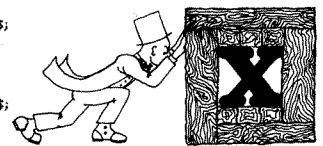
```



```

3200 W0$=""
3210 X1$=""
3220 S1=0
3230 A1$=""
3240 GOTO 1080
3250 PRINT "GAME NOW OVER"
3260 PRINT "TO PLAY AGAIN KEY A."
3270 Z$=INKEY$
3280 IF Z$="" THEN 3270
3290 IF Z$="A" THEN RUN
3300 END
3310 REM ROUTINE TO DELETE ENTRIES BY PLAYER
3320 A$=A1$
3330 GOTO 3350
3340 A$=RIGHT$(A$,LEN(A$)-2)
3350 PRINT @ 69, "DELETING "A$
3360 IF LEN(A$)<3 THEN 3430
3370 X1$=STRING$(LEN(A$), " ")
3380 L=LEN(A$)-3
3390 IF L>7 L=7
3400 FOR LP=0 TO WC(L)-1
3410 IF A$=W$(L,LP) THEN 3450
3420 NEXT
3430 PRINT @ 90, " NOT FOUND";
3440 GOTO 1480
3450 W$(L,LP)=" "
3460 W$(L,LP)=W$(L,WC(L)-1)
3470 W$(L,WC(L)-1)=" "
3480 W0$=W$(L,LP)
3490 ON L+1 GOTO 3500, 3540, 3580, 3620, 3660, 3700, 3740, 3780
3500 PRINT @ 325+64*LP, X1$;
3510 PRINT @ 325+64*LP, W0$;
3520 PRINT @ 325+64*(WC(L)-1), X1$;
3530 GOTO 3810
3540 PRINT @ 325+64*LP, X1$;
3550 PRINT @ 325+64*LP, W0$;
3560 PRINT @ 325+64*(WC(L)-1), X1$;
3570 GOTO 3810
3580 PRINT @ 346+64*LP, X1$;
3590 PRINT @ 346+64*LP, W0$;
3600 PRINT @ 346+64*(WC(L)-1), X1$;
3610 GOTO 3810
3620 PRINT @ 358+64*LP, X1$;
3630 PRINT @ 358+64*LP, W0$;
3640 PRINT @ 358+64*(WC(L)-1), X1$;
3650 GOTO 3810
3660 PRINT @ 371+64*LP, X1$;
3670 PRINT @ 371+64*LP, W0$;
3680 PRINT @ 371+64*(WC(L)-1), X1$;
3690 GOTO 3810
3700 PRINT @ 709+64*LP, X1$;
3710 PRINT @ 709+64*LP, W0$;
3720 PRINT @ 709+64*(WC(L)-1), X1$;
3730 GOTO 3810
3740 PRINT @ 724+64*LP, X1$;
3750 PRINT @ 724+64*LP, W0$;
3760 PRINT @ 724+64*(WC(L)-1), X1$;
3770 GOTO 3810
3780 PRINT @ 740+64*LP, X1$;
3790 PRINT @ 740+64*LP, W0$;
3800 PRINT @ 740+64*(WC(L)-1), STRING$(LEN(W0$), " ");
3810 WC(L)=WC(L)-1
3820 GOTO 1480
3830 REM S/R TO DELETE INVALID ENTRIES
3840 PP=323 : PQ=328
3850 GOTO 3990
3860 PP=333 : PQ=339
3870 GOTO 3990
3880 PP=344 : PQ=351
3890 GOTO 3990
3900 PP=356 : PQ=364
3910 GOTO 3990
3920 PP=369 : PQ=378
3930 GOTO 3990
3940 PP=707 : PQ=717
3950 GOTO 3990
3960 PP=722 : PQ=733
3970 GOTO 3990
3980 PP=738 : PQ=750
3990 PRINT @ PP+64*LQ, PP$;
4000 PRINT @ PQ+64*LQ, PQ$;
4010 WD(LP)=WD(LP)+1
4020 RETURN
4030 PRINT @ 108, CHR$(143); RETURN
4040 PRINT @ 108, " " : RETURN
4050 PRINT @ 896, "TO CONTINUE, PRESS ANY KEY.";
4060 FOR LP=0 TO 75: AA$=INKEY$: IF AA$="" THEN 4100 ELSE NEXT
4070 PRINT @ 896, XX$;
4080 FOR LP=0 TO 50: AA$=INKEY$: IF AA$="" THEN 4100 ELSE NEXT
4090 GOTO 4050
4100 CLS
4110 PRINT
4120 RETURN

```





# ACTION, STRATEGY, AND FANTASY for the **SERIOUS** games player

## Brain Games - 1 demands ingenuity.

Two players bombard radioactive material with protons and electrons until it reaches critical mass and sets up a **Nuclear Reaction**. **Dodgem** requires you to outmaneuver another player to get your pieces across the board first. **Dueling Digits** and **Parrot** challenges your ability to replicate number and letter sequences. **Tones** lets you make music with your Apple (16K) CS-4004 \$7.95. **Strategy Games** and **Brain Games** are on one disk (16K) CS-4503 \$14.95.

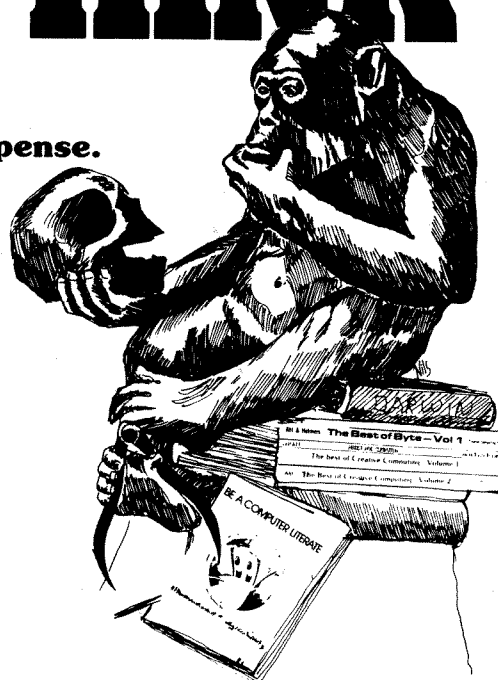
## Strategy Games - 1 keeps games players in suspense.

You and your opponent trail around the screen at a quickening pace attempting to trap each other in your **Blockade**. A 7 category quiz game will certify you as a **Genius** (or an errant knave!). Beginners will meet their master in **Checkers**. **Skunk** and **UFO** complete this classic collection (16K) CS-4003 \$7.95

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Find out how your life style effects your **Life Expectancy** or explore the effects of **Alcohol** on your behavior. **Sex Role** helps you to examine your behavior and attitudes in light of society's concept of sex roles. **Psychotherapy** compares your feelings, actions, and phobias to the population's norms and **Computer Literacy** tests your microcomputer savvy. A fun and instructional package (16K) CS-4301 \$7.95. **Know Yourself** and **CAI Programs** are on one disk (16K) CS-4503 for \$14.95

# THINK



# IMAGINE



## You're in command in **Space Games - 1**.

Maneuver the TIE fighters into your blaster sights and zap them with your lasers to save the rebel base camp from annihilation in **Star Wars**. **Rocket Pilot** is an advanced real time take off and landing game. High resolution graphics, exploding saucers and sound effects add to the suspense as you repel the **Saucer Invasion**. Finally, a bonus graphics demonstration, **Dynamic Bouncer** (16K) CS-4001 \$7.95. **Space Games** and **Sports Games** are on one disk (16K) CS-4501 for \$14.95

# ACTION

## **Sports Games - 1** puts you in the Apple World Series

Take the field in the **Great American Computer Game**. Mix up your pitches to keep the batter off balance. Move your fielders to snag the ball before he gets to first. Balls and strikes, double plays, force outs, and errors let you play with a realistic strategy. Also in the line up—**Slalom**, a championship downhill ski race, **Torpedo Alley**, and **Darts** (16K) CS-4002 \$7.95. **Space Games** and **Sports Games** are on one disk (16K) CS-4501 for \$14.95

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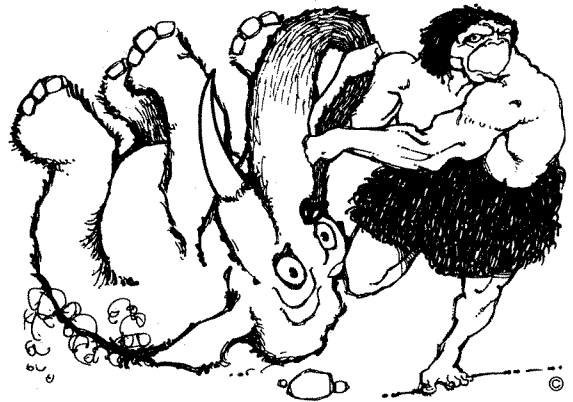
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# Bilingual Original Adventure

Betsy Staples



"You are standing at the end of a road before a small brick building. A small stream flows out of the building and down a gully."

So begins Bilingual Adventure, Creative Computing's version of Original Adventure. For those familiar with the Adventure series of games, the first move is obvious. For the benefit of those who have never played, however, a brief explanation is in order.

The object of the game is to find and escape with as many treasures as possible. Each move presents the player with a new situation, which may include a new treasure or peril, and always requires that a decision be made—even if it is only the choice of direction to be taken on the next move.

But, back to the beginning of the game: the first thing the player would want to do is have a look around inside the building, so he or she types a one or two word command and waits to see if the computer responds. If it does not, he must keep trying until he finds words which are included in the vocabulary of the program.

Entering a building is trivial, of course, but killing a dwarf may require some more taxing mental gymnastics. The game itself is quite absorbing and challenging even for one who has never been much of a game player.

Ancelme Roichel has added a new twist to the Creative Computing version of Original Adventure. The game, which is written in the Sam 76 language, may be played in either English or French.

When I first heard about this version of Adventure my reaction was one of enthusiasm on behalf of French speaking computer buffs. But I was skeptical about its value as a tool for foreign language teaching. It was with that attitude that I sat down to try the game for myself.

I played for a little while in English until I became accustomed to the logic and procedures required

in the game. Each proper command is met with an acknowledging phrase: "Roger," "OK," or "Done." If the player types in an incorrect or incomplete command, the program responds by repeating the command followed by "what?" ("Open what?") This is amusing the first time or two, but soon becomes tiresome, particularly since nothing that is typed in response is ever accepted.

It was not until I encountered "a vicious looking green snake" that I became curious about the French translation. I typed "French," waited about 15 seconds for the French description of my current location to appear on the screen, and discovered that the snake was an *affreux serpent*.

I also discovered to my surprise that my rusty French was adequate for deciphering most of the descriptions of the snake's surroundings. I was not, however, up to doing away with the snake *en Francais*, so I returned to English long enough to discover that "for ecological reasons, snakes can't be killed here."

Very shortly thereafter I became hopelessly lost in a maze and had to give up. I started over and decided to try the whole thing in French. Outside of the fact that I never could get out of the brick building, I found the experiment very rewarding.

As I went from one situation to another, I remembered the general descriptions and was able either to guess or remember the meanings of most of the French words. The real challenge was remembering enough vocabulary to give the appropriate commands

I had, for example a very difficult time putting down the treasures I was carrying. I tried "*rester*," "*mettre*," "*laisser*," "*deposer*," and several other verbs that my dictionary suggested. None worked. I switched to English.

On the other hand, once I had come up with the proper infinitive

form of the verb, I found that Adventure was not fussy about the conjugation thereof. It would respond to the first person singular (*je prends*) as well as the second person plural (*prenez*) or the infinitive (*prendre*).

Is it a good way to learn French? Probably not if one is starting from scratch. As a vehicle for practicing the language, however, it seems superb.

Obviously, the student is limited by the vocabulary used in the game, but that is sizable and far from elementary. Much more important is the mental exercise the player gets trying to think of alternate ways to express the same thought. If "put out lamp" fails, for example, he can try "unlight lamp" or "extinguish lamp."

This ability to re-cast a sentence or thought in words and constructions that are familiar is one of the keys to successful foreign language learning. This is a skill that gets a workout even when the game is played in English, and the French version provides even better practice.

When I mentioned Adventure to a member of our editorial staff, he expressed impatience with the procedure of trying to guess the vocabulary recognized by the program. He would prefer, he said, a menu or listing of the vocabulary available. This approach, I believe, would eliminate some of the fun and a large part of the educational value of the game. When speaking to someone in a foreign country, it is frequently necessary to rephrase one's question or idea several times before the other person understands.

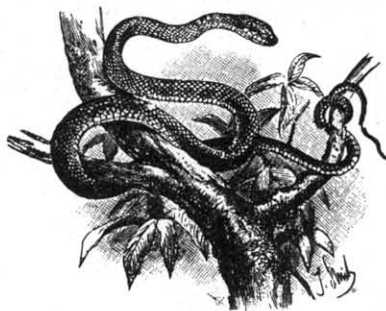
One of the most difficult aspects of foreign language teaching is motivating students to learn. There is, after all, a limit to the amount of excitement that can be generated using a 500-word vocabulary, and each addition to the list seems to require a painful round of drills and quizzes.

## Bilingual, cont'd...

After only a brief sojourn in the subterranean world of Bilingual Adventure, I had increased my French vocabulary by eight or ten words (including *affreux*), so I am sure that a persistent student with access to the game over a long period of time could learn quite a bit. There is nothing like being threatened by a knife-wielding dwarf to inspire you either to recall or discover the word for "kill"!

Motivation is desirable, but frustration is not, and not being able to understand or extricate oneself from a situation in a foreign language could be frustrating. This is not a problem with Bilingual Adventure. The ability to change from one language to the other makes it possible to bridge a gap in vocabulary and continue with the adventure. (As I mentioned above, even with the help of a dictionary, I never did discover the French command that would allow me to leave the brick house.)

Since the transition is not accomplished instantaneously, the player is not tempted to switch back and forth frequently. It is much quicker to



consult a dictionary than it is to shift to English and then back to French to find the meaning of a word. However, if the whole description is unclear, or all attempts to find an acceptable command have failed, it is very comforting to know that a translation is only 15 seconds away.

The instruction sheet that comes with the disk warns that the material is "PG Rated," and suggests some steps to take "if bawdy material of an erotic nature offends you or your controller." However, in over 12 hours of play, I failed to notice anything that could be considered offensive—with the possible excep-

tion of the dispatch of numerous dwarves, which might offend those who are bothered by violence.

The instruction sheet also provides directions for saving a game: "preserve" allows you to save the game as it stands and continue later." Unfortunately, it does not tell how to recall the game after it has been saved.

With the exception, then, of the few annoyances I have mentioned—most of which do no more than slow the game—my evaluation of Bilingual Adventure is positive. I think it can be used very effectively in a classroom or tutorial situation for practice and reinforcement of vocabulary and reading skills. And if you get tired of self-improvement, you can always just play it for fun—it should be good for many, many hours of diversion even if you don't know French. □

Bilingual Original Adventure is available on 8" CP/M floppy disk (CS-9004) for \$24.95. It runs in a 32K system or, to use the save game feature, 48K. A TRS-80 version will be available in June. Write Creative Computing Software, P.O. Box 789-M, Morristown, NJ 07960.

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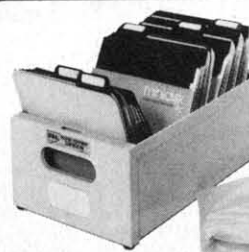
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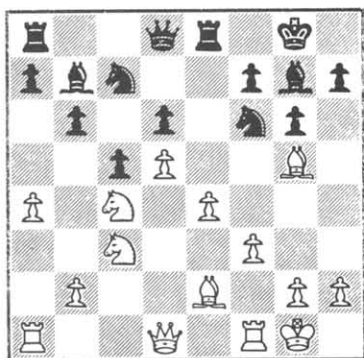
"Little Brother" to the rugged Flexi-Matic. Holds 50 mini-diskettes. Three supporting metal tilt plates, adjustable in increments of 1". Five index/dividers plus clear vinyl dust cover. Will cross-file in standard letter-size file drawer. Locking steel hood optional.



# The 1980 North American Computer Chess Championship

This event is the Indy 500 of the computer industry.  
Theodore H. Ehara

CHES 4.9 from Northwestern University, won the North American Computer Chess Championship (NACCC) after drawing BELLE from Bell Laboratories, in the last round battle (see Figure 1). BELLE, who was



GAME 1  
CHES 4.9 - BELLE

1. P-Q4, N-KB3
2. P-QB4, P-B4
3. P-Q5, P-K3
4. N-QB3, PXP
5. PXP, P-Q3
6. P-K4, P-KN3
7. N-KB3, B-N2
8. B-K2, O-O
9. O-O, R-K1
10. N-Q2, N-R3
11. P-B3, N-B2
12. P-QR4, P-QN3
13. N-QB4, B-QR3
14. B-Kn5, P-R3
15. B-R4, P-KN4
16. B-B2, N-R4
17. N-K3, B-B1
18. Q-B2, N-B5
19. B-B4, B-Q2
20. KR-Q1, Q-B3
21. B-N3, N-R4
22. B-K1, N-B5
23. K-R1, P-R3
24. B-N3, P-N4
25. PXP, PXP
26. RXR, RXR
27. B-B1, P-QN5
28. N-K2, P-N6
29. Q-N1, N-R4
30. B-B2, N-B5
31. N-B4, NNN
32. BNN, B-N4
33. B-N3, R-R5
34. Q-B1, B-B1
35. R-Q2, Q-Q1
36. Q-B1, P-R4
37. K-N1, P-R5
38. B-B2, B-N2
39. N-K3, BXB
40. QXB, R-R8+
41. R-Q1, R-R7
42. Q-Q3, RXP
43. N-B4, R-QB7
44. P-K5, BXP
45. NXB, PNN
46. QXQNP, R-K7
47. K-B1, P-B5
48. Q-N7, R-R7
49. B-N6, P-R6
50. QNN, Q-B3
51. Q-Q8+, QXQ
52. BXX, RXP
53. R-K1, P-B6
54. RXP, P-B7
55. R-K8+, K-N7
56. BXP, RXB
57. R-QB8, R-N7
58. P-Q6, RXP
59. P-Q7, R-Q7
60. K-N1, RXP
61. RXP, R-Q3
62. R-B2, K-B3
63. K-R2, draw

FIGURE 1



defending champion, had drawn earlier with CHAOS in the second round of the tournament. This gave BELLE a final score of three against CHES 4.9's score of three and a half, out of four possible points.

A highlight of this tournament was an exhibition game given by CHES 4.9. In response to a theoretical argument as to whether a strong chess player could defeat a weaker player who was aided by a strong program, CHES 4.9 and its programmer, David Slate (expert) played David Levy (International Master). Playing the Bird's Opening, Slate and CHES 4.9 lost the game after fifty moves (see Figure 2).

This event, which is held by the American Computing Machinery in their annual convention, has been compared to the Indy 500 for the computer industry. While the same



Left to Right: Joe Condon, David Slate, Larry Atkin and Ken Thompson in the CHES 4.9 - BELLE game. Joe Condon and David Slate study the position, while Larry Atkin and Ken Thompson await BELLE's reply.

Crosstable of the North American Computer Chess Championship

| Crosstable of the North American Computer Chess Championship |      |      |     |     |     |     |       |
|--------------------------------------------------------------|------|------|-----|-----|-----|-----|-------|
| Program                                                      | rate | perf | 1   | 2   | 3   | 4   | total |
| 1 CHES 4.9                                                   | 2040 | 2099 | 8W  | 9W  | 3W  | 2D  | 3+    |
| 2 BELLE                                                      | 1950 | 1982 | 5W  | 4D  | 7W  | 1D  | 3     |
| 3 DUCHESS                                                    | 1889 | 1942 | 10W | 7W  | 1L  | 4W  | 3     |
| 4 CHAOS                                                      | 1775 | 1794 | 12W | 2D  | 9W  | 3L  | 2+    |
| 5 L'EXCENTRIQUE                                              | 0    | 1640 | 2L  | 12W | 8W  | 6D  | 2+    |
| 6 MYCHESS                                                    | 0    | 1552 | 7L  | 10W | 11W | 5D  | 2+    |
| 7 SARGON 3                                                   | 0    | 1614 | 6W  | 3L  | 2L  | 9D  | 1+    |
| 8 OSTRICH 80                                                 | 1450 | 1374 | 1L  | 11W | 5L  | 10D | 1+    |
| 9 BLITZ 6.9                                                  | 0    | 1516 | 11W | 1L  | 4L  | 7D  | 1+    |
| 10 AWIT                                                      | 1325 | 1314 | 3L  | 6L  | 12W | 8D  | 1+    |
| 11 BS '66 '76                                                | 0    | 1045 | 9L  | 8L  | 6L  | 12W | 1     |
| 12 RUFUS                                                     | 0    | 644  | 4L  | 5L  | 10L | 11L | 0     |

Example of how to read this crosstable:

L'EXCENTRIQUE wasn't rated before this tournament, but had a performance, in the tournament, of 1640. It lost its first round game against BELLE, then won its next two games against RUFUS and OSTRICH 80. In the final round it drew its game with MYCHESS, for a final result of 2+ (2.5). A win counts as a point, a draw counts as half a point.

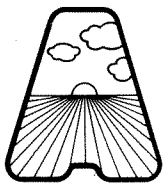
# A New Type of Game



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The original computer version of Adventure was written by Willie Crowther and Don Woods in Fortran on a PDP-10 at MIT. In this version the player starts near a small wellhouse. Upon entering the house, he finds food, water, a set of keys and a lamp. Armed with only these items, he must set out to explore the countryside in search of treasure and other objects of play. He must also confront dwarfs, snakes, trolls, bears, dragons, birds, and other creatures during his quest. The game accepts one-or two-word commands such as GET LAMP\* SOUTH\* or KILL DWARF. Of course, if you don't have the proper tool to carry out an action, or if you do something foolish, you may find yourself in big trouble.

In playing the game you wander thru various 'rooms' (locations), manipulating the objects there to try to find 'treasures'. You may have to defeat an exotic wild animal to get one treasure, or figure out how to get another treasure out of a quicksand bog. You communicate thru two-word commands such as 'go west', 'climb tree', 'throw axe', 'look around'.



## Adventure

For Apple, TRS-80, Sorcerer, PET, CP/M

**ORIGINAL ADVENTURE** (by Crowther, Woods, Manning and Roichel) - Somewhere nearby is a colossal cave where others have found fortunes in treasures and gold, but some who have entered have never been seen again. You start at a small brick building which is the wellhouse for a large spring. You must try to find your way into the underground caverns where you'll meet a giant clam, nasty little dwarves, and much more. **This Adventure is Bi-Lingual**—you may play in either **English or French**—a language learning tool beyond comparison. Runs in 32K CP/M system (48K required for SAVE GAME feature). Even includes SAM76 language in which to run the game. The troll says "Good Luck."

**PIRATE ADVENTURE** (by Scott Adams) - "Yo Ho Ho and a bottle of rum..." You'll meet up with the pirate and his daffy bird along with many strange sights as you attempt to go from your London flat to Treasure Island. Can you recover LONG JOHN SILVER's lost treasures? Happy sailing matey.....

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**THE COUNT** (by Scott Adams) - You wake up in a large brass bed in a castle somewhere in Transylvania. Who are you, what are you doing here, and **WHY** did the postman deliver a bottle of blood? You'll love this Adventure, in fact, you might say it's **LOVE AT FIRST BITE**.....

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## Championship, cont'd...

elements of man and machine exist in both events, the battle of ideas seems to overflow in the NACCC. Not only have programmers taken different approaches to their use of hardware and programming, but their research in improving the chess playing program strikes at the very core of problems facing the developers of artificial intelligence.

A good example of the diversity of thought at the NACCC is shown through the answers given by two programmers in separate interviews. Answering similar questions, David Kittinger and Ken Thompson display their personal understanding of "where we are" and "where we should go" to improve the electronic chess player.

Ken Thompson, along with Joe Condon, has developed and refined BELLE for the last ten years. It is run on a PDP 11/70 with a special move generation hardware (100 K words; 16 bits; 800,000 inst/sec). BELLE plays about expert level and is written in C



David Levy points to a demonstration board and comments to the audience while the programmers await their machines' move.

and assembly language. It requires 16K for the program and 1K for the tree search. BELLE has a book of 200,000 opening positions, along with special end-game databases that are also incorporated into the program.

Participating in its first ACM tournament, David Kittinger took MYCHESS to the Paul Masson tournament and in unofficial competition achieved a performance of a "C" player. MYCHESS runs on a Cromeco Z-2D (64K; 8 bits; 600,000 inst/sec) and was one of three micro-computers in the field of twelve contestants. The program is written in Z-80 assembly language and requires 19K bytes. MYCHESS has a small book of 3,000 opening positions and searches 9,000 positions in every move.

CC: Do you, yourself play chess?

DK: Yes. I'm about a 1900 (class A) rated player, which helps.

KT: No . . . (being a chess player) wouldn't help or hinder programming a chess program. It would be just a waste of time.

CC: What do you think of the micro-computers, compared to the big machines?

DK: These micros, you're talking about a 1/2000 or so computing speed and yet their level of skill is certainly higher than 1/2000. They play a very capable game.

KT: I don't think micros are fast enough to compete. Right now the name of the game is horsepower. Micros just have to get a lot faster before they compete well, or some programming revelation will have to occur that I don't foresee.

CC: What are your thoughts about the evaluator function (evaluating positional advantages) in micros?

KT: It doesn't buy it. They'll (micros) lose the game. You know you'll have a very, very pretty position and the other opponent will cut your throat. It only takes one mistake to lose — totally. You can build up a good position, but at some point you've got to win and while you're building up, you can't lose. There are a lot of moves in tactics that will lose a game instantly. Look at SARGON (talking

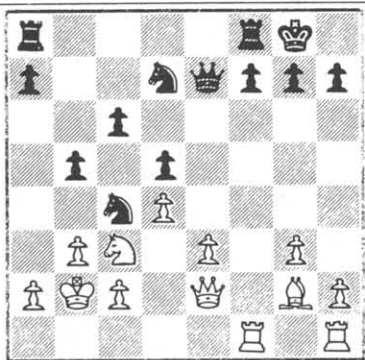
about the recent SARGON-BELLE game, see Figure 3). They had a totally won game and made one move that was overwhelmed by tactics.

DT: (Discussing the SARGON-BELLE game) SARGON came close to winning it, indicating that a direction to pursue in these chess computer games is the evaluator function. That's overlooked. Between their program and my program, I think we have the best evaluator tied in with a full width search of any program. 4.9 also has a good evaluator, I understand, although they cut a lot of it out, going for speed, because they think extra plys means better chess — maybe they're right — SARGON should have beaten BELLE last night. It came very close. In fact they had a draw by repetition in the bag, but because SARGON was even it tried to avoid the draw. But it had a draw against BELLE, which won this tournament last year.

It must be noted that Ken Thompson intends to improve his hardware by building a parallel machine. ("Something the size of a suitcase.") This machine should speed BELLE up by a factor of 100. Thompson estimates it will add 2-3 plys more to BELLE's search and added, "That's a jump in hardware of about twenty years." He hopes to complete the machine for the 1981 NACCC.



Levy discussing his game with the audience following its completion.



GAME 2

CHESS 4.9 + Slate vs. Levy

- |                 |                  |
|-----------------|------------------|
| 1. P-KB4, P-Q4  | 26. K-K2, R-N7   |
| 2. N-KB3, N-KB3 | 27. Q-Q2, R×RP   |
| 3. P-K3, B-N5   | 28. R-QN1, Q-K2  |
| 4. P-QN3, QN-Q2 | 29. R-R1, Q-K5   |
| 5. B-N2, P-QB3  | 30. KR-QB1, R×R  |
| 6. B-K2, B×N    | 31. R×R, Q-N7+   |
| 7. B×B, Q-B2    | 32. K-Q1, Q-R8+  |
| 8. N-B3, P-K4   | 33. Q-K1, Q-N2   |
| 9. P×P, N×P     | 34. K-K2, R-N1   |
| 10. Q-K2, B-Q3  | 35. R-R4, R-B1   |
| 11. P-N3, Q-K2  | 36. R-R5, Q-K5   |
| 12. O-O-O, O-O  | 37. R×P, Q×BP+   |
| 13. B-N2, B-R6  | 38. Q-Q2, Q-K5   |
| 14. K-N1, B×B   | 39. Q-K1, P-B6   |
| 15. K×B, P-QN4  | 40. K-B2, P-R4   |
| 16. QR-KB1,     | 41. R-R5, P-R5   |
| KN-Q2           | 42. R-R1, P-R6   |
| 17. P-Q4, N-B5+ | 43. Q-R1, Q-B7+  |
| 18. P×N, Q-N5+  | 44. K-B3, R-B3   |
| 19. K-B1, Q×N   | 45. Q-QN1, R-B3+ |
| 20. P×NP, P×P   | 46. K-N4, Q-K2+  |
| 21. B×P, N-N3   | 47. K-R4, R-R3+  |
| 22. B-N3, N-B5  | 48. K-N5, Q-R4+  |
| 23. B×N, P×B    | 49. K-B4, R-B3+  |
| 24. Q-K1, Q-R6+ | 50. K-K4,        |
| 25. K-Q2, QR-N1 | Q-B4 mate        |

FIGURE 2

BELLE also has a micro-version, run on a LSI-11. Unlike SARGON or MYCHESS, Thompson is not selling the program commercially. This little BELLE had beaten an earlier version of SARGON. When asked if Thompson had ever thought of entering the little BELLE into a micro-tournament, his reply was short and to the point. "No. It's much too strong."



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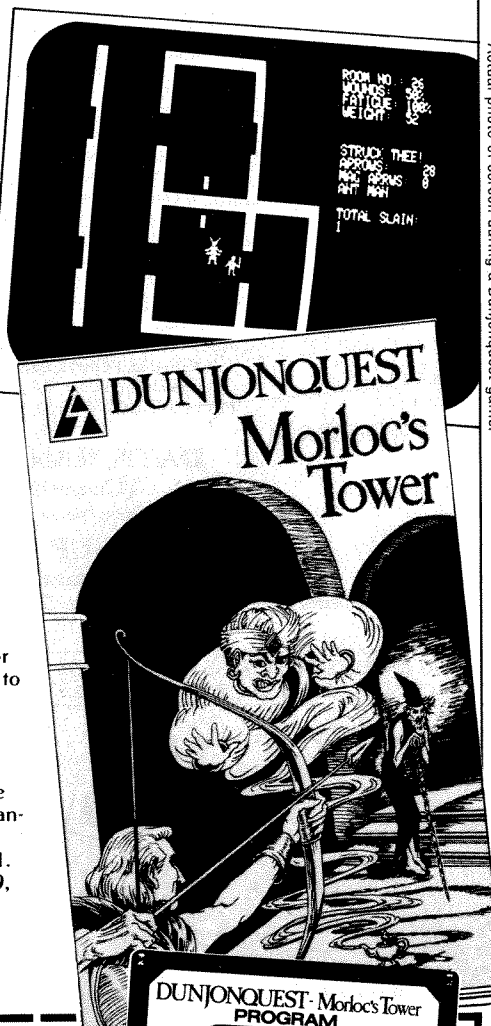
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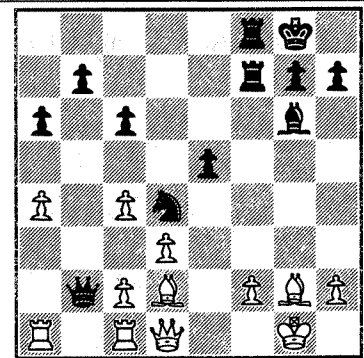
Actual photo of screen during a Dunjonquest game.

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- |                  |                 |
|------------------|-----------------|
| 1. N-QB3, P-Q4   | 35. B-Q2, Q-N7  |
| 2. P-K4, N-KB3   | 36. QR-N1, Q-R7 |
| 3. PXP, NXP      | 37. R-R1, Q-N7  |
| 4. NXN, QXN      | 38. B-K3, R-K2  |
| 5. N-K2, N-B3    | 39. QR-N1, Q-R6 |
| 6. P-Q3, P-K4    | 40. R-R1, Q-B6  |
| 7. N-B3, B-QN5   | 41. B-Q2, Q-N7  |
| 8. B-Q2, BxN     | 42. QR-N1, Q-R7 |
| 9. PxB, B-B4     | 43. B-N4, KR-B2 |
| 10. P-QB4, Q-Q5  | 44. R-R1, Q-N7  |
| 11. B-K3, Q-B3+  | 45. QR-N1, Q-R7 |
| 12. B-Q2, Q-R6   | 46. BxR, RxB    |
| 13. P-N4, B-Q2   | 47. R-R1, Q-N7  |
| 14. B-N2, O-O    | 48. K-B1, R-KB2 |
| 15. O-O, P-B4    | 49. QR-N1, Q-R7 |
| 16. Q-N1, QR-N1  | 50. Q-K1, NXP   |
| 17. PXP, BXP     | 51. QXP, BXP+   |
| 18. Q-N5, P-QR3  | 52. K-N1, Q-R6  |
| 19. Q-Q5+, R-B2  | 53. Q-N8+, R-B1 |
| 20. KR-N1, R-Q8  | 54. QXP, N-Q5   |
| 21. Q-B3, N-Q5   | 55. R-R1, Q-B4  |
| 22. Q-Q1, P-B3   | 56. R-Q1, BXP   |
| 23. B-N5, QR-KB1 | 57. K-N1, B-Q4  |
| 24. B-K3, Q-B6   | 58. BxB, QxB+   |
| 25. R-B1, Q-N2   | 59. K-N1, N-K7+ |
| 26. P-QR4, B-N3  | 60. K-B1, Q-B6  |
| 27. QR-N1, Q-R3  | 61. K-K1, QXP   |
| 28. R-R1, Q-B6   | 62. K-Q2, R-Q1+ |
| 29. B-Q2, Q-N7   | 63. K-B2, N-Q5+ |
| 30. QR-N1, Q-R7  | 64. K-Q3, N-N4+ |
| 31. QR-Q-N7      | 65. Q-Q7, RxQ+  |
| 32. B-K3, K-R1   | 66. K-B4, Q-B7+ |
| 33. QR-N1, Q-R3  | 67. K-N4,       |
| 34. R-R1, Q-B6   | Q-B3 mate       |

FIGURE 3

When asked if CHESS 4.9 would pursue advances in speed along with BELLE, David Slate replied, "No. We really aren't into the hardware business." In addition, the most interesting member of the Northwestern team didn't show up at the tournament — CHESS 5.0. CHESS 5.0 is a complete rewrite of the program. It wasn't entered in the 1980 NACCC because they were still getting the bugs out of it. Instead of assembly language, CHESS 5.0 is written in Fortran. According to Slate, it is playing master-level chess.

If all these different ways of improving chess programs seem confusing, things might clear up a little, probably after the 1981 North American Computer Chess Championship.



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by Douglas Carlston

Trade your way to a fortune in a three dimensional universe. You must barter, deal with the energy cartel and watch for spies. This is truly an outstanding computer game by the author of "Galactic Empire." \$14.95

Also available "Galactic Empire" for \$14.95

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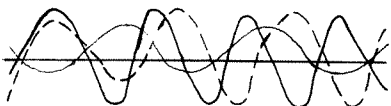
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# Interview with Gordon Bell

**David Ahl**



At Brown University Symposium (L to R) Kent Curtis (NSF), Gordon Bell (DEC), Peter Denning (Purdue Univ.)

*Dr. Gordon Bell is Vice President of Engineering of Digital Equipment Corporation, the world's largest manufacturer of minicomputers. He was previously a Professor of Computer Science at Carnegie-Mellon University. Publisher David Ahl, an alumnus of both Carnegie-Mellon and DEC, talked to Gordon following his presentation at Brown University. Here are some excerpts from their conversation.*

**Dave:** In contrast to some people in the educational community, you seem to feel that computer research can be done at places other than universities and posed a couple of alternatives giving the Japanese example; do you think you could get any agreement on that? Also, where should it be done?

**Gordon:** Need certainly plays a big part. Research is sometimes done by accident and sometimes with planning. In the meantime, one recognizes that, essentially, a flow of ideas is needed to make a product. But we sometimes have problems and we don't see immediate solutions and one can't be developed; we do research based on meaning.

**Dave:** For example, do you think the Japanese system, where government doesn't fund any kind of research except by pumping money into companies, works better?

**Gordon:** They find out about a lot of research through the industry and industry puts the money back in, but I don't know whether they control on that basis. I would certainly like some similar controls because that would solve the basic problem of flow. If you've got ideas the biggest problem is how to develop and research them. Getting it to move out of this environ-

ment is virtually impossible. An idea may sit there for years. They sit there and will never be resolved. I really believe in a healthy buyer-seller relationship. There are people who have some research needs and so people do that because there is a need.

**Dave:** Which generally doesn't exist in the university?

**Gordon:** Certainly NSF is not oriented that way; you are writing for a group of peers. It has no other purpose than to have a by-product with which to educate the faculty so they can teach and to generally get some more knowledge in the field, which is fine. It's a self-perpetuating community.

**Dave:** You also said that you didn't feel we need any more language compilers or typesetting systems but gave a couple of examples of business and the arts being more productive areas for new applications. Specifically, what do you think are areas where young people can concentrate and have some expectation of payoff if they want to do something interesting in computer science. Should it be done through a company or should they work on their own with a microcomputer. Where are the greatest opportunities for significant achievement?

**Gordon:** In the whole application, pick an area and do work in that area. Some of them aren't going to materialize for awhile but, for example, the use of data bases for tracing historical ideas and doing fundamental concept analysis will ultimately exist, but it will be rough going for a time. I think large data bases will trigger a lot of ideas in themselves.

**Dave:** What kind of data bases and how would people get access to them?

**Gordon:** I think personal data bases will be developed and used as tools. For example, right now we are

building a computer museum and there are already a couple of programs; one that keeps track of everything in the museum, whether a manual or a part, or whether there is a manual for a part, whether there is a photograph of a part or a negative attached to that; just keeping track of those kinds of things. That was a natural thing that we needed. Also, a program to lead one through the museum; those kinds of things. There is some fairly interesting work being done now in computer graphics and computer art. Those are all possibilities. I don't know what the opportunities are in the language area, but there are new ideas that say maybe we can do reasonable machine-aided translation. We would like to see a machine-aided translation aid, say for translating technical manuals. That's a really clear kind of application because the manuals are typically very sterile and you can have quite a stylized description particularly in describing how a piece of software works.

**Dave:** Our main criticism of most manuals is that they are just not clear enough.

## I think large data bases will trigger a lot of ideas in themselves.

**Gordon:** This actually might help. You could write them in a more stylized form. I'm trying to push to use the 500 word basic language. It is a language which deals with a fairly small vocabulary; the theory is that it would be easier from which to translate — either mechanically or by human endeavor, from one natural language to another language. People get too hung up on vocabulary or syntax vs. context; that's why I need a wide vocabulary to express my thoughts.

## Bell, cont'd...

**Dave:** I spoke to Dick Neisser recently, in the Artificial Intelligence field, and, after being involved in doing language translation and dealing with many failures, his strong feeling is that a computer will never be able to translate language because it doesn't have the same cultural heritage to provide the context in which thoughts and sentences are expressed; that without understanding the context, it couldn't really translate.

**Gordon:** That's right. If you try the general problem it can't do general language translation.

**Dave:** But by translating text books or manuals you provide the context.

**Gordon:** Yes, an extremely well defined context. Also remember that I said "machine-aided," not machine translation. Just getting 90% of the thing out and then cleaning it up may be the right way to do it.

**Dave:** Just prior to the time I left DEC in 1974 I remember Ken Olsen (president of DEC) saying that he couldn't see any need or any use for a computer in someone's home and, as I recall, at the time you took some issue with that. Then he repeated it several years later at the World Future Society meeting in Boston and some people in the audience took issue with that. How does he feel today?

**Gordon:** We have a word processing terminal at home, and it also runs the payroll and the accounts payable. I've had a terminal at home for at least ten years, probably more. Right now we do a lot of word processing, a little computing for accounts payable but fundamentally the real computing is somewhere else. We use it 10 to 20% of the time as a terminal to the electronic mail system. Ken also has a terminal at home. I personally wouldn't recommend anything other than a terminal for home because microcomputers aren't big enough. Right now I don't think I want a home computer because I have always used a big computer and why should I live with a little computer when I can have access to a big computer?

**Dave:** Are there any projects on the horizon at DEC that push down into the real micro area besides the LSI-11?

**Gordon:** We just announced an 11-23. It's a little cheaper than the current LSI-11. We are gradually getting into that area. We don't want to give up this main base that we have at the current price level. Lots of the machines do end up in the home like that.

**Dave:** What's a useful thing for younger children, say 6th, 7th and 8th grade to do with computers other than play games and write games and have fun with them.

**Gwen:** Edit their papers. Writing and rewriting by hand is really difficult for a kid.

**Gordon:** With a computer, they can do a real quality job. Maybe the best thing that happens is you get kids into thinking rapidly.

**Dave:** I see text editing probably affecting the biggest base of the population.



The Brown Symposium, "Bridging the Gap Between Theory and Practice" brought together Gordon Bell and Don Knuth.

**Gordon:** For younger children I think, voice, music and graphics I/O are probably the only things that are going to attract them. Games may be attractive but I think it is really important for all children to learn about programming. I think, from a computer design standpoint, it means we've got to have attractive enough transducers so they find out that it is worth them getting on so they can get some reasonable output. We've gone through the high school era where essentially students had no reward for writing a program, because they didn't get anything back. They would write a program to play blackjack, but blackjack isn't that much fun. Usually it was on a teletype and that's not much fun either. We have a daughter who would like to learn to program; she's a musician and if we had good transducers on the machines I think she'd go on immediately. We're not very far away from having that rich environment where there is a reward to have it do something.

**Dave:** We've been working recently with the ALF music boards for the Apple. It gives you a regular staff of music. You put the note where you want it with your paddle control. Then press the button and you can program up to six parts and play them backward, forward and upside down and experiment anyway you want. You can really relate to that. □

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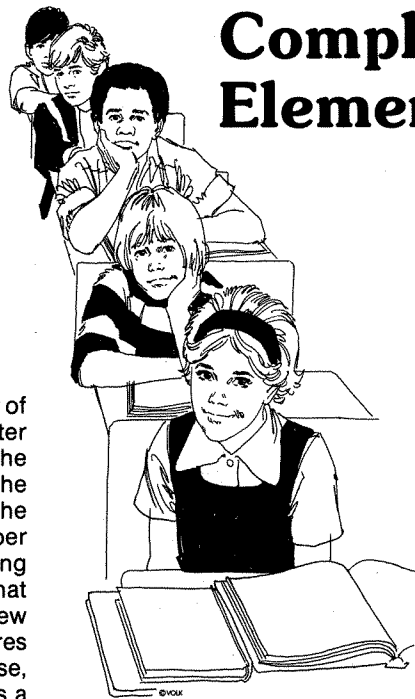
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# Complexity Theory and Elementary Mathematics

Kenneth Sipser, Ph.D.  
and  
Michael Sipser, Ph.D.



In a very general way, the theory of complexity as it refers to computer technology, deals with determining the extent of the equipment needed for the completion of a specified task. In the process, it seeks to reduce the number of components through developing greater efficiency amongst those that are in a system, and by producing new designs for expediting procedures within systems. In another sense, complexity theory can be viewed as a means of examining the time required to accomplish a specified task. Not only is the issue of determining the complexity of a problem of significant theoretical interest, but it is also of substantial practical value since, if an efficient algorithm can be brought to bear on the solution of a problem, then the running time required for problems containing large numbers of cases might be significantly shorter.

Interestingly, in certain problems, the time required for solution is directly related to the number of multiplications required. We assume that the basic computer arithmetic operation is addition, requiring, for all intents and purposes, insignificant processing time. Multiplication, on the other hand, based on multiple additions generally requires time which is substantially greater than that of addition. Thus, if a problem containing a number of multiplications is reduced by one or more of them, even at the cost of several additions, the solution method has been made more efficient.

In order to demonstrate this point, suppose we examine the elementary problem of finding the coefficients of the polynomial resulting from the multiplication of the two binomials, say,  $5X + 3$  and  $2X + 1$ . Our usual procedure would require four multiplications as follows:

$$\begin{array}{r} 5X + 3 \\ 2X + 1 \\ \hline 10X^2 + 6X \\ \quad + 5X + 3 \\ \hline 10X^2 + 11X + 3 \end{array}$$

Can the coefficients of the product polynomial be found in three multiplications? Surprising as it may seem, the answer is yes! First, add the coefficient and constant term of the first binomial  $5 + 3 = 8$ , and of the second  $2 + 1 = 3$ . Find the product of these sums  $8 \times 3 = 24$ . That's one multiplication. Multiply

**Complexity theory can be viewed as a means of examining the time required to accomplish a specific task.**

the coefficients of the  $X$  terms  $5 \times 2 = 10$ , and of the constant terms  $3 \times 1 = 3$ . That takes care of 3 multiplications. The last two products obviously provide us with the coefficients of the  $X^2$  and constant terms, respectively. The sum of the last two products  $10 + 3 = 13$ , subtracted from the product of the sums  $8 \times 3 = 24$  yields the coefficient of the  $X$  term. Algebraically, given  $AX + B$  and  $CX + D$ , let  $S_1 = A + B$  and  $S_2 = C + D$  represent the respective sums of  $A$  and  $B$ , and  $C$  and  $D$ . The product of these sums  $S_1 S_2 = AC + AD + BC + BD$ . This is one multiplication.  $A \times C = AC$  and  $B \times D = BD$  produce the coefficients of the  $X^2$  and constant terms, respectively. The differences  $S_1 S_2 - (AC + BD)$  produces the coefficient of the  $X$  term.

While we may reduce the number of multiplications required for finding the product of two polynomials from 4 to 3, a much more dramatic reduction may be made in the number of multiplications for the product of two matrices.

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} AE + BG & AF + BH \\ CE + DG & CF + DH \end{pmatrix}$$

The product of two  $2 \times 2$  matrices, employing the usual rules of the inner product for matrix multiplication requires eight multiplications. As the order of the matrices increases, the number of multiplications rises cubically so that two  $3 \times 3$ 's require 27 multiplications, two  $4 \times 4$ 's, 64 multiplications. A remarkable property of matrix multiplication is that the product of two  $2n \times 2n$  matrices can be carried out by partitioning each of the matrices into four  $n \times n$  matrices, calculating their respective inner products, and using these in the resulting  $2 \times 2$  matrix multiplication

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} AE + BG & AF + BH \\ CE + DG & CF + DH \end{pmatrix}$$

where the  $A, B, \dots$  are square matrix partitions of the original matrices. A reduction in the number of multiplications in the  $2 \times 2$ 's by even one would therefore be significant, not so much for the saving represented by 7 multiplications over 8, but by the increasing difference developed as the order of the matrices increases. For example, in the case of the  $4 \times 4$ 's this procedure yields  $7^2$  or 49 multiplications whereas it would ordinarily require  $4^3$  or 64 multiplications.

**The Bridges of Koenigsberg is an old and famous problem which because of its simplicity has an appeal for students at all levels.**

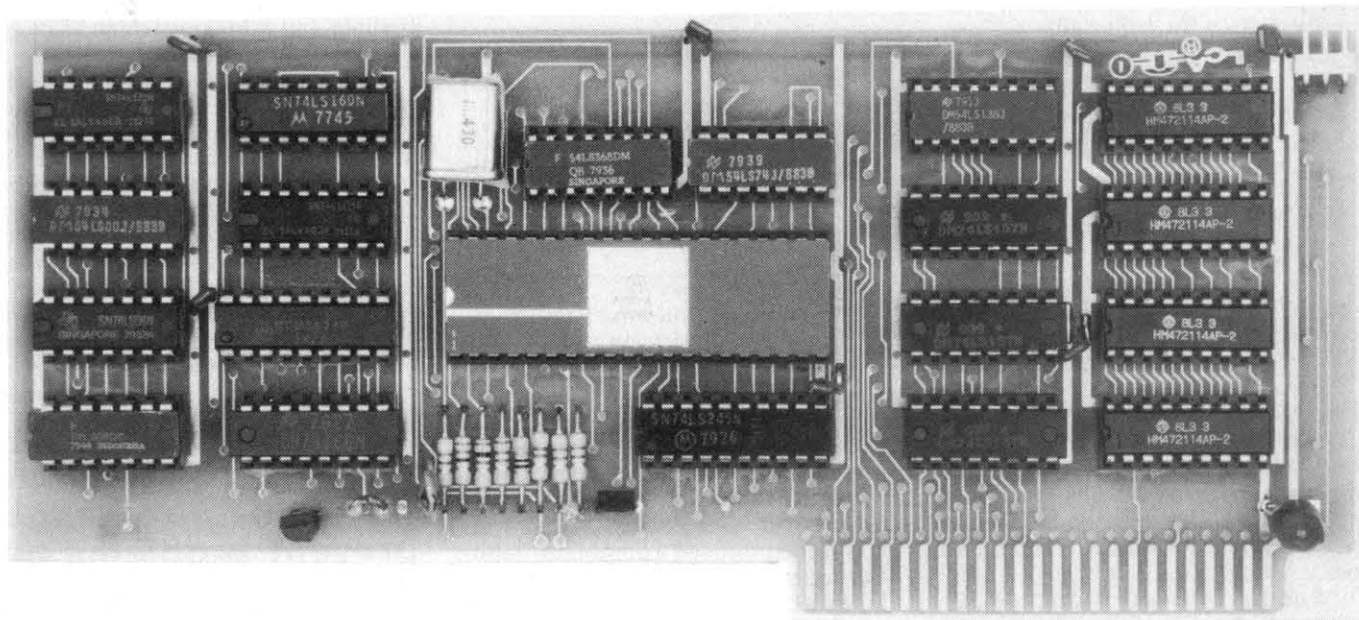
Before you start trying to solve this problem, be advised that in 1969, V. Strassen<sup>1</sup> in a paper "Gaussian Elimination Is Not Optimal" produced the 7 multiplication solution for the  $2 \times 2$ 's. This is reproduced here without rationale, since an analysis of the procedure is beyond the scope of this paper. Given two  $2 \times 2$  matrices:

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## Complexity, cont'd...

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{pmatrix}$$

where

$$P_{11} = m_1 + m_2 - m_4 + m_6$$

$$P_{12} = m_4 + m_5$$

$$P_{21} = m_6 + m_7$$

$$P_{22} = m_2 - m_3 + m_5 - m_7$$

where

$$m_1 = (B - D)(G + H)$$

$$m_2 = (A + D)(E + H)$$

$$m_3 = (A - C)(E + F)$$

$$m_4 = (A + B)H$$

$$m_5 = A(F - H)$$

$$m_6 = D(G - E)$$

$$m_7 = (C + D)E$$

The seven multiplications ( $m_i$ ) are brought together by selective additions and subtractions in the four  $P_{jk}$ , so that  $P_{11} = AE + BG$ , etc.

Very recently another mathematician, Victor Pan,<sup>2</sup> of the IBM Thomas J. Watson Research Center, in a paper titled "Strassen's Algorithm Is Not Optimal" improved on this technique still further. Unfortunately, his results are also too intricate to be reproduced here.

Another aspect of complexity theory deals with the efficiency of algorithms as they relate to the solution of some mathematics problems. In general, those problems which can be solved algorithmically fall into certain categories according to the extent of their solvability. Two of these are: 1) P, the class of polynomial time problems, and 2) NP, the class of non-deterministic polynomial time problems. The first of these, containing problems on the order of the Bridges of Koenigsberg, have efficient solutions and are therefore solvable in polynomial time. This refers to that set of algorithms which can produce a solution in polynomial time growth as the problem size increases as opposed to those whose time growth is exponential. The Bridges of Koenigsberg is an old and famous problem which because of its simplicity has an appeal

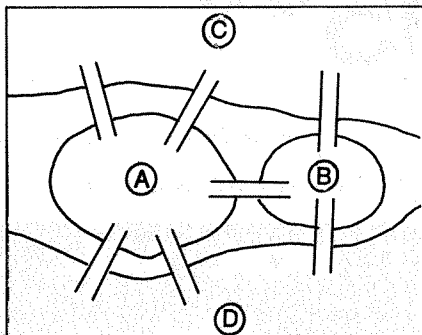


Figure 1

for students at all levels. In old Koenigsberg, now Kalinin, USSR, there are two islands in a river which are connected to each other and to the two banks by seven bridges (see Figure 1). The question is: can one start at any point and cross all of the bridges exactly once? The problem can be attacked by brute force, that is, by listing all of the possible paths, and

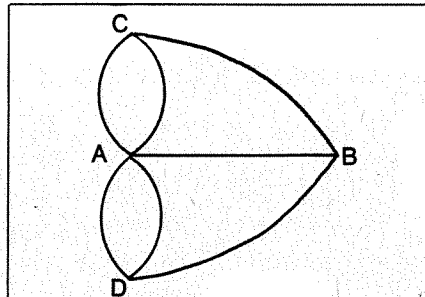


Figure 2

then finding the solution(s) if there are any. The mathematician, Leonhard Euler, solving this problem more efficiently, wrote of the listing solution: "This method is too tedious and too difficult because of the large number of possible combinations, and in other problems where many more bridges are involved it could not be used at all."<sup>3</sup> Euler produced a point-line graph of the islands and bridges (see Figure 2), argued that each point, except the start and end, required one line leading to it and one leading away and must therefore have an even number of lines connecting them to other points. Since the point-line graph has four points all of which contain an odd number of lines, the tour is impossible. This solution method was qualitatively simpler than the brute force listing; Euler had produced a solution in polynomial time. On the other hand, problems which can be solved only through methods which are comparable to the brute force listing or other such inefficient methods are classified as nondeterministic polynomial time.

According to Ron Graham of Bell Telephone Laboratories "the trouble with this brute force approach is that as the number of tasks in a set becomes large the number of possible priority lists (and thus the number of schedules) grows so explosively that there is no hope of examining even a small fraction of them. If there are  $n$  tasks in a set, the number of different lists is  $n!$ , or  $n(n-1)(n-2) \dots 1$ , a very large number even for relatively small values of  $n$ . For example, when there are 20 tasks, even if a computer could check as many as a million schedules per second, it would take more than 70,000 years to check all 20 lists!"<sup>4</sup>

A problem which falls into the class NP is that of determining whether an integer is composite. There is no way of finding the factors of an integer

other than the inefficient method of looking for proper divisors. There are indeed divisibility techniques for ruling out some unnecessary trials, but no algorithm exists which will reduce the number of trials to a point wherein the problem could be solved in polynomial time. Other well known problems which fall into this class are:

1) The Traveling Salesman Problem: Given a set of cities (points), find the shortest round-trip route connecting lines (air routes) in which all of the cities are visited.

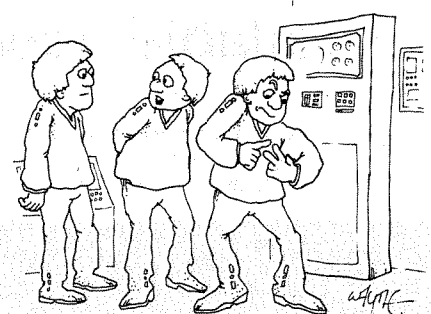
2) The General Scheduling Problem: Given a set of identical machines, with a set of tasks to be performed, each with specific requirements for deadline time, priority of importance, running time and precedence constraints, find the most efficient schedule for assigning these tasks among the given machines.<sup>5</sup>

3) The Three Color Map Problem: Given a set of regions of a map, color all of the regions in one of three colors in such a way that no two adjoining regions share the same color.

**Today's computers and telephone exchanges present problems beyond our understanding, but these systems are dwarfed by even the humblest biological systems.**

There is a set of problems, of which the above three are members, which form a kind of super category, NP-complete. If a polynomial time algorithm can be found for any one of them, then with minor adjustments, the algorithm can be applied to all NP problems solving them in polynomial time as well. Accordingly, it is likely that NP-complete problems are difficult, if not impossible to solve efficiently.

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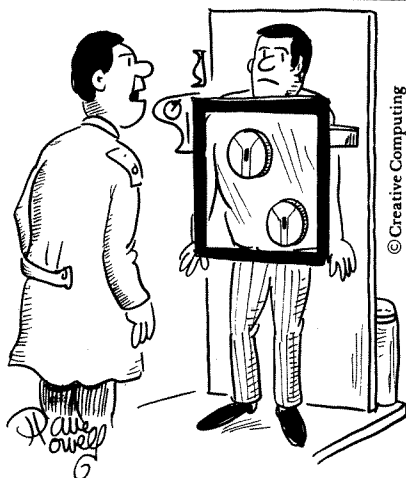
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## Complexity, cont'd...

In this article we have attempted to overview this new and exciting field of complexity theory which links computer science with mathematics, and ultimately to the solution of theoretical as well as practical problems in society and technology. In an article on complexity theory as it refers to the solution of problems in telephone technology, Pippenger says: "Today's computers and telephone exchanges present problems beyond our understanding, but these systems are dwarfed by even the humblest biological systems. While complexity theory struggles with problems within its reach, far greater problems lie beyond."<sup>7</sup> □

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1. V. Strassen, "Gaussian Elimination Is Not Optimal," Num. Math., Vol. 13, (1969), pp. 354-356.
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7. Nicholas Pippenger, "Complexity Theory", Scientific American, Vol. 238, No. 6, (June, 1978), p. 124.




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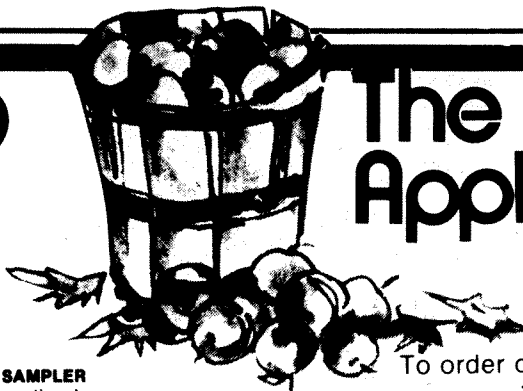
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# Eliminating the TRS-80 Power Cord Mess

Delmer Hinrichs

Do you dislike the tangle of 120 V. power cords behind your TRS-80? Is it difficult to find a wall outlet with three sockets?

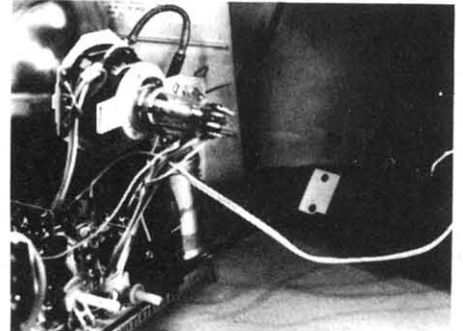


Double outlet socket installed in back of monitor.

This problem affects most TRS-80 owners, but it is easy to fix: Just install a double socket on the back of your CRT monitor, as shown in Photo 1. Then you can plug your computer power supply and your cassette recorder into the monitor. Only one cord (the monitor cord) then needs to be plugged into a wall socket. A further advantage is that now the whole system can be turned on or off with one switch, the monitor "Power" switch.

How is this modification done? First, you must collect the necessary tools and materials. For tools, you will need a  $\frac{1}{4}$ " nut driver (it looks like a screwdriver, but has a  $\frac{1}{4}$ " hex socket on the end), a drill and bits, a coarse file, a screwdriver and a soldering iron. Materials required are a double electrical socket (the type used for wall outlets), about two feet of fairly heavy-duty electrical wire, solder and two nuts for the socket mounting screws (they are not included with the socket, as the socket screws were intended to screw into a wall outlet box).

Now to work! First unplug the monitor, and place it face down on a soft surface. Be sure that it has been "off" long enough for the hazardous high voltage inside the case to dissipate. Use the nut driver to remove the five hex-headed screws holding the back onto the monitor (four are in deep recesses). Gently remove the back, being very careful of the CRT socket, which protrudes and is fragile. Mark where you want to put the double outlet socket, making sure that it will clear things inside the case. A spare outlet socket cover plate makes a good marking template. Drill starter holes through the plastic back, then file them to shape to accept the double outlet socket. This usually takes a bit of file and try, file and try. Drill holes for the socket mounting screws and mount the socket in place. Fasten one end of the wire pair under the screws of the socket, and solder the other end to the terminals under the CRT yoke, as shown in Photo 2.



Inside of monitor, showing outlet socket installation.

These terminals are shown in Figure 1. Now carefully put the back on again, being sure that the added wire has enough free space, and that the socket doesn't interfere with anything.

You can now plug your computer power supply and your cassette recorder into the back of your monitor and eliminate that tangle of power cords. Neatness triumphs! □

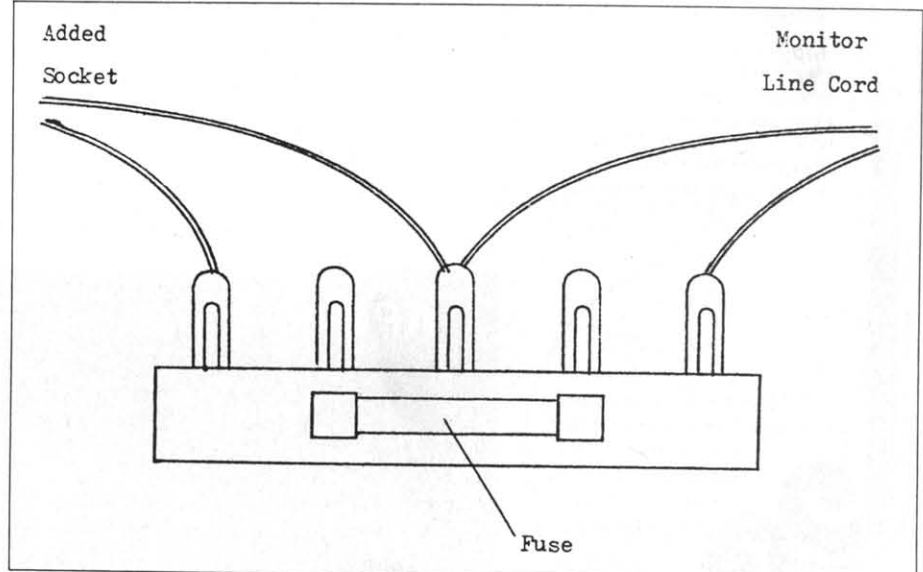


Figure 1.  
Connections to monitor terminal board.

Delmer Hinrichs, 2116 SE 377th Ave., Washougal, WA 98671.



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for easier programming!

%PROC SBT

%CALL INITSBT

%CALL XALL

%CALL FINISH

END

%END-PROC

## STRUCTURED BASIC TRANSLATOR

by  
Gene  
Bellinger

Tired of attempting to make program modifications without being foiled by line numbers and GOTO's? Have you managed to forget how portions of your programs work because you left out the REMARK to conserve memory and speed up execution? If these and other drawbacks of BASIC keep you from getting things done, then *Structured BASIC Translator* can provide some relief!

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The strength of this package is its small size and fast translation. For example, the source code for the program itself, which is provided on the disk, will translate in less than 4 minutes. This is important because with this speed you will not hesitate to alter or modify a source listing.

Acorn produces several other utility programs for the TRS-80\*. These include *Aterm*, *Term-80*, and *Numbering* by Tom Stibolt; *Disassembler*, *Tape Utility*, and *Disk Utility* by Roy Soltoff. Ask for these and other quality Acorn programs at your local computer store.

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## Stan and the Two-Horse Team



When Stanislaus came whipping into the living room in his Little League gear, his pop looked up from the Racing Form and smiled.

"My boy!" said Pop, "I have a problem for you and your pile of semi-conductors."

"Two bits an hour for consultation and the programming, and a buck a page for printouts," Stan said. "What's up?"

"That ought to come to about three or four dollars," Pop said.

"The meter is running," Stan said. "C'mon up to my room."

"Strictly a hypothetical case," Pop said. "We don't much approve of horse race gambling, you know." Stan gave him a look and a nod. So Pop laid it out:

In any one race, there might be two horses that look too good to ignore. Either could win. Suppose a person wants to bet on both. Now, each will be offered at some price, such as 5 to 2, or 4 to 1, or whatever. Can we make the computer tell us how much to bet on each, so as to yield a profit of, say, a hundred dollars?"

"Easy," said Stan, turning on the power and loading Basic. And he wrote:

```
10 INPUT "FIRST HORSE PAYS";A
20 INPUT "...FOR WHAT BET";B
30 INPUT "SECOND HORSE PAYS";C
40 INPUT "...FOR WHAT BET";D
50 INPUT "PROFIT WANTED";P1
```

And he stopped to think.  
Then he wrote:

```
100 X=B/(A+B):Y=D/(C+D)
```

"These will be decimal fractions. I think if we add them, and subtract their sum from 1..."

```
110 Z1=X+Y: Z=1-Z1
```

"And then find the ratio between each decimal value and the remainder Z... and multiply that by the profit you want... we'll have it." He wrote:

```
120 B1=INT((X/Z)*P1+.5):D1=INT((Y/Z)*P1+.5)
```

"I've gone for the integer, rounding up. Okay?"

Pop let his jaw hang open but didn't speak.

```
130 PRINT B1, D1
```

N. B. Winkless, Jr., 11745 Landale St., No. Hollywood, CA 91607.

"Ready?" said Stan. "We'll use what you said, 5 to 2 and 4 to 1, and one hundred dollars." He tapped in RUN, and filled in the INPUTS.

The screen said "56 39".

"Want to check that out?"

Pop did. He found that 56 bet at 5 to 2 would yield 140, minus the 39, to leave a profit of 101. And 39 at 4 to 1 would yield 156, less the 56, for a profit of 100.

"Terrific!" Pop said.

"Good," said Stan. "That'll be 15 cents, unless you want me to print it."

"Er..." said Pop. "I'd really like to have it on paper, as tables, y'know? And there are other ratios —"

"How many?" said Stan.

"Uh, forty-nine altogether."

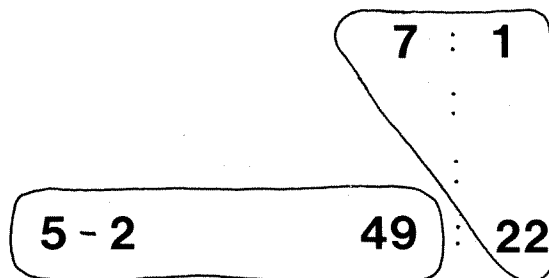
"Gulp," said Stan. "The calculations are easy, but the formatting is going to be a problem, and I'm not sure about that rounding-up routine. Do you mind if we have supper before I knock this off?"

Stan is fast, but it took him most of Sunday to get things to the point where he showed his pop a partial printout:

Exhibit A Stan on bet ratios

|       | 7   1    | 8   1    | 9   1    | 10   1   | 11   1  | 12   1  | 13   1  |
|-------|----------|----------|----------|----------|---------|---------|---------|
| 6 - 5 | 109   30 | 105   26 | 103   23 | 100   20 | 99   19 | 98   17 | 96   16 |
| 7 - 5 | 92   28  | 89   24  | 87   21  | 85   19  | 84   17 | 83   16 | 82   14 |
| 3 - 2 | 85   27  | 82   23  | 80   20  | 79   18  | 78   17 | 77   15 | 76   14 |
| 8 - 5 | 79   26  | 77   23  | 75   20  | 74   18  | 73   16 | 72   15 | 72   14 |
| 9 - 5 | 69   25  | 68   21  | 67   19  | 65   17  | 64   15 | 64   14 | 63   13 |
| 2 - 1 | 62   24  | 60   20  | 59   18  | 58   16  | 58   15 | 57   14 | 56   12 |
| 5 - 2 | 49   22  | 48   19  | 47   17  | 46   15  | 46   14 | 45   13 | 45   12 |
| 3 - 1 | 40   20  | 40   18  | 39   16  | 38   14  | 38   13 | 38   12 | 37   11 |
| 7 - 2 | 35   20  | 34   17  | 33   15  | 33   14  | 32   12 | 32   11 | 32   11 |
| 4 - 1 | 30   19  | 30   17  | 29   15  | 29   13  | 28   12 | 28   11 | 28   10 |
| 9 - 2 | 27   19  | 26   16  | 26   14  | 26   13  | 25   12 | 25   11 | 25   10 |
| 5 - 1 | 24   18  | 24   16  | 23   14  | 23   13  | 23   12 | 23   11 | 22   10 |

The calculations are based on \$100 wins (approximate). The left-hand number is the bet on the pick at the left end of the line. The right-hand number is the bet on the pick at the top of the column. Example:



If your two picks go at 7 to 1 and 5 to 2, you put \$22 on the 7-1 shot and \$49 on the 5-2 shot. If the 7-1 comes home you win 7 times 22, or \$154, and lose \$49 — profit \$105. If the 5-2 comes home you win 5/2 times 49, or \$122.50, and lose \$22 — profit \$100.50.

To win more or less, just adjust the bets. That is, to win \$50, bet half of what the tables show. To win \$200, bet twice what the tables show.

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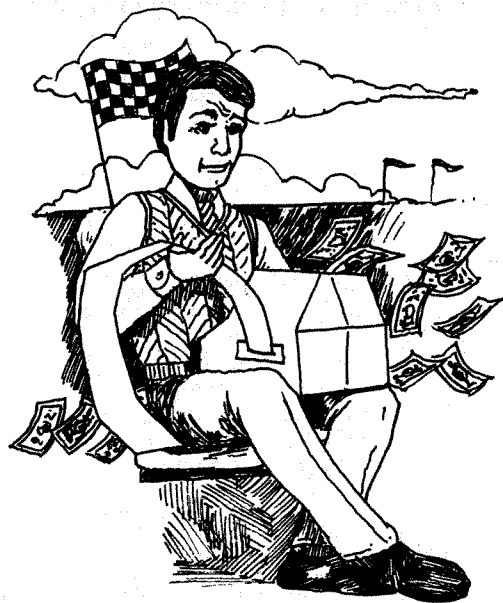


## Two-Horse, cont'd . . .

"I'm going to fill one page with this," he said, "and there will be six more pages."

"Wow," said Pop. "Will I understand the program?"

"I think so. I wrote in a lot of explanation, just for you."



```

1 !FORMATTED FOR 7 COLUMN RATIOS AND 1 RATIO AT THE LEFT
9 POKE(160512)=130: ! Sets maximum printer width
10 GOSUB 450: PRINT CHAR$(6);
11 ! Turns on printer, clears the screen
20 DIM A(49),B(49),C(49),D(49): !We'll need these subscripts
21 ! We're 'filling the boxes' with ratios to draw on in succession
22 C(1)=1:C(2)=1:C(3)=2:C(4)=1:C(5)=3:C(6)=4:C(7)=1:C(8)=5
23 D(1)=9:D(2)=5:D(3)=5:D(4)=2:D(5)=5:D(6)=5:D(7)=1:D(8)=5
24 C(9)=7:D(9)=5:C(10)=3:D(10)=2:C(11)=8:D(11)=5:C(12)=9:D(12)=5:C(13)
=2:D(13)=1:C(14)=5:D(14)=2:C(15)=3:D(15)=1:C(16)=7:D(16)=2
25 C(17)=4:D(17)=1:C(18)=9:D(18)=2:C(19)=5:C2=5
26 FOR C1=20 TO 39:C2=C2+1:C(C1)=C2:NEXT C1:C1=0:C2=0
27 C(40)=30:C(41)=35:C(42)=40:C(43)=45:C(44)=50:C(45)=60:C(46)=70:C(47)
)=80:C(48)=90:C(49)=99
28 FOR D1=19 TO 49:D(D1)=1:NEXT D1:D1=0
29 FOR D8=1 TO 49:A(D8)=C(D8):B(D8)=D(D8):NEXT D8:D8=0
60 D$=CHAR$(27)+CHAR$(31)+CHAR$(9):OPEN O"*P":PUT 0 D$:CLOSED
61 ! Line 60 sets horizontal character spacing
70 GOSUB 460: !Turns off the printer
80 INPUT "HOW MUCH YOU WANNA WIN ON THIS PAIR OF BETS";P1
91 INPUT "START TOP LINE WHERE";T1: ! Can't get it all on one page, so.
..
93 INPUT "START LEFT LINE WHERE";L1: ! Mostly for trial runs
94 C1=T1: C2=T1
95 R=12
99 Q2=0
100 !Starts printing the top line of ratios
102 C1=C1+1: ! Counters to move up the line of subscripted boxes
103 C2=C2+1
106 A=A(C1):B=B(C2): ! Extracts the values from the boxes
110 K$=STR$(A):L$=STR$(B): !Turns the numbers into strings for formatti
ng
111 IF LEN(K$)<6 THEN K$=" "K$: GOTO 111: ! Formats neatly
112 IF LEN(L$)<6 THEN L$=" "L$: " ": GOTO 112
115 M$=K$+" "+L$
120 !Next line turns on the printer again
129 GOSUB 450:PRINT TAB(R);M$: !Printing the headers
132 R=R+15
136 Q2=Q2+1:IF Q2=7 THEN Q2=0:R=0:T=0:GOTO 160: !Limits column headers
to seven
140 GOSUB 460
150 GOTO 100: ! Returns to find the next values
160 ! I used to have a line here.
190 C3=L1:C4=L1: ! Permits choosing start-point for left column
200 ! Preparing to print the second ratio, left column
201 IF T4=49 THEN 1000: !Guts off after 49 lines
202 C3=C3+1
203 C4=C4+1
205 IF C3>49 THEN 1000
206 C=C(C3):D=D(C4): ! Sets up next ratio in left column
208 X$=STR$(C)
209 Y$=STR$(D)
210 IF LEN(X$)<4 THEN X$=" "X$:GOTO210
218 GOSUB 450: ! Turns on printer again
220 PRINT:PRINT X$+" "+Y$: ! Prints the left ratio
230 T=9
240 GOSUB 460: ! Turns off printer
290 C1=T1: C2=T1: ! Picks values from boxes to correspond with headers
300 T=13: ! Sets tab stop
302 C1=C1+1: !Increments box-count as we go along
303 C2=C2+1
304 IF C1>50 THEN 1000: !Guts off if too deep. Do we need this?
306 A=A(C1):B=B(C2)
307 T3=T3+1

```

```

310 GOSUB 400: !We'll calculate at 400+
315 IF D1<0 THEN A$=" NO ": GOTO 322: !If impossible, say No
316 A$=STR$(D1): ! ... else make a string of the value
317 IF LEN(A$)<6 THEN A$=" "A$: GOTO 317
322 IF B1<0 THEN B$=" NO ":GOTO 339
328 B$=STR$(B1): !Stringing helps the formatting in neat columns
329 IF LEN(B$)<6 THEN B$=" "B$: " ": GOTO 329
339 GOSUB 450: ! Turns on the printer again
340 E$=A$+" "+B$: PRINT TAB(T);E$: ! Prints the bets
345 T=T+15: !Incrementing the tab set
350 GOSUB 460: ! YOU know; turns off printer
355 IF T3=7 THEN T3=0:T4=T4+1:GOTO200: ! Guts off after seven columns
360 GOTO 302: ! Returns to cycle for next bet on the line
400 X=B/(A+B): Y=D/(C+D): !The decimal frac of the two odds — remember
?
405 IF A/B=D/C THEN D1=-1:B1=-1: GOTO 440: ! Can't work out if
406 ! the two ratios are reciprocals. Think about it.
410 Z1=X+Y: Z=1-Z1: ! Adds them and takes their complement of 1, per br
ief example
420 B1=INT((X/Z)*P1): !Calcs per example
430 D1=INT((Y/Z)*P1)
431 ! Abandoned the simple '+.5' rounding-off method...
432 ! because it didn't seem to work for everything.
434 IF B1<0 OR D1<0 THEN 440: ! Eliminates certain impossibles
435 M1=B1*(A/B)-D1:IF 0 AND M1>P1 THEN 0=0: GOTO 440
436 IF M1<P1 THEN B1=B1+1:GOTO435
437 M2=D1*(C/D)-B1
438 IF M2<P1 THEN D1=D1+1: GOTO 437
439 IF M2>P1 THEN 0=1:GOTO435
440 RETURN: !Goes back into program at 320
445 !435 to 439 is one giant effort at rounding-off. Obvious?
450 PRINT CHAR$(16):; RETURN
460 PRINT CHAR$(15):; RETURN

1000 !PRINT: PRINT: PRINT:PRINT:PRINT CHAR$(16)
1005 PRINT "THE FORM ' XX | YY' SHOWS BETS TO GAIN $100 (APPROX)"
1006 PRINT "USING THE XX FIGURE FOR ODDS AT THE LEFT,"
1007 PRINT " THE YY FIGURE FOR THE ODDS AT TOP OF COLUMN."
1010 PRINT "TO GAIN MORE OR LESS, MULTIPLY OR DIVIDE THE $100."
1020 PRINT "(THAT IS, TO GAIN ONLY $50, BET HALF WHAT'S SHOWN."
1025 PRINT "TO GAIN $200, BET TWICE WHAT'S SHOWN.)"
1030 PRINT CHAR$(15)
1100 END: !At last!!
READY

```

"Er, Stanislaus," Pop said. "Suppose we adjust this to handle three or four horses in a race . . ."

"I've been thinking about that, Pop. Four horses would take the tables to 7 times 49 times 49 pages. At a buck a page, that'll be about \$17,000. I'm game for it if you are Pop.Pop?Pop?"□

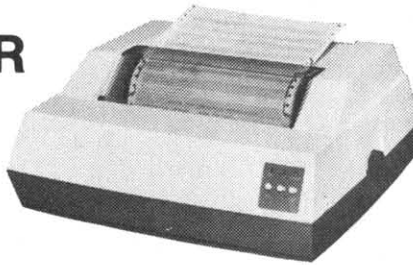
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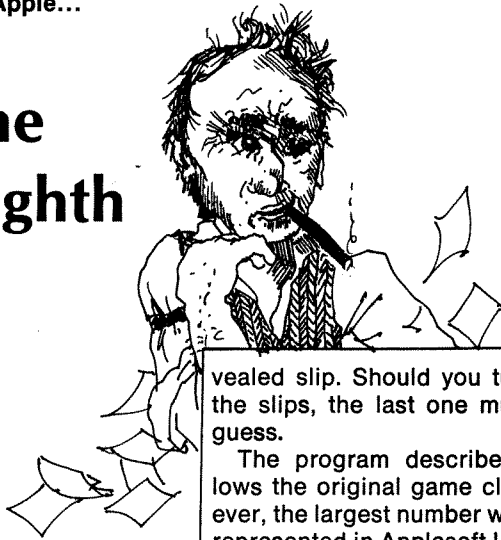
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## Ten to the Thirty-Eighth



Readers of Martin Garner's book "New Mathematical Diversions from Scientific American," may recognize the game described here. It is a version of the game "Googol," discussed in Gardner's book. I will explain later why I changed the name of the game. I have also added some twists which you may find of interest.

### A googol is the number ten multiplied by itself one hundred times.

Invention of the original game of Googol is attributed to John H. Fox, Jr. and L. Gerald Marnie. As described in Gardner's book, the game is played by having someone (the computer in this case) select a number of slips of paper. On the back of each slip, a positive number is written which you are not allowed to see. The values of the numbers range from small fractions up to numbers the size of a "googol" or larger. A googol is the number ten multiplied by itself one hundred times, or "ten-to-the-one-hundredth." The game thus derives its name from the not very rigidly defined upper limit to the numbers written on the slips.

When all the numbers have been written down, the slips are randomized and placed face down. You then turn the slips face up, one at a time. The object is to stop when you turn up the number which you guess to be the largest. The last slip which you choose to turn up is your guess. You may not go back to a previously re-

vealed slip. Should you turn over all the slips, the last one must be your guess.

The program described here follows the original game closely. However, the largest number which can be represented in Applesoft II is  $10^{38}$  (ten to the thirty-eighth), hence the name of this version. Also, you get to choose the number of slips to use (from 3 to 14). These two facts tend to help you since you know that with a small number of slips to choose from, a number of  $10^{37}$  or greater is almost certainly the largest. In the original game, the googol is not necessarily the upper limit, so that you are never certain of any large number.

I will not go into the detailed analysis of the odds of your finding the highest number. I'll only quote the results of the argument attributed to L. Moser and J. R. Pounder. You may derive it for yourself or refer to Gardner's book.

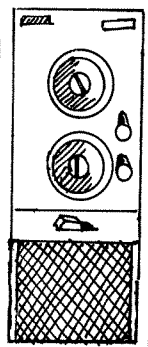
The strategy is to select  $p$  slips out of the  $n$  available. Note the largest value among the  $p$  slips and then continue selecting from the remaining slips until you find a larger number. The following formula gives the probability of finding the largest number in  $n$  slips;

$$\frac{p}{n} \left( \frac{1}{p} + \frac{1}{p+1} + \frac{1}{p+2} \cdots + \frac{1}{n-1} \right)$$

Given  $n$ ,  $p$  is determined by picking a value for  $p$  which gives the largest value to the above expression. For example, if  $n = 10$  then  $p = 3$ . For other values of  $n$ , you are urged to determine  $p$  for yourself. (You didn't buy that computer just to play Star Trek, did you?) Of course, as I mentioned above, the fact that you know the upper bound to the possible values does put the odds a little more in your favor.

While writing the program to play this game, it occurred to me that it might be interesting to skew the odds a little. Since the computer is turning over the slips, it is possible for it to lie to you about the value of any slip.

TIME TO  
PLACE  
YOUR  
BETS!



William Bradford

The false value you get is chosen at random, so it may be higher or lower than the true value. If knowing that the machine may be lying to you is not enough, you can have it tell you when it is lying. Of course, it won't tell you until after you have made a bet or chosen another slip.

You now know the essential facts about the game. The program was written for an Apple II in Applesoft II, so it should be fairly portable to other machines using Microsoft's Basic. The program is set up to handle from one to four players. Players make their bets before selecting a slip to turn over. Only one slip is turned over at a time, so players should work out who does the selecting. When a slip is turned over, each player is offered the chance to stop. All players may continue to bet until all the players have chosen. Bets may not be decreased, but they may remain fixed at any value. When the last player has selected, all of the strips are revealed with their true values. The slip with the

### The googol is not necessarily the upper limit

largest value is shown in flashing mode. Wins and losses are computed and displayed and the players' funds adjusted accordingly. At this time new players may be added, the number of slips changed, or the game option may be changed.

The program shown in the accompanying listing has some features which are designed with the Apple II video output in mind. The strips are shown in the INVERSE video mode, while the bets and available funds are shown in the NORMAL video mode.

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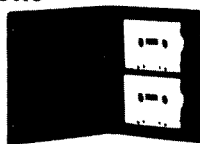
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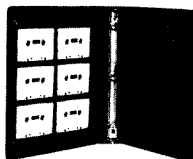
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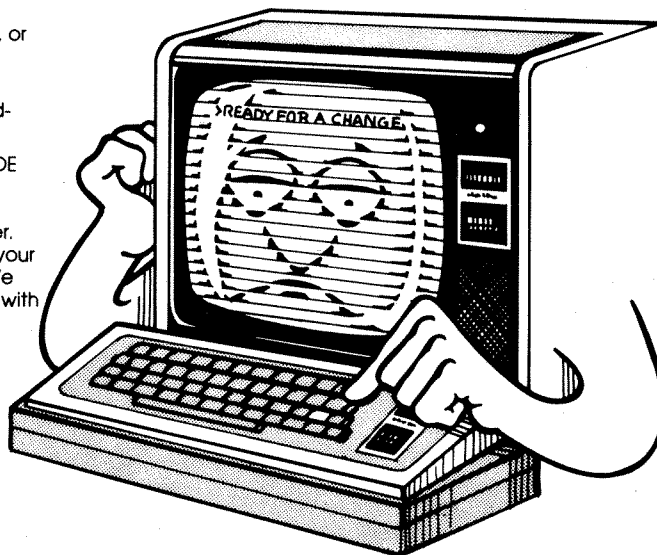
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## 10<sup>38</sup>, cont'd...

When a player wins, the word WIN is shown in FLASHING mode above his bet. Similarly, the winning number is shown as a flashing number. If hard copy output is desired, several statements (205, 403, 406, 1207 and 1314) will require some modification. In fact, for a hard copy only device, statements 1200 through 1220 can be deleted.

**Since the computer is turning over the slips, it is possible for it to lie to you about the value of any slip.**

In the course of writing this article, it occurred to me that it would be interesting to see a version of the game where the computer is a player. Perhaps an interested reader could contribute a program to do so to Creative Computing. Another option would be to have the computer display a blank slip instead of lying. The slip would not be turned over until all bets were in. Other possibilities include more sophisticated schemes for having the computer lie, such as telling you that it has lied when it really hasn't. Of course, we humans can generally lie better than a computer (at least until a HAL 9000 type of computer shows up), so there are many such variations. Take advantage of the "Input/Output" column to share your ideas. In any case, the idea is to have a little fun with your brain and its extension, your computer.

For those of you who are wondering about the origin of the term "googol," it was invented by a nine year old child, a nephew of mathematician Dr. Edward Kasner. Dr. Kasner, a respected teacher, is noted as having given lectures on the mathematics of infinity, topology and other advanced mathematical subjects to kindergarten-age children. The reasoning of Dr. Kasner's nephew concerning the finite value of googol is interesting, and is described in the selection by Drs. Kasner and Newman referenced below. □

### References

Gardner, Martin, New Mathematical Diversions from Scientific American, Simon and Schuster, New York, 1966, Chapter 3, Problem 3.

Kasner, Edward and James R. Newman "New Names for Old" in The World of Mathematics, Simon and Schuster, New York, 1956, Volume 3, page 2009.

### SAMPLE RUN

```
RUN
10A38
(TEN TO THE THIRTY-EIGHTH)
A BETTING GAME FOR THE APPLE II
PROGRAMMED BY L. W. BRADFORD
DO YOU WANT INSTRUCTIONS? (Y/N)N

GAME OPTIONS
1STRAIGHT UP GAME (I DON'T LIE)
2'RUSSIAN ROULETTE'(I LIE TO YOU)
3LIKE NO. 2, BUT I TELL YOU WHEN
I AM DEALING A BOGUS NUMBER
IF THIS ISN'T CLEAR,SEE THE INSTRUCTIONS
WHICH? 3

HOW MANY PLAYERS? (1 TO 4) 1

YOU'RE OUT OF CASH NO. 1
DO YOU WISH TO BORROW SOME? Y
OK, HOW MUCH? (LIMIT IS $1000) 1000
HOW MANY SLIPS OF PAPER DO YOU WISH TO PICK FROM? (MAX = 14)
?9

BETS 0
FUNDS 1000
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?5
BETS 5
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?5
695520.399
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?5
BETS 5
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?2
2.40168801
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?10
BETS 10
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?7
.055058695
DO YOU WISH TO STOP NOW NO. 1?N
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?10
BETS 10
FUNDS 1000
WHICH STRIP DO YOU WISH TO SEE?8
3.51407399E+29
DO YOU WISH TO STOP NOW NO. 1?Y

ALL BETS ARE NOW IN
4328953.03
2.40168801
4952400.91
7.5659165
695520.399
133182.867
.055058695
3.51407399E+29
47.9456399
THE CORRECT NUMBER WAS 3.51407399E+29 !
WIN
10
FUNDS
1010
?
DO YOU WISH TO CHANGE GAME OPTION?N
DO YOU WANT TO CHANGE THE NUMBER OF PLAYERS?N
BETS 0
FUNDS 1010
HOW MANY SLIPS OF PAPER DO YOU WISH TO PICK FROM? (MAX = 14)
?3
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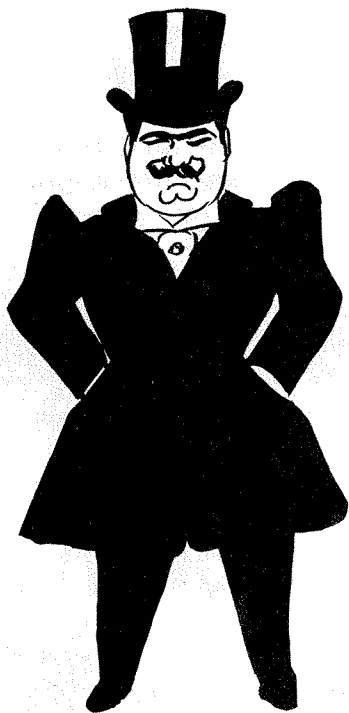
BETS 0
FUNDS 1010
TIME TO PLACE YOUR BETS!
HOW MUCH DO YOU WISH TO WAGER NO. 1 ?
?1000

BETS 1000
FUNDS 1010
WHICH STRIP DO YOU WISH TO SEE?2.

5.866947E+27
DO YOU WISH TO STOP NOW NO. 1?Y

ALL BETS ARE NOW IN
.427343843 1
5.866947F+27 2

1701507.38 3
THE CORRECT NUMBER WAS 5.866947E+27 !
WIN
1000
FUNDS
2010
?
```



```

1 TEXT : HOME :Y$ = "Y":N$ = "N"
2 DIM S(15),B(4),F(4),CH(4)
3 NG = 0: GOTO 3000
100 REM PRINT BETS AND FUNDS AV
    AILABLE AND HEADERS FOR THEM

101 POKE 34,16: POKE 35,19
105 VTAB 16: HTAB 1: PRINT "BETS
";
106 FOR R = 1 TO PM
107 PS = R * 8
108 VTAB 16: HTAB PS: PRINT B(R)

110 NEXT R
112 VTAB 18: HTAB 1: PRINT "FUND
S";
114 FOR R = 1 TO PM
115 PS = R * 8
116 VTAB 18: HTAB PS: PRINT F(R)

118 NEXT R
120 RETURN
198 REM PRINT OUT THE NUMBER FO
    R STRIP ST IF VALUE IS NEGAT
    IVE THEN STRIP HAS BEEN TURN
    ED OVER ALREADY
```

```

200 IF S(ST) < 0 THEN 250
201 R = INT ((ST + 1) / 2)
202 CL = ST - 2 * (R - 1)
203 POKE 34,0: POKE 35,16
204 VTAB R * 2 - 1:PS = 22 * (CL
    - 1): IF PS = 0 THEN PS = 4

205 : HTAB PS: INVERSE : PRINT ABS
    (S(ST))
206 NORMAL : POKE 34,20: POKE 35
    ,23
207 XP = XP + 1:ERR = 0
208 HOME : VTAB 20
209 S(ST) = - S(ST)
210 RETURN
211 REM TEST FOR GAME OPTION, P
    RINT MESSAGE FOR LIE (IF NEE
    DED)
212 IF W = 1 THEN RETURN
213 IF ST < > L THEN RETURN
214 IF W = 2 THEN 230
216 PRINT "THE VALUE JUST SHOWN
    IS NOT A TRUE ONE!"
218 GOSUB 990
230 S(L) = - TE
234 RETURN
250 PRINT "THAT NUMBER HAS ALREA
    DY BEEN SHOWN"
252 GOSUB 990
253 ERR = 1
254 RETURN
298 REM A CHOICE HAS BEEN MADE
    BY PLAYER R. IF HE STOPS SET
    HIS CHOICE FLAG.
300 FOR R = 1 TO PM
302 IF CH(R) < > 0 THEN 320
303 HOME
304 PRINT "DO YOU WISH TO STOP N
    OW NO. ";R;: INPUT A$
306 IF A$ < > Y$ AND A$ < > N$
    THEN 304
308 IF A$ = N$ THEN 320
310 CH(R) = ST
314 WS = WS + 1
320 NEXT R
330 RETURN
398 REM TEST FOR WINNERS. BALAN
    CE THE PLAYERS' FUNDS
400 FOR R = 1 TO PM
401 PS = R * 8
402 Q = CH(R): IF S(Q) < > MX THEN
    406
403 VTAB 15: HTAB PS: FLASH : PRINT
    "WIN"
405 SG = 1: GOTO 410
406 VTAB 15: HTAB PS: INVERSE : PRINT
    "LOSE"
407 SG = - 1
410 VTAB 16: HTAB PS: PRINT B(R)

412 F(R) = F(R) + SG * B(R)
414 VTAB 18: HTAB PS: NORMAL : PRINT
    " : VTAB 18: HTAB PS: NORMAL
    : PRINT F(R)
416 B(R) = 0: NEXT R
420 RETURN
598 REM BANKING ROUTINE SET UP
    LOANS AND CLEAR ACCOUNTS
600 R = 1: IF F(R) > 0 THEN RETURN

605 POKE 34,20: POKE 35,23: HOME
    : PRINT "YOU'RE OUT OF CASH
    NO. ";R: INPUT "DO YOU WISH
    TO BORROW SOME? ";A$
606 IF A$ < > Y$ AND A$ < > N$
    THEN 605
608 IF A$ = Y$ THEN 620
610 F(R) = - 1: PRINT "OK! BE SE
    EING YOU!"
612 RETURN
620 INPUT "OK, HOW MUCH? (LIMIT
    IS $1000) ";F(R)
621 IF F(R) < 0 THEN 621
622 IF F(R) < 1000.01 AND F(R) >
    0 THEN RETURN
624 IF F(R) > 1000 THEN 630
626 INPUT "DO YOU WISH TO QUIT?
    ";A$
627 IF A$ < > Y$ AND A$ < > N$
    THEN 626
628 IF A$ = Y$ THEN 610
630 PRINT "LET'S TRY AGAIN": GOTO
    620
```

```

650 I = 1
654 IF F(I) < > - 1 THEN 664
656 FOR R = 1 TO PM - 1
658 B(R) = B(R + 1):CH(R) = CH(R +
    1):F(R) = F(R + 1)
660 NEXT R
662 PM = PM - 1:PO = PM
664 I = I + 1: IF I > PM THEN RETURN

670 GOTO 654
698 REM TAKE BETS A BET OF 0 (
    ZERO) DEALS YOU OUT (HOWEVER
    , YOU ARE ASKED TO CONFIRM Y
    OUR DESIRE TO QUIT)
700 POKE 34,20: POKE 35,23
705 HOME : VTAB 21
710 PRINT "TIME TO PLACE YOUR BE
    TS!"
720 PRINT "HOW MUCH DO YOU WISH
    TO WAGER NO. ";I;: ?": INPUT
    AZ
721 IF AZ < 0 THEN 720
722 IF AZ > F(I) OR AZ > 1000 THEN
    730
723 IF AZ = 0 AND B(I) < > 0 THEN
    RETURN
724 IF AZ < B(I) THEN 780
725 IF AZ = 0 AND B(I) = 0 THEN
    750
726 B(I) = AZ: RETURN
730 PRINT "YOU CAN'T WAGER THAT
    MUCH, TURKEY!": PRINT "TRY A
    GAIN"
732 GOSUB 990
734 GOTO 720
750 INPUT "DO YOU WISH TO QUIT?"
    ;A$
751 IF A$ < > N$ AND A$ < > Y$
    THEN 750
754 IF A$ = N$ THEN 770
756 F(I) = - 1
758 RETURN
770 PRINT "YOU MUST PLACE A BET
    OR QUIT!"
772 GOTO 720
780 PRINT "YOU CAN'T DECREASE YO
    UR BET!"
782 GOSUB 990
784 GOTO 720
990 FOR SS = 1 TO 300: NEXT SS
992 RETURN
996 REM NOW BEGIN PLAY SET UP O
    PTIONS ON LIES BRANCH TO GE
    T NUMBER OF PLAYERS
1000 PO = 0
1001 TEXT : HOME
1005 NG = 1
1010 VTAB 2: HTAB 14: PRINT "GAM
    E OPTIONS"
1012 VTAB 6: PRINT "1";: HTAB 5
    : PRINT "STRAIGHT UP GAME (I
    DON'T LIE)"
1014 VTAB 8: PRINT "2";: HTAB 5
    : PRINT "'RUSSIAN ROULETTE'(
    I LIE TO YOU)"
1016 VTAB 10: PRINT "3";: HTAB
    5: PRINT "LIKE NO. 2, BUT I
    TELL YOU WHEN": VTAB 11: HTAB
    7: PRINT "I AM DEALING A BO
    GUS NUMBER"
1020 VTAB 18: PRINT "IF THIS ISN
    'T CLEAR,SEE THE INSTRUCTION
    S"
1022 VTAB 21: INPUT "WHICH? ";W
1024 IF W > 3 OR W < 1 THEN 1022

1026 HOME : GOTO 1100
1030 POKE 34,0: POKE 35,16: HOME

1032 VTAB 2: PRINT " HOW MANY S
    LIPS OF PAPER DO YOU WISH TO
    PICK FROM? (MAX = 14)"
1033 VTAB 5: INPUT NP: IF NP < 2
    OR NP > 14 THEN 1033
1040 Z = RND (1):MX = - 1:IM =
    15
1042 FOR I = 1 TO NP:X = RND (2
    )
1044 Y = INT (38 * RND (3) * RND
    (4)):S(I) = X * (10 ^ Y)
1045 IF S(I) < MX THEN 1047
1046 IM = I:MX = S(I)
1047 NEXT I
```



# SIMUTEK PRESENTS

# ★ TRS-80 ★

## GAMES

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### PACKAGE ONE

**GRAPHIC-TREK "2000"** — This full graphics, real time game is full of fast, exciting action! Exploding photon torpedoes and phasers fill the screen! You must actually navigate the enterprise to dock with the giant space stations as well as to avoid klingon torpedoes! Has shields, galactic memory readout, damage reports, long range sensors, etc! Has 3 levels for beginning, average, or expert players! **\* INVASION WORG** — Time: 3099, Place: Earth's Solar System Mission: As general of Earth's forces, your job is to stop the Worg invasion and destroy their outposts on Mars, Venus, Saturn, Neptune, etc! Earth's Forces: Androids — Space Fighters — Laser Cannon — Neutrino Blasters! Worg Forces: Robots — Saucers — Disintegrators — Proton Destroyers! Multi level game lets you advance to a more complicated game as you get better! **\* STAR WARS** — Maneuver your space fighter deep into the nucleus of the Death Star! Drop your bombs, then escape via the only exit! This graphics game is really fun! May the Force be with you! **\* SPACE TARGET** — Shoot at enemy ships with your missiles. If they eject in a parachute, capture them — or if you're cruel, destroy them! Full graphics, real time game! **\* SAUCERS** — This fast action graphics game has a time limit! Can you be the commander to win the distinguished cross! Requires split second timing to win! Watch out!

### PACKAGE TWO

**CHECKERS 2.1** — Finally! A checkers program that will challenge everyone! Expert as well as amateur! Uses 3-ply tree search to find best possible move. Picks randomly between equal moves to assure you of never having identical games. **\* POKER FACE** — The computer uses psychology as well as logic to try and beat you at poker. Cards are displayed using TRS-80's full graphics. Computer raises, calls, and sometimes even folds! Great practice for your Saturday night poker match! (Plays 5 card draw). **\* PSYCHIC** — Tell the computer a little about yourself and he'll predict things about you, you won't believe! A real mind bender! Great amusement for parties. **\* TANGLE MANIA** — Try and force your opponent into an immobile position. But watch out, they're doing the same to you! This graphics game is for 2 people and has been used to end stupid arguments. (And occasionally starts them!) **\* WORD SCRAMBLE** — This game is for two or more people. One person inputs a word to the computer while the others look away. The computer scrambles the word, then keeps track of wrong guesses.

### PACKAGE THREE

**POETRY** — This program lets you choose the subject as well as the mood of the poem you want. You give TRS-80 certain nouns or names, then the mood, and it does the rest! It has a 1000-word + vocabulary of nouns, verbs, adjectives and adverbs! **\* ELECTRIC ARTIST** — Manual: draw, erase, move as well as, Auto: draw, erase and move. Uses graphics bits not bytes. Saves drawing on tape or disk! **\* GALACTIC BATTLE** — The Swoosh enemy have long range phasers but cannot travel at warp speed! You can, but only have short range phasers! Can you blitzkrieg the enemy without getting destroyed! Full graphics — real time! **\* WORD MANIA** — Can you guess the computer's words using your human intuitive and logical abilities? You'll need to, to beat the computer! **\* AIR COMMAND** — Battle the Kamikaze pilots. Requires split second timing. This is a FAST action arcade game.

### PACKAGE FOUR

**LIFE** — This 2-80 machine language program uses full graphics! Over 100 generations per minute make it truly animated! You make your starting pattern, the computer does the rest! Program can be stopped and changes made! Watch it grow! **\* SPACE LANDER** — This full graphics simulator lets you pick what planet, asteroid or moon you wish to land on! Has 3 skill levels that make it fun for everyone. **\* GREED II** — Multi-level game is fun and challenging! Beat the computer at this dice game using your knowledge of odds and luck! Computer keeps track of his winnings and yours. Quick fast action. This game is not easy! **\* THE PHAROAH** — Rule the ancient city of Alexandria! Buy or sell land. Keep your people from revolting! Stop the rampaging rats. Requires a true political personality to become good! **\* ROBOT HUNTER** — A group of renegade robots have escaped and are spotted in an old ghost town on Mars! Your job at "Robot Hunter" is to destroy the pirate machines before they kill any more settlers! Exciting! Challenging! Full graphics!

### PACKAGE FIVE

**SUPER HORSE RACE** — Make your bets just like at the real racetrack! 8 horses race in this spectacular graphic display! Up to 9 people can play! Uses real odds but has that element of chance you see in real life! Keeps track of everyone's winnings and losses. This is one of the few computer simulations that can actually get a room of people cheering! **\* MAZE MOUSE** — The mouse with a mind! The computer generates random mazes of whatever size you specify, then searches for a way out! The second time, he'll always go fastest route! A true display of artificial intelligence! Full graphics, mazes & mouses! **\* AMOEBA KILLER** — You command a one man submarine that has been shrunken to the size of bacteria in this exciting graphic adventure! Injected into the president's bloodstream, your mission is to destroy the deadly amoeba infesting his body! **\* LOGIC** — This popular game is based on Mastermind but utilizes tactics that make it more exciting and challenging — Has 2 levels of play to make it fun for everyone. **\* SUBMARINER** — Shoot torpedoes at the enemy ships to get points. Fast action graphics, arcade type game is exciting and fun for everybody!

### PACKAGE SIX

**20 HOME FINANCIAL PROGRAMS** — Figures amortization, annuities, depreciation rates, interest tables, earned interest on savings and much, much more. These programs will get used again and again. A must for the conscientious, inflation minded person.

### PACKAGE SEVEN

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```

1048 IF W = 1 THEN RETURN
1050 L = RND (4): IF L < .1 THEN
1050
1052 L = 100 * L:ZZ = INT ((L /
NP - INT (L / NP)) * NP + .
05):L = ZZ
1054 TE = S(L):X = RND (2):Y = INT
(38 * RND (5) * RND (6))
1056 S(L) = X * (10 ^ Y)
1060 RETURN
1098 REM GET THE NUMBER OF PLAY
ERS
1099 REM THEN INITIALIZE FUNDS.
THEN HOW MANY STRIPS, THEN
TAKE BETS (CONVOLUTED, BUT I
T WORKS)
1100 VTAB 10: INPUT "HOW MANY PL
AYERS? (1 TO 4) ";PM
1101 IF PM < 1 OR PM > 4 THEN 11
00
1102 IF PM = P0 THEN 1111
1103 IF P0 = 0 THEN 1109
1104 FOR I = PM TO P0: GOSUB 600
: NEXT I
1106 P0 = PM: GOTO 1111
1109 P0 = PM
1110 FOR I = 1 TO PM: GOSUB 600:
NEXT I
1111 GOSUB 650: GOSUB 1030: GOSUB
100
1112 FOR I = 1 TO PM: GOSUB 700:
NEXT I
1115 GOSUB 650
1119 REM INITIALIZE CHOICE MEMO
RY
1120 FOR I = 1 TO PM:CH(I) = 0: NEXT
I
1130 WS = 0
1198 REM THIS SECTION PRINTS OU
T THE DISPLAY FOR APPLE VIDE
O. STRIPS ARE WHITE BLOCKS (
INVERSE BLANKS)
1200 TEXT : HOME
1202 N = 0:PP = 0
1204 FOR J = 1 TO 14 STEP 2
1206 VTAB J: HTAB 1: FOR K = 1 TO
2
1207 NORMAL : PRINT " "; INVERSE
: PRINT " "
1208 N = N + 1: IF N = NP THEN 12
10
1209 NEXT K
1210 PQ = J + 1: FOR K = J TO PQ:
VTAB J:PS = 38 * (K - J)
1212 IF PS = 0 THEN PS = 1
1214 NORMAL : HTAB PS: PRINT K: IF
K = NP THEN 1220
1216 NEXT K
1218 NEXT J
1220 NORMAL
1222 POKE 34,17: POKE 35,19
1229 REM DISPLAY BETS AND TOTAL
S
1230 GOSUB 100
1250 POKE 34,20: POKE 35,23
1252 HOME : VTAB 21
1254 PRINT "WHICH STRIP DO YOU W
ISH TO SEE?": INPUT ST
1255 IF ST > NP THEN 1252
1256 GOSUB 200: IF XP = NP THEN
1290
1257 IF ERR = 1 THEN 1252
1258 GOSUB 300
1260 IF WS = PM THEN 1300
1261 REM WS=PM MEANS ALL PLAYER
S HAVE CHOSEN
1265 GOSUB 212
1269 REM CHANGE BETS?
1270 FOR I = 1 TO PM
1272 GOSUB 700
1275 NEXT I
1277 GOSUB 650
1280 GOTO 1230
1288 REM OKAY ALL STRIPS HAVE B
EEN SHOWN. IF NO CHOICE HAS
BEEN MADE, THEN THE CHOICE M
UST BE THE REMAINING STRIP
1290 FOR I = 1 TO PM: IF CH(I) <
> 0 THEN 1296
1292 CH(I) = ST
1296 NEXT I
1298 REM ALL BETS ARE IN, PRINT
OUT THE REAL VALUES FOR ALL

```

```

THE STRIPS, FLASH THE LARGE
ST
1300 POKE 34,20: POKE 35,23: HOME
1301 VTAB 20
1302 PRINT "ALL BETS ARE NOW IN"
1303 GOSUB 230
1304 POKE 34,0: POKE 35,15
1306 FOR ST = 1 TO MP
1308 GOSUB 201
1309 S(ST) = ABS (S(ST))
1310 IF S(ST) < > MX THEN 1320
1312 VTAB R * 2 - 1:PS = 22 * (C
L - 1): IF PS = 0 THEN PS =
4
1314 HTAB PS: FLASH : PRINT S(ST
)
1320 NEXT ST
1330 : POKE 34,20: POKE 35,23
1331 HOME : VTAB 20
1332 PRINT "THE CORRECT NUMBER W
AS ";MX;" I"
1339 REM SETTLE THE BETS
1340 GOSUB 400
1342 XP = 0
1345 PRINT H$;: INPUT A$
1350 TEXT : HOME
1354 VTAB 10: INPUT "DO YOU WISH
TO CHANGE GAME OPTION?";A$
1356 IF A$ < > N$ AND A$ < > Y
$ THEN 1354
1358 IF A$ = Y$ THEN 1005
1360 VTAB 12: INPUT "DO YOU WANT
TO CHANGE THE NUMBER OF PLA
YERS?";A$
1362 IF A$ < > N$ AND A$ < > Y
$ THEN 1360
1364 IF A$ = Y$ THEN 1100
1366 HOME
1368 GOSUB 100
1370 GOTO 1111
1372 REM
1374 REM LOOP THROUGH THE PROGR
AM
1376 REM
1400 REM PRINT HEADER FOR PROGR
AM, ASK IF INSTRUCTIONS ARE
NEEDED
1500 REM
3000 VTAB 8: HTAB 17: PRINT "10~
38": VTAB 10: HTAB 8: PRINT
"(TEN TO THE THIRTY-EIGHTH)"
: VTAB 12: HTAB 5: PRINT "A
BETTING GAME FOR THE APPLE I
I"
3002 VTAB 16: HTAB 6: PRINT "PRO
GRAINED BY L. W. BRADFORD"
3004 VTAB 22: INPUT "DO YOU WANT
INSTRUCTIONS? (Y/N)";A$
3005 IF A$ < > Y$ AND A$ < > N
$ THEN 3006
3006 IF A$ = N$ THEN 1000
4000 TEXT : HOME
4001 H$ = "HIT RETURN TO CONTINUE
"
4002 PRINT "10~38 IS BASED ON 'G
OOGL', A GAME THAT IS DESCR
IBED BY MARTIN GARDNER IN HI
S BOOK 'NEW MATHEMATICAL D
IVERSIONS FROM SCIENTIFIC A
MERICAN'."
4003 PRINT : PRINT
4004 PRINT "THE GAME WAS ORIGINA
TED BY JOHN H. FOX AND L. G
ERALD MARNE, IN 1958."
4005 PRINT
4006 PRINT : PRINT "THE GAME DES
CRIBED HERE IS ESSENTIALLY
THE SAME, BUT WITH SOME 'TWI
STS' TO IT."
4008 PRINT : PRINT "A GOOGL IS
10 MULTIPLIED BY ITSELF 100
TIMES. THE ORIGINAL GAME HA
D THAT VALUE AS AN UPPE
R LIMIT."
4009 PRINT "THE LIMIT FOR THIS G
AME IS 10~38, WHICH EXPLAINS
THE NAME"
4010 VTAB 22: PRINT H$;: INPUT A
$
4020 HOME : PRINT "THE BASIC GAM
E IS PLAYED AS FOLLOWS;": PRINT

```

```

"THE PROGRAM PICKS SOME RAND
OM POSITIVE"
4022 PRINT "NUMBERS (FROM 0 TO A
BOUT 10~38).": PRINT "THE NU
MBERS ARE WRITTEN ON THE BAC
K OF": PRINT "SOME STRIPS OF
PAPER."
4023 PRINT
4024 PRINT : PRINT "THE NUMBER O
F STRIPS OF PAPER TO BE USED
IS UP TO YOU.": PRINT "BUT
YOU MUST CHOOSE AT LEAST 3 A
ND NOT MORE THAN 14."
4026 PRINT : PRINT "WHEN YOU SEL
ECT A STRIP, IT WILL BE
'TURNED OVER' TO DISPLAY THE
NUMBER."
4028 VTAB 22: PRINT H$;: INPUT A
$
4040 HOME : PRINT "THE GAME IS P
LAYED BY TURNING THE STRIPS
OVER ONE AT A TIME;": PRINT
"UNTIL YOU COME"
4042 PRINT "TO THE STRIP WHICH Y
OU GUESS TO BE THE LARGEST
OF THE BUNCH."
4044 PRINT : PRINT "YOU MUST TAK
E THE LAST STRIP YOU TURNED
OVER, YOU CAN'T GO BACK TO
ANOTHER."
4046 PRINT "FROM ONE TO FOUR PEO
PLE MAY PLAY AT ANY ONE TIM
E.": PRINT : PRINT "PLAYERS
MAKE BETSON THEIR OWN CHOICE
S."
4048 PRINT "IF A PLAYER MAKES A
CHOICE,THE OTHERS MAY CONT
INUE SEARCHING.": PRINT "BET
TING CONTINUES UNTIL ALL PLA
YERS HAVE CHOSEN"
4050 PRINT : PRINT "TO HOLD AT A
PARTICULAR BET, ENTER A
ZERO FOR THE BET.": PRINT "Y
OU MUST,HOWEVER, MAKE SOME B
ET OF AT"
4052 PRINT "LEAST $1.00"
4058 VTAB 22: PRINT H$;: INPUT A
$
4060 HOME : VTAB 2: PRINT "TO TH
ROW A LITTLE CONFUSION INTO
MATTERS THE COMPUTER CAN LI
E TO YOU."
4062 PRINT : PRINT "TWO OPTIONS
ARE PROVIDED TO THE BASIC G
AME.": PRINT "IN THE FIRST O
PTION, THE COMPUTER WON'T TE
LL YOU"
4064 PRINT : PRINT "THE SECOND O
PTION IS NOT FOR THE FAINT
OF HEART.": PRINT "THE COMPU
TER WILL TELL YOU IF IT HAS
LIED ABOUT THE LAST NUMB
ER."
4066 PRINT : PRINT "SO, IF YOU'V
E JUST BET ON IT, YOU MAY
LOSE OR YOU MAY WIN BUT YOU
WON'T BE SURE"
4068 PRINT "BUT THEN NEITHER WIL
L ANYBODY ELSE."
4070 VTAB 22: PRINT H$;: INPUT A
$
4072 HOME : VTAB 3: PRINT "THE R
EAL CHALLENGE OF THE GAME IS
TO FIND A WAY TO OPTIMIZ
E YOUR BETTING."
4074 PRINT : PRINT "MARTIN GARDN
ER DISCUSSES THE STRATEGY
FOR THE NORMAL GAME IN HIS B
OOK."
4076 PRINT : PRINT "NEW MATH
EMATICAL DIVERSIONS FROM": PRINT
"SCIENTIFIC AMERICAN"
4078 PRINT : PRINT "THE ANALYSIS
OF THE SITUATIONS WHERE THE
COMPUTER LIES TO YOU IS LEF
T TO THE INTERESTED READE
R."
4080 VTAB 20: INPUT "HIT RETURN
TO START PLAY";A$
9000 TEXT : HOME
9100 GOTO 1000
9999 END

```

# YORN

David Gerrold



So there I was, showing off my North Star to some friends who were thinking about getting a machine of their own, and suddenly, the attractive redhead asked, "If it's so smart, how come I have to type in a '1' or a '2' for 'yes' or 'no'?"

"Um —" I said. "That's just the way the program was written. I copied it out of **Creative Computing**. The author was probably trying to save memory, so he didn't bother putting in a recognition subroutine."

"But it's possible?" she asked.

"Sure," I said. "It's probably very easy. In fact, they encourage you to personalize the programs to your own uses."

"So, why haven't you?" she asked.

She had me there. I said, "Because I hadn't recognized a need to . . . ?"

"Well, it would be nice," she sniffed. And I knew what that sniff meant.

All right. I'd show her.

After they left, I sat down at the machine and constructed the following all-purpose "Y" or "N" subroutine to patch into various game programs.

I call it Yorn, and it's written in North Star Basic.

Whenever a "yorn" is needed, have

your program print the question, then jump to the Yorn subroutine. It will then return a 1 or a -1.

The subroutine will recognize any variation of yes or no that begins with the same letters: **Yeah** or **Yup** or **Nein** or **Nyet**. For some reason, this impresses people who don't realize exactly what the program is recognizing.

I chose to use the positive and negative values, because it appeals to my sense of symmetry. Also, the value can be inverted by multiplying by -1. This could be convenient for some applications.

If the user puts in anything but a yes-or-no answer, the subroutine prompts him (line 1100) to answer properly and then starts over. You can't get out of the subroutine unless you answer with a yes or a no.

If you want to be more versatile, you can add:

1085 DATA "AFFIRM",1,"ALL RIGHT",1,"SURE",1,"OK",1

— or any other affirmatives or negatives, you want recognized.

My redheaded friend was suitably impressed when Yorn responded to her "Yassuh" and her "Naw" — but then, she looked up at me and asked, "How come it always prints out at the edge of the page? Can't you center it?"

But that's another subroutine. □

David Gerrold, P.O. Box 1190, Hollywood, CA 90028.

```
1010REN -----YORN
1020INPUT I$
1030RESTORE 1080
1040READ A$,Z\IF A$="zzz" THEN 1060\A=LEN(A$)
1050IF I$(1,A)<>A$ THEN 1040
1060ON ABS(Z) GOTO 1070,1100
1070RETURN
1080DATA "Y",1,"y",1,"N",-1,"n",-1
1090DATA "zzz",2
1100PRINT "'Yes' or 'no', please."
1110GOTO1020
READY
```



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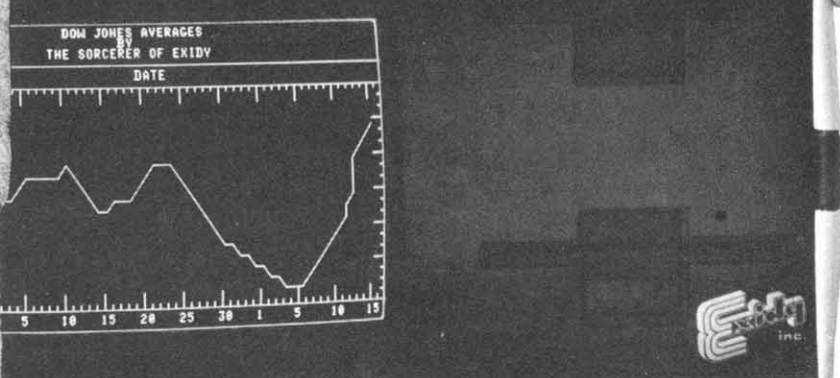
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# Gimme, gimme."



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CIRCLE 216 ON READER SERVICE CARD

# Intelligent Computer Games



David Levy

*Correspondence is welcome. Letters with interesting questions and ideas will be used in the column along with a response. No personal replies can be made. Send to: David Levy, 104 Hamilton Terrace, London NW8 9UP, England*

## Games with Big Trees

Last month we discussed the use of the minimax method to search game trees, using noughts and crosses (tic-tac-toe) as our example. This is a game with sufficient symmetry to reduce the number of essentially different moves at the start to three: the center, a corner, or the middle of an edge. At the second ply there are a total of 12 essentially different positions, so with only seven spaces then remaining there will be an upper bound of  $12 \times 7$  on the total number of terminal positions in the whole of the game tree. In practice the total will be somewhat less than this figure, since a number of paths will lead to a win for one side or the other, or a draw (i.e. a position in which every row, column and diagonal has at least one "O" and one "X" in it), before all nine elements of the  $3 \times 3$  array have been filled. In order to play a perfect game of noughts and crosses with the crudest of evaluation functions, we could search the game tree exhaustively, using a score of +1 for a variation won by the program, -1 for a variation won by the opponent, and 0 for a draw.

Most interesting two-person games have much larger trees than this: in chess there are roughly one million terminal positions in an average 4-ply search, in Go the figure would be ten thousand million for a 4-ply search at the start of the game. How can we cope with such gigantic combinatorial growth in our game trees? The answer lies in a refinement of the

minimax method known as the alpha-beta algorithm.

## The Alpha-Beta Algorithm

The alpha-beta algorithm owes its power to the argument that if a player can choose from a number of moves, once he finds one move which serves his purpose he need not examine the

remainder of the moves in that group. Let us look at a simple two-person game tree to illustrate this point.

(See Figure 1)

We shall assume that a program searches the above tree from left to right, and that the evaluation function assigns scores of 8, 5 and 3 respectively to the terminal nodes  $P_{11}$ ,  $P_{12}$  and  $P_{21}$ . If the program is to move from position  $P_0$ , it first considers move  $m_1$ , and then tries to decide what its opponent will do from position  $P_1$ . The opponent may choose between scores of 8 and 5, and since we have adopted the convention that the opponent's target is a low score, the opponent will choose position  $P_{12}$  with a score of 5.

The program now knows that if it chooses  $m_1$ , its opponent can prevent it from achieving a score of more than 5. This value of 5 is therefore the value

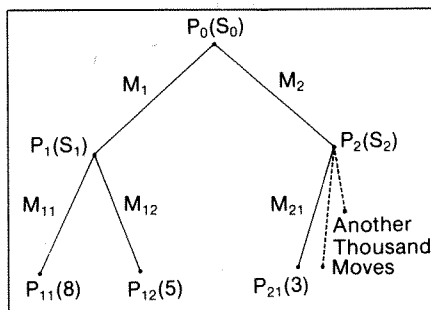


FIGURE 1.

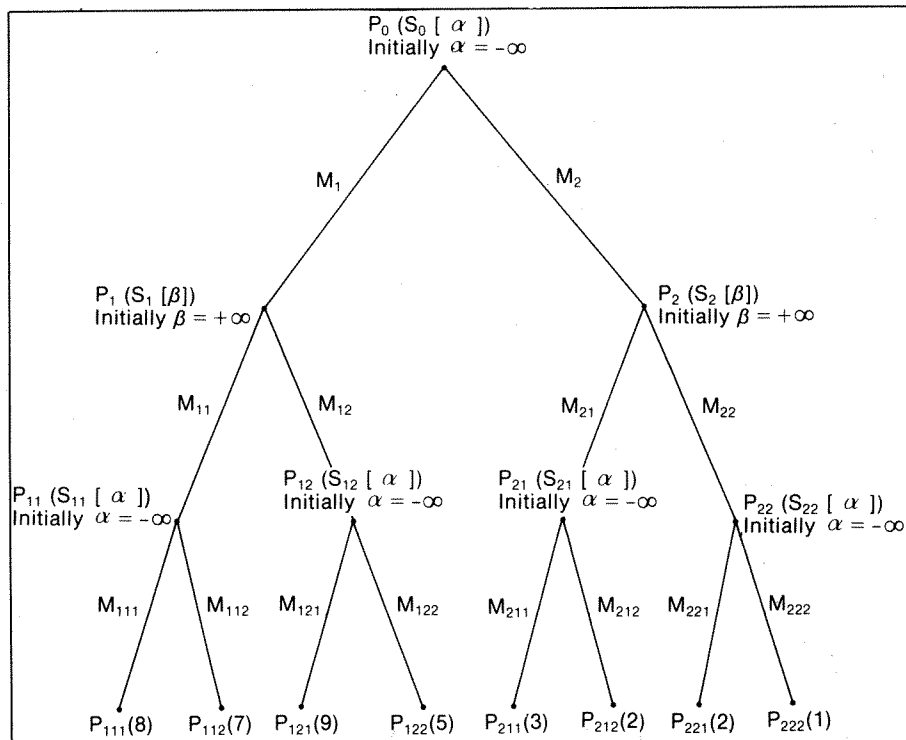
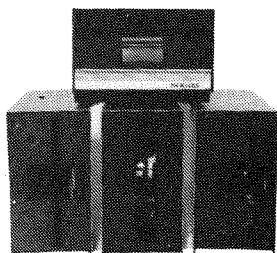


FIGURE 2.



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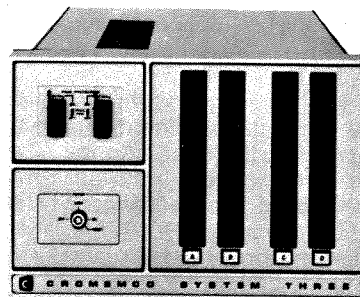
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for (i = 1; i < 30000; i++) x = 5;  
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of position  $P_1$ , assuming correct play by the opponent, and so the value 5 is assigned to  $S_1$ . We call this process of assigning values as the program backtracks up the tree "backing-up."

The score at  $S_1$  is now backed up to  $S_0$  and the program then considers position  $P_2$ , to determine whether it will prefer to play move  $m_1$  or  $m_2$ . It sees that from position  $P_2$  its opponent can, if he wishes, move to  $P_{21}$  for a score of 3, and since 3 is better than 5 from the opponent's point of view, the program will wish to deny its opponent this option and it will not, therefore, choose move  $m_2$ . It is completely irrelevant what the scores are for the thousands of unexamined brother nodes,  $P_{2,2}, P_{2,3}, \dots, P_{2,1001}$ , because the move  $m_{21}$  is already known to refute  $m_2$ . Thus the program has determined that  $m_1$  is better than  $m_2$ , even though it has examined only 3 of the 1,002 terminal nodes on the tree!

Of course this particular example has been specifically designed to sell you the alpha-beta algorithm, and most game trees do not allow us to get away so lightly, but the savings achieved with this algorithm are certainly substantial enough to make alpha-beta an almost essential segment in any program that searches two person-game trees. The algorithm always chooses the same move that would be selected by the minimax algorithm, but usually in a fraction of the time.

Since alpha-beta is so important in game playing, I make no apologies for including another, more complex example. This will show how the method works for a 3-ply tree and will illustrate why it has been given its strange name.

(See Figure 2)

Initially, all non-terminal nodes at even ply are assigned the value  $-\infty$  ( $\alpha$ ). All non-terminal nodes at odd ply are assigned the value  $+\infty$  ( $\beta$ ). As usual it is the program's turn to move from the root position  $P_0$ , and the program is trying to maximize the value of  $\alpha$ . The opponent moves from positions  $P_1$  and  $P_2$ , trying to minimize the value of  $\beta$ . The program moves from the positions at ply-2 ( $P_{11}$ ,  $P_{12}$ ,  $P_{21}$  and  $P_{22}$ ), trying to maximize  $\alpha$ .

The tree search now proceeds as follows:

1. Examine  $P_{111}$ . The score of 8 is greater than  $-\infty$  so  $\alpha$  at  $S_{11}$  is set to 8. This score is then compared with  $\beta$  at  $S_1$  and found to be less than  $+\infty$ , so this value of  $\beta$  is also set to 8. In order to decide whether the program might be willing to play  $m_1$ , this score of 8 at  $S_1$  is compared with  $-\infty$  at  $S_0$  and found to be greater, so  $\alpha$  at  $S_0$  is set to 8.

2. Examine  $P_{112}$ . The score of 7 is less than  $\alpha$  at  $S_{11}$ , which is now 8, and since it is intended to maximize  $\alpha$ , the value of  $\alpha$  at  $S_{11}$  is not adjusted, and therefore the value of  $\beta$  at  $S_1$  and that of  $\alpha$  at  $S_0$  also remain unchanged.

3. Examine  $P_{121}$ . The score of 9 is greater than  $-\infty$ , so  $\alpha$  at  $S_{12}$  is set to 9. This score is then compared with  $\beta$  at  $S_1$  and found to be greater, and since it is intended to minimize  $\beta$  the program can reject move  $m_{12}$ , knowing that its opponent can do better with move  $m_{11}$ .

4. The left hand side of the tree has now been examined and the search proceeds to the comparison of the best score achieved so far (8) with whatever can be reached, assuming

cussion of the theoretical and practical results of this research is well beyond the scope of this series, but the studious reader will find this work well documented in the bibliographic references found at the conclusion of this article. What follows is a summary of the most important results, and a brief discussion of their significance.

Monroe Newborn has investigated the power of the alpha-beta algorithm when searching game trees in which the moves within any group are examined in a random order. The following table shows, for various branching factors (b), the number of terminal nodes which we would expect a program to examine, using alpha-beta, in searches of 2 and 3-ply.

| 2-ply search |                      |             | 3-ply search         |             |
|--------------|----------------------|-------------|----------------------|-------------|
| b            | total terminal nodes | expectation | total terminal nodes | expectation |
| 2            | 4                    | 3.67        | 8                    | 6.84        |
| 4            | 16                   | 12.14       | 64                   | 40.11       |
| 8            | 64                   | 38.65       | 512                  | 220.37      |
| 16           | 256                  | 122.11      | 4096                 | 1214.45     |

TABLE 1.

best play by both sides, if the program should choose  $m_2$ . This part of the search commences with an examination of  $P_{211}$ , which is found to have a score of 3. This is compared with  $\alpha$  at  $S_{21}$  and found to be greater, and since it is intended to maximize  $\alpha$  the program will set this value of  $\alpha$  to 3.

5. Examine  $P_{212}$ . The score of 2 is less than 3, so  $\alpha$  at  $S_{21}$  (currently 3) is left unchanged, since it is intended to maximize  $\alpha$ . This score of 3 is then compared with  $\beta$  at  $S_2$ , found to be lower, and since it is intended to minimize  $\beta$  this value of  $\beta$  at  $S_2$  is set to 3. Finally this value of 3 is compared with  $\alpha$  at  $S_0$  (currently 8) and found to be lower. Since it is intended to maximize  $\alpha$ , the program already knows that  $m_2$  is inferior to  $m_1$ , because playing  $m_2$  is not consistent with maximizing  $\alpha$ .

The search is now over and it can be seen that only five of the eight terminal nodes needed to be examined. If you wish to verify the validity of this process by practical means, try assigning different sets of values to positions  $P_{122}$ ,  $P_{221}$  and  $P_{222}$ , and you will always find that the program prefers move  $m_1$  to move  $m_2$ .

### How Powerful is the Alpha-Beta Algorithm?

During the past few years there has been considerable research into the question of just how big are the savings achieved using this algorithm rather than simple minimax. A full dis-

It will be seen that as the branching factor increases, so the proportion of nodes that can be ignored thanks to the alpha-beta algorithm also increases. And as the depth of search increases the effect of the algorithm is again increased. So the bigger the tree becomes, the greater will be the savings using the alpha-beta method.

The savings become even more dramatic when the branches of the tree are examined in an intelligent order. In general it is true to say that within any group of moves the best one should be examined first, so that if the best one is not good enough we need not waste time in examining the second best, third best and inferior moves. If the tree is searched in such a way that the moves are examined in their optimal order, then the number of terminal nodes examined will be approximately  $2 \times N$ , where N is the total number of terminal nodes on the tree. Thus, for a game of chess in which the branching factor is typically 36, the number of terminal nodes on the tree is  $36^4$  for a 4-ply tree. Yet by using the alpha-beta algorithm, if the tree is optimally ordered we need examine only  $2 \times 36^2$  terminal nodes before we find the best move from the root of the tree, a saving of well over 99% when compared with the simple minimax method.

Taking the figures from Newborn's results quoted above, we can compare the expected number of nodes examined with random ordering and the number of nodes examined with optimal ordering.

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| 16 | 122.11       | 31       | 1214.45      | 127      |

TABLE 2.

I hope that the reader is now convinced that for all two-person game trees, except the smallest of the small, alpha-beta is a must. The most important implication of these results is that if it is at all possible, you should generate and/or examine the moves within any group or family in such a way as to take maximum advantage of the savings that can be achieved, and this means ordering the search in some way. We shall discuss various techniques for speeding up the alpha-beta search in our next month's article, but one obvious method can be mentioned here. First, generate all the moves at the root of the tree,  $m_1, m_2, \dots$  etc., and evaluate the resulting positions with the evaluation function. Sort the moves so that the move with the highest score will be examined first, then the move with the next highest, and so on.

Next look at the first position on the list and generate its successor positions. These are assigned scores using the evaluation function and they are then sorted, this time with the lowest scored position coming at the top of the list and the highest scored position at the bottom. (This is because the program's opponent is trying to minimize the score.)

This process is repeated all the way down the tree, except for the terminal nodes, which are not sorted. Now, when searching the tree with the alpha-beta algorithm, the tree will be found to be much nearer an optimally sorted tree than if this process had not been applied. One disadvantage of this method, however, is that it requires us to keep in memory all the successor nodes to each node on the principal variation, apart from the terminal nodes. So in a search of a chess tree, with 36 moves at each node, this method would require us to keep in memory:

- a) the root node
- b) 36 nodes at each level of look-ahead apart from the terminal node.

In order to combat this problem we might try to find an extremely compact method of representing a position, but if this compactness results in a slowing down of the search process while each position is unravelled or created, much of the effect of the fast alpha-beta algorithm will be lost. Such problems require careful thought and it is often necessary to experiment before the best balance is achieved between

representation and optimality of search.

Other useful techniques for examining the moves in a sensible order can often be found by thinking a little about the nature of the game. Let us consider once again the game of noughts and crosses. The elements of the  $3 \times 3$  array might be numbered as in the following diagram:

|   |   |   |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |

A simple way to generate all the legal moves from any position is to look at the elements, starting with 1 and working up to 9, and putting any empty space on the move list. But with a basic knowledge of the strategy of the game we can speed up the search process by looking first at element 5, then 1, 3, 7 and 9, and finally at 2, 4, 6 and 8. This method of move generation takes no longer than 1, 2, 3, 4,  $\dots$  9, yet it enables the alpha-beta algorithm to examine the moves in a more sensible order, thereby taking us closer to an optimal search process.

Next month we shall examine a flow-chart for the alpha-beta algorithm and look at further ideas for speeding up the search process.

### Task for the Month

Write a program to play noughts and crosses (tic-tac-toe), taking advantage of symmetry and employing the alpha-beta algorithm. Search the whole game tree using the primitive evaluation function described above (+1 is a win for the program, -1 a win for the opponent and 0 a draw).

Test the program a) when the moves are generated in a random order; and b) when the moves are generated in the order: centre, corners, middle of edges. The results should indicate a useful improvement with ordered search over random search.

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Knuth, D.E., and Moore, R.W.: *An Analysis of Alpha-Beta Pruning*. Artificial Intelligence, vol. 6, pp. 293-326, 1975.

Newborn, M.M.: *The Efficiency of the Alpha-Beta Search on Trees with Branch-dependent Terminal Node Scores*. Artificial Intelligence, vol. 8, pp. 137-153, 1977.

### Acknowledgement

This program was written on an Apple II computer which was purchased through Grant A0260 from the National Science and Engineering Council of America.

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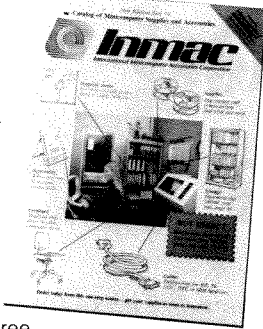
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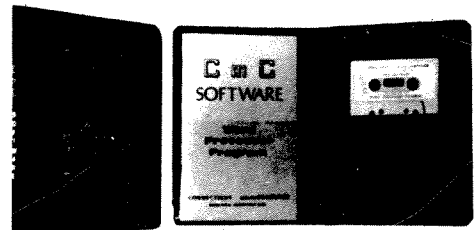
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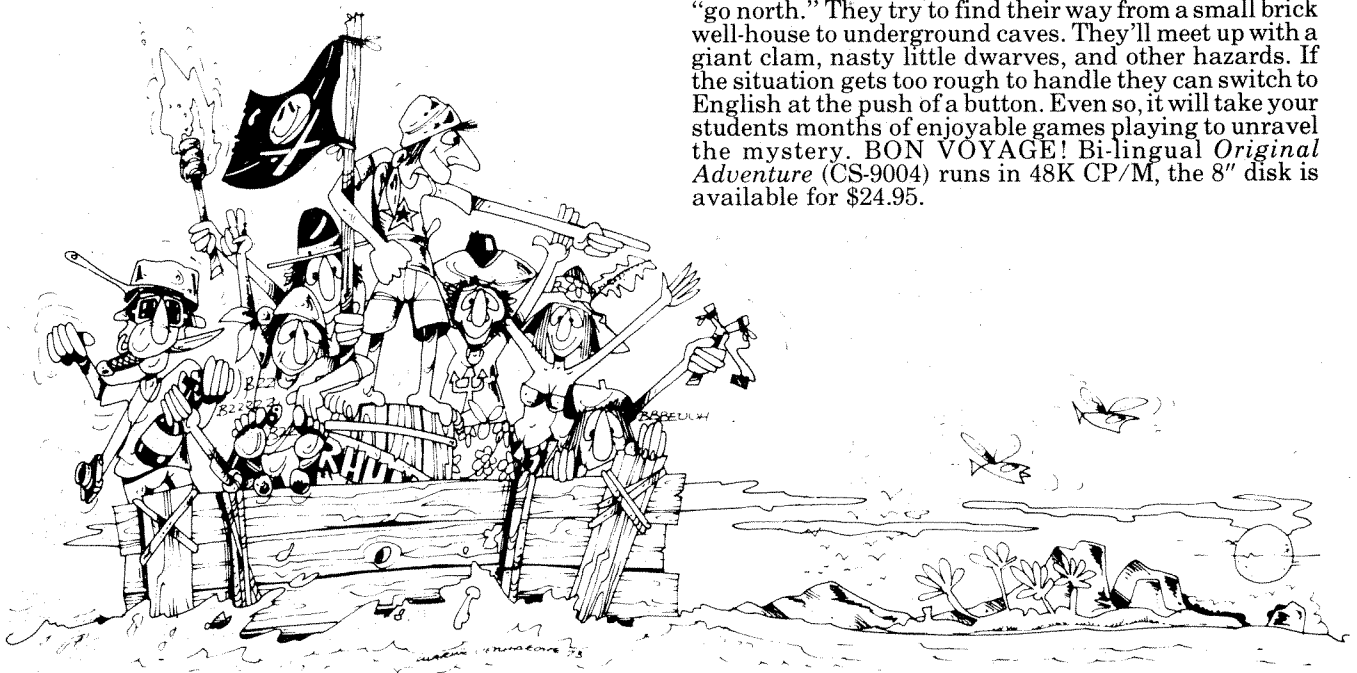
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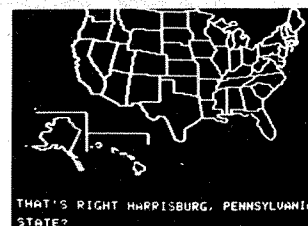
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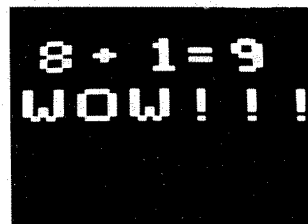
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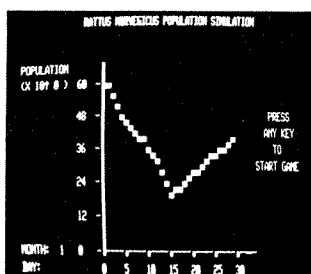
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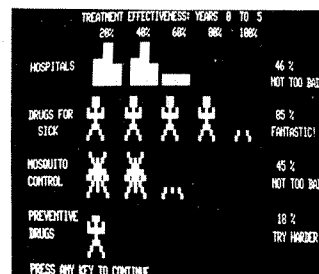
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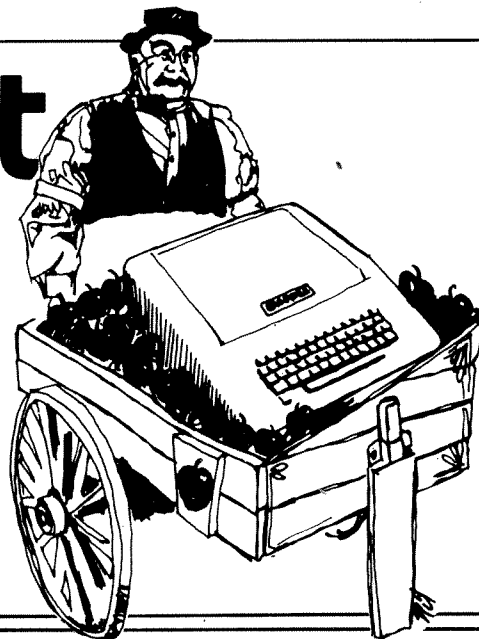
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## Simple File Builder

One of the most useful features associated with the Apple II DOS is the use of files. Files can include anything from a matrix of data as a result of mathematical calculations to a sophisticated Data Base Management System. Listing 1 is an example of a simple file builder and manager. Random access, fixed length files, are used in this example. At this level, sequential files, of fixed length, would have been just as easy to implement. But that's not part of this story.

Most of the elements required to manage a file system are used in this example. Here's what has been included:

- Initialization Routines
- Error Detection Routine
- An Operating System Section
- Building New Files
- Adding New Records
- List Records with Suspension
- Keyword Search
- Record Editing

The initializing and error detecting sections are transparent to the user. The others are included in the operating section as menu options. Other menu selections could include printer selection and control, and sorting. We'll leave these for the future. Let's examine each section of the Simple File Builder and see what it's all about.

### Initialize

After clearing the screen with HOME, the program is directed to line 2720 if an error occurs. In one part of the program an error is forced, and used to change the flow of the program. Otherwise, if an error occurs, the program returns to the options menu. If you use control C the effect is the same as an error. The forced error, #5 in line 2720, is an out-of-data error.

When a new file is named and you try to read it, this error occurs. There are no records to read. The error is trapped and the program directs you to the Build New Records option. More on this when we get to the Operating System. Other tasks handled in the initialization routine are setting up the control D required to identify DOS commands, dimensioning the number of records (R\$) and setting the initial count of the record counter (C).

Line 1110 turns the NOMON controls on. Sometimes it is desirable to see some of the data passing to or from the disk. In this program, I turned everything off. In line 1120, my clock routine is loaded into memory for future use. If there is no routine there, an error will be generated and mess things up. Leave it out or substitute something else here. Lines 1130 to 1160 print a heading and ask for the name of a file. Enter the name of your first file — something like Inventory or Apple II Articles — and press RETURN. The program now passes on through the System Variables listing to the Operating System.

### Operating System

The Operating System is a section of the program including an option selection menu and control for directing input requests. Line 1350 CALLs a Mountain Hardware clock output routine. The date and time is available each time the options menu is selected. An error will occur if you try to use this command without a legitimate routine to CALL. In fact, a CALL to nothing in particular will blow the program. Options for the file are printed by lines 1380 to 1430. Existence of a file is checked in lines 1440 through 1480. If the file, named in line 1150, previously existed, then the number of records are posted on the screen

along with the name of the file. If the file named is a new file and no records existed, then error #5 is generated.

These lines (1440 - 1480) use DOS commands to make the test for a file. Line 1440 is used to OPEN the file F\$ with a length of 40 characters in each record. The contents of record 0 are READ in line 1450 to INPUT the value C, the record count. It is at this point that the OUT OF DATA error, #5, occurs and Build New Records option is selected for a new file. If the MON I,O,C commands were left on at this point, you would see the error displayed on the screen. If there is an existing file, the file is CLOSED in line 1460. The number of records and the name of the file are displayed in line 1470. Input for the option selection is accepted in line 1480 and tested for range in lines 1490 and 1500. Numbers greater than 5 return the program back to the options list again. A zero POKes the DOS error register back to zero, CLOSEs the file, sets SPEED back to the fastest value, and ENDs the program. Line 1510 sends the program to the program line number corresponding to the file option selected. Branches occur according to the value of S, like this:

```
S=1, GOTO 1520 - Build the File
S=2, GOTO 1620 - Add Records
S=3, GOTO 1900 - List Records
S=4, GOTO 2110 - Edit a Record
S=5, GOTO 2350 -
      Keyword Search
```

Because numbers greater than 5 are trapped and zero stops the program, branching to the requested option is quite reliable.

### New and Bigger

Building a new file and adding records options do essentially the same thing. The new file has to start at one and new record adds start at the

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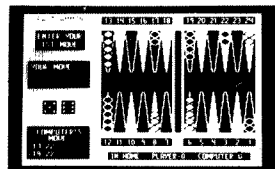
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## Apple Cart, cont'd...

last record plus one. Otherwise, the file must first be OPENed and prepared for accepting records. Let's start with BUILD FILE and detail the steps used for this segment of the program.

To start the file building process, a short reminder of the option and file name are printed by line 1560. The named file is OPENed in line 1570 for a length of 40 characters. This length was chosen because the output is listed only on the screen. Next, line 1580 uses a control D to halt DOS action. Doing this prevents further program activity from creating garbage in the file. Line 1770 prints the current record number and waits for INPUT. A test for file END is included in line 1780. If the input is END, the program branches to line 1840 and record processing is concluded. Line 1790 makes DOS active again for a WRITE and line 1800 PRINTs (or WRITEs) the record to the DOS buffer. The buffer accepts up to 256 characters and then transfers them automatically to the disk. The buffer contents get transferred to the disk when the file is CLOSEd, too. DOS action is stopped again in line 1810, the record counter is incremented in line 1820 and the program returns for another record at line 1830. This loop continues until the input equals END in line 1780 and the branch to line 1840 is taken.

No new record was added when END was typed. So the counter (C) is decremented and the result printed in line 1840. DOS is again activated and the current record count is written into record zero. Lines 1850 and 1860 do the record count work, and line 1870 CLOSEs the file. In line 1880, a GET command in combination with CHR\$(13) is used to exclude all key input except RETURN. When RETURN is pressed, the program returns to the option menu.

Adding records uses two more steps than starting a new file. First, the previous record count is READ in from record zero. Then, the last record entered is READ. This is accomplished in lines 1700 and 1720. The record number and the record are printed in line 1740. Having this information on the screen provides a model for subsequent entries. The record count is incremented in line 1760 and the rest is the same as new record processing.

### Listing Records

Up to line 2000, the List program functions are much the same as processing new and added records. Line 2010 starts a loop that lists the

contents of the file. A file suspension routine using the WAIT command in combination with a PEEK at the keyboard and a POKE at the keyboard reset is included in line 2020. Each record is INPUT (READ) to the DOS buffer and printed on the screen. When all records are listed, the file is CLOSEd and control is returned to the options menu.

Use of the list option allows scanning the file for one or more records. Speed control is another feature that could be added for listing records. The suspension routine stops and starts the list routine. But, the records still go by quite fast on the screen. Include a line to set the Speed to 125 at the beginning of the listing loop. A header to describe the contents of the file is another possible option. Add a line to put titles on the fields and keep it on the screen with a POKE 34,N.

```
1950 PRINT"DESCRIPTION....COST  
...DATE PUR"  
1955 POKE 34,4
```

```
2006 SPEED=125
```

```
2096 POKE 34,0 : SPEED=255
```

New line 1955 holds the top of the screen at 4 lines until the listing is completed. Be sure to disable or reset any special controls you use. You'll get some funny results otherwise.

Now, suppose you would also like to add the cost figures in the cost column. The records have been used as one continuous string, so something besides adding simple variables together is needed. In this example program, the cost figures start in column 22 and are 7 characters wide. Add lines to add the figures in these columns like this:

```
2004 LET T=0
```

```
2065 LET ST=VAL(MID$(R$,22,7)):  
T=T+ST
```

```
2074 PRINT:PRINT TAB (24) "$";  
INT(T*100+.5)/100
```

Each time a record is READ, line 2055 extracts the VAL of the cost column as a subtotal (ST) and starts summing the total (T). When the list is complete, the final total is printed with a \$ under the cost column. If you change the position of the cost field, be sure to adjust MID\$ and Total TAB too.

### Edit a Record

To edit a record with this very simple editor, you must know the

number of the record(s) to be edited. The technique used is quite simple, but effective for short and simple records. After requesting the record number, the file is opened and prepared for reading records. The requested record will be displayed on the screen with the record number. After it's displayed, you get a chance to change it or leave it alone. If the record was the wrong one, just press N and the record is stored back on the disk unchanged. A Y to change the record displays the INPUT prompt (?) on the screen. You can then type in a new line, being careful to follow the exact format. Or, you can use escape D to move the cursor up to the displayed record. Then use the right arrow key to move to the part of the record to be changed. Retype the changes as needed and move the cursor to the end of the line. Press RETURN. The new record will be put on the disk in place of the old one. A bit more sophisticated approach would use VTAB and HTAB to position the INPUT prompt at the beginning of the line to be changed. The step to use escape D to move the cursor is not needed if this is done. After all changes are made, the program returns to the option menu. (Remember, I said it was a simple editor.)

### Keyword Search

This routine is useful for finding all the items with the same name or things in the same year or month and so on. For most of the files I am using, I prefer to use a search rather than a sort. For nice ordered lists of things though, a sort is the only way. But, that's a story for another time. Keyword search was described in detail in the January '80 Apple Cart. Most of the detail included opening, reading and closing Apple II DOS files. These details have been covered here too, so on to the meat of the program.



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## Apple Cart, cont'd...

After requesting the keyword to be located, the file is OPENed and prepared for READING records. A loop for calling-up each record starts at line 2510. Each record is then scanned, 1 character at a time, for the keyword. If a keyword is found, the record is displayed and a flag is set. The program returns for the next record and continues the search. If no keywords were found, a prompt to look for another keyword is displayed. If records were found containing the keyword, you are also given the option to make changes. The option to search for more keywords is also displayed. Answering No to both of the prompts returns the program to the option menu.

### More Zing

Several times during this discussion the simplicity of the program has been emphasized. There are a number of features that would make using file more productive. Each improvement would make the program more confusing and difficult to explain. A program for cataloging magazine articles from Southeastern Software uses a number of clever features. The human factors of using the program were greatly improved by the techniques used. Inclusion of sort routines and more ideas for building records and formatting will be included in future columns.

### Basic on Videotape

Videocassettes teaching computer applications and programming fundamentals are now available to businesses and schools. The concept, called Evolution 1 (TM), was created by Dr. Portia Isaacson of Electronic Data Systems (EDS) in Dallas.

Currently available are 4 tapes of interest to potential Apple owners (and other beginning Basic programmers). The videotape presentation, using familiar analogies, makes no assumptions about prior knowledge of computers or programming. Lesson 1 starts with instructions on getting the computer operating. The viewer is then taught to use several Basic programming commands in a refreshing, unhurried manner. By the end of the fourth tape, the viewer has acquired sufficient skill to proceed with confidence, to more advanced challenges. Each tape is accompanied by a study booklet. The booklets are easy to use and effectively reinforce learning through color highlighted text and representations of a video screen. The booklets could be used separately but all the supporting information from the

tape presentation would be lost. Additional tapes, teaching more advanced Basic, are planned.

Other videotapes in the Evolution 1 (TM) series include 2 Point Of Sale (POS) tapes and 2 Business application tapes. The POS tapes are designed to support retail sales people with technical information. Business applications illustrate techniques for using a small computer in a small business. Three new lessons are planned for the business series too. The newest entries include an 8 tape series titled 'Little Computers . . . See How They Run.' These tapes describe various microcomputer features and accessories including detail of the microprocessor chip itself.

Tapes are available to computer retailers, distributors, educational people and corporations on a lease basis. The lease rate is \$35.00 per month per tape with a 6 tape minimum. Tapes can be mixed in combinations. These tapes can be exchanged during the year for a \$40.00 fee. One set of study booklets comes with each tape series. Additional sets cost \$10.00 to \$20.00 per set.

For more information, call Evolution 1 at 800-527-0278 (in Texas, 214-661-4070), or write them at 14580 Midway Road, Dallas, TX 75234. Also, look for these videocassettes at your local computer store.

### Super Invader: A Review

This recreational diversion (sometimes called a game) is addictive. The constant challenge for higher and higher scores closely parallels gambling. Except you have nothing to lose but your sanity.

Super Invaders, by M. Hata, is a real time, interactive high-res graphics program. Graphics implementation is excellent. Animation is included as the invaders flap their way towards destruction of your cannons and your blockade. An invader cheering section adds insult to injury each time one of your laser cannons is destroyed. However, there is some retribution as the cheering section shows remorse when the last invader in each wave is destroyed. A high-flying 'saucer' provides additional scoring as it flies at random across the top of the screen. Space sounds are used to emphasize the affect of laser fire, invader demise and to announce the flight of the saucer. The randomness of various scoring features adds to the challenge of going-for-more.

As of the date this is being written (mid Jan '80), my son has achieved a score of over 5800. My score is somewhat less. Super Invaders has been described as the game that drove

Japan crazy. I'm sure you will agree once you've tried it (and tried it and tried it . . .). The game is available from such diverse sources as Creative Computing Software (see add on page 23) and from your local computer store. The cost is \$19.95 on tape or diskette.

### Data Base Management System

If you're looking for a technically well designed Data Base Management System, try the one from High Technology. The system has many features allowing flexible data base operations. There are also some not-so-good features. This is how I would summarize my evaluation:

- Software Engineering . . . . Excellent
- Human Factors . . . . . Poor
- Documentation . . . . . Marginal

Once set-up, the features and flexibility of the system make it excellent for use with structured data base requirements. For instance, mailing lists, customer records, inventory management and perhaps some types of personal record management. For our application, a structured diskography using 9 files with 4 sorts including 2 secondary and 1 tertiary sort, the system is an excellent choice. A listing of our master file set-up is shown in Figure 1. Let's look at the not-so-good things first and get them out of the way.

### Human Factors

The complexity of the set-up requirements precludes use of this system by many people not familiar with programming. Even though the program software is well engineered, the lack of helpful prompts and examples geared to a non-technical target population minimize its usefulness. Correction of errors is clumsy: A RESET and rebooting is the only way you can recover from a processing error (one that sets off an obnoxious siren sound). For an input entry error, you must complete all input for the record, then call the MODIFY option. Once in operation, use is simpler, but there are still a large number of entries required to access the data. Also, there are no easily understood error messages.

### Documentation

There are only 23 partially filled pages of documentation in a 3 ring binder. The documentation consists of brief descriptions of each menu option. The descriptions do not include meaningful examples, and little consideration is given to interactions between options. For instance, it is necessary to use option 13 before you



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The ANA1 two letter user commands are: CA = Calculate, no graph. CG = Clear Graphs, leave Grids. CK = Checking out program, known data. CO = Color of next graph (red, green, violet, white, blue). CS = Clear Screen. DL = Draw Line between points. FI = Filter data for time, magnitude, or percent change. FU = Data, transform, or constant Function with +, -, x, / operator. GD = Graphic mode, display all Graph Data on screen. GR = Graph data to screen. GS = Set Grid Scale. HE = Help, summary of any commands usage. LD = Load Data from disk file from inputted date to memory. LG = Leave Graphs, automatic Grid rescaling. LO = Look, select a range of the LD data and GR; All commands can now be used on this range. LS = Least squares linear fit of the data. MA = Moving Average of the data. NS = No Scale, next graph on screen does not use Grid Scale. NT = No Trace. PR = User implemented Printer routine. TD = Text mode, display Text Data on screen. TI = Time number to date or vice versa. TR = Trace. TS = Text Stop for number of lines outputted to screen when in TD. U1/U2 = User 1/2 implemented routines. VD = Values of Data outputted in text. VG = Values of Grid; low/high/delta. VT = Values of Transform outputted in text.

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P.O. BOX 22072  
SAN DIEGO, CA 92122**

\* Software Review in Call-A-P.P.L.E. (2/80): "An example of an excellent piece of software exploiting most of Apple II's major features." Overall Rating = 92.1

\* Software Review in Apple Orchard (3/80): "A remarkably flexible approach to the analysis and plotting of any time series data." Overall Rating = 85.7

CIRCLE 147 ON READER SERVICE CARD

## Apple Cart, cont'd...

can use option 2. Another shortcoming was the description of 'Literals' in the menu option 7. These turned out to be optional field headings for use with the output formatting set-up. The literals would replace the names of fields used for the print out. In all menu options, it is not apparent what the input limitations are. You are left to your own devices to find out. Some walk-through examples are needed.

One other item. There is no way to know how much space is used or is left on the text file disk. By another method, I found there are about 100K bytes of space on a formatted disk. Our records are 224 bytes long and 250 of them used about 75K. Allow about 10% for the sorting keys, formatting files and other overhead and there was something over 20K left for additions and changes.

### The Good Stuff

Part of the confusion when first using this system comes from its complexity. You can do a great many things with this data base. A certain learning experience is needed before you can become comfortable with the system. Here's a list of some of the features included in the 14 menu options:

- Develop a named data base with up to 20 fields, set the size of each field in the record (255 characters per record), and designate whether each field is alpha or numeric. Up to 10 additional field names — called literals — are also allowed.

- Sort on any field number, and any combination of up to 10 sub and sub-sub fields.

- Set-up and change master program parameters to allow for format and data base variations. Options include printer slot, printer type, lines per page, number of printed columns — up to 250, name of file in use and the slot the text file disk is in.

- A variety of options to create and change the data base, enter the data, search for records and other useful housekeeping operations.

- Develop your own format for printing the data. You can include several formats on the text file disk. Another option prints the data base in a mailing list format. Input has to be developed a specific way to use this option. The option to total numbers in any column is also included.

- Initialize a diskette and exit from the system are two more options included in the menu.

When using any DBM system, keep in mind the speed of sorting operations. Even though it is realistic

to manage a large amount of data with your Apple II, don't expect to do it very fast. There is not enough RAM memory left to hold more than a few Kbytes of records at a time. Consequently, a lot of swapping takes place between the disk and memory when large files are sorted. In Figure 1, the number of sorts and sub sorts used is 7. We found that sorting 250 records required one-half hour. Once sorted into keyed files however, the data was quickly retrieved. Printing a copy of the file was as fast as the printer could go.

### Not Too Bad Really

High Technologies DBM system is a powerful tool and will do a lot of work for you. I discussed many of the items here with Nancy Galloway, Software Manager, at High Technology. She was quite helpful and suggested several things to simplify use of the system. Among them was the idea to set-up your master file on the text diskette and then use it for a master. Make copies and use the copies for saving your various data files. Nancy also mentioned that many improvements are being made in the system.

Even though I found the system awkward to use at first, I have not found any other that will do the job better. The system is available at computer stores. The cost is \$99.50. □

```

RUN
HOME INVENTORY FILE MANAGER
-----
ENTER THE FILE NAME - HOME.INVEN

1980 01/14 20:46:09.640

FILE OPTIONS:

1. BUILD NEW RECORDS
2. ADD MORE RECORDS
3. LIST RECORDS
4. EDIT A RECORD
5. KEYWORD SEARCH
0. END THE PROGRAM

FILE 'HOME.INVEN' CONTAINS 5 RECORDS !

WHICH NUMBER - 3

LIST TEXT FILE - HOME.INVEN

1  COUCH/DAY BED.....1134.95..02/77
2  LOVE SEAT.....0395.89..02/77
3  REFRIGERATOR.....0895.79..09/78
4  WASHER.....0379.55..09/78
5  CASSETTE DECK.....1145.37..12/79

PRESS RETURN TO CONTINUE -

WHICH NUMBER - 3

LIST TEXT FILE - HOME.INVEN

1  COUCH/DAY BED.....1134.95..02/77
2  LOVE SEAT.....0395.89..02/77
3  REFRIGERATOR.....0895.79..09/78
4  WASHER.....0379.55..09/78
5  CASSETTE DECK.....1145.37..12/79

                                $3951.55

PRESS RETURN TO CONTINUE -
```

```

WHICH NUMBER - 5

KEYWORD SEARCH - HOME.INVEN

KEYWORD - 09/78

3 REFRIGERATOR.....0895.79..09/78

4 WASHER.....0379.55..09/78

DO YOU WANT TO EDIT ? Y/N ?N

TRY ANOTHER KEYWORD ? Y/N ?N

PRESS RETURN TO CONTINUE -
```

```

MASTER FILE: (6,2) DISCOGRAPHY DATA FILE.MST

FIELD #   DESCRIPTION           TYPE
-----
1         TITLE                 45,A
2         ARTIST                 35,A
3         COMPOSER               50,A
4         PRODUCER               30,A
5         LABEL                  20,A
6         DATE                   6,N
7         POSITION                 3,N
8         CONDITION              15,A
9         REMARKS                 20,A

SORT #     DESCRIPTION
-----
1          TITLE
2          ARTIST
          *LABEL
          **DATE
3          LABEL
          *DATE
4          POSITION
```

FIGURE 1

```

1000 REM *****
1010 REM * SIMPLE FILE BUILDER *
1020 REM * BY: CHUCK CARPENTER *
1030 REM *****
1040 :
1050 REM ** INITIALIZE **
1060 REM *****
1070 :
1080 HOME
1090 ONERR GOTO 2720
1100 LET D$ = CHR$(4): DIM R$(200): C = 1
1110 PRINT D$:"NOMON I,O,C"
1120 PRINT D$:"BLOAD B.TIME": REM DATE & TIME
1130 HOME : VTAB (2): PRINT "HOME INVENTORY FILE MANAG
ER"
1140 FOR I = 1 TO 27: PRINT "-:": NEXT I: PRINT
1150 INPUT "ENTER THE FILE NAME - ":F$
1160 :
1170 REM ** SYSTEM VARIABLES **
1180 REM *****
1190 :
1200 REM F$= FILE NAME
1210 REM D$= CONTROL D
1220 REM R$= FILE RECORD
1230 REM A$= RETURN (CHR$(13))
1240 REM G$= LOCAL RESPONSE
1250 REM I&J LOCAL VARIABLES
1260 REM C = RECORD COUNT
1270 REM S = OPTION SELECTION
1280 REM R = RECORD # TO EDIT
1290 REM K$= KEYWORD TO SEARCH
1300 REM K = SEARCH FLAG
1310 :
1320 REM ** OPERATING SYSTEM **
1330 REM *****
1340 :
1350 CALL 900: REM DATE & TIME
1360 PRINT : PRINT "FILE OPTIONS:
1370 PRINT
1380 PRINT " 1. BUILD NEW RECORDS"
1390 PRINT " 2. ADD MORE RECORDS"
1400 PRINT " 3. LIST RECORDS"
1410 PRINT " 4. EDIT A RECORD"
1420 PRINT " 5. KEYWORD SEARCH"
1430 PRINT " 0. END THE PROGRAM"
1440 PRINT : PRINT D$:"OPEN":F$:"L40"
1450 PRINT D$:"READ":F$:"R":O: INPUT C
1460 PRINT D$:"CLOSE":F$:""
1470 PRINT "FILE '":F$:"' CONTAINS '":C:" RECORDS !"
1480 PRINT : INPUT "WHICH NUMBER - ":S
1490 IF S > 5 GOTO 1350
1500 IF S = 0 THEN PRINT : PRINT : PRINT "DONE": POKE
216,0: PRINT D$:"CLOSE":F$:"": SPEED= 255: END
1510 ON S GOTO 1520,1620,1900,2110,2350
1520 :
1530 REM ** BUILD THE FILE **
1540 REM *****
1550 :
1560 HOME : VTAB (2): PRINT "BUILD FILE - ":F$:" "
1570 PRINT D$:"OPEN":F$:"L40"
1580 PRINT D$
1590 GOTO 1770
1600 :
1610 REM ** ADD RECORDS **
1620 REM *****
1630 :
1640 HOME
1650 PRINT : VTAB (2): PRINT "ADD FILE RECORDS - ":F
$:":": PRINT
1660 PRINT D$:"OPEN":F$:"L40"
1670 PRINT D$:"READ":F$:"R":O:
1680 INPUT C
1690 PRINT D$:"READ":F$:"R":C
1700 INPUT R$(C)
1710 PRINT D$: PRINT
1720 PRINT "R":C:"": PRINT TAB( 6)R$(C)
1730 PRINT
1740 LET C = C + 1
1750 :
1760 :
1770 PRINT "R":C:" ": INPUT R$(C)
1780 IF R$(C) = "END" GOTO 1840
1790 PRINT D$:"WRITE":F$:"R":C
1800 PRINT R$(C)
1810 PRINT D$
1820 LET C = C + 1
1830 GOTO 1770
1840 LET C = C - 1: PRINT : PRINT C: PRINT
1850 PRINT D$:"WRITE":F$:"R":O
1860 PRINT C
1870 PRINT D$:"CLOSE":F$:""
1880 PRINT : PRINT "PRESS RETURN TO CONTINUE - ": GET
A$: IF A$ = CHR$(13) THEN HOME : VTAB (5): GOTO
1350
1890 HOME : GOTO 1880
1900 :
1910 REM ** LIST RECORDS **
1920 REM *****
1930 :
1940 HOME
1950 PRINT : PRINT "LIST TEXT FILE - ":F$:""
1960 PRINT
1970 PRINT D$:"OPEN":F$:"L40"
1980 PRINT D$:"READ":F$:"R":O
1990 INPUT C
2000 PRINT D$
2010 FOR I = 1 TO C
2020 IF PEEK ( - 16384) > 127 THEN POKE - 16368,0:
WAIT - 16384,128,0: POKE - 16368,0
2030 PRINT D$:"READ":F$:"R":I
2040 INPUT R$(I)
2050 PRINT D$
2060 PRINT I: TAB( 4):R$(I)
2070 NEXT I
2080 PRINT D$:"CLOSE":F$:""
2090 PRINT : PRINT "PRESS RETURN TO CONTINUE - ": GET
A$: IF A$ = CHR$(13) THEN HOME : VTAB (5): GOTO
1350
2100 HOME : GOTO 2090
2110 :
2120 REM ** EDIT A RECORD **
2130 REM *****
2140 :
2150 HOME
2160 PRINT : PRINT "EDIT FILE RECORD - ":F$:"": PRINT
2170 PRINT "ENTER RECORD NUMBER - ": INPUT R: PRINT
2180 PRINT D$:"OPEN":F$:"L40"
2190 PRINT D$:"READ":F$:"R":R
2200 INPUT R$(R)
2210 PRINT D$
2220 PRINT "RECORD '":R:" CHANGES - 35 CHARACTERS MAX."
2230 PRINT : PRINT "RECORD '":R:" ="
2240 PRINT " ": PRINT R$(R)
2250 PRINT : INPUT "DO YOU WANT TO CHANGE IT - Y/N ":G
$: PRINT : IF G$ = "N" GOTO 2320
2260 INPUT R$(R)
2270 :
2280 PRINT D$:"WRITE":F$:"R":R
2290 PRINT R$(R)
2300 PRINT D$:"CLOSE":F$:""
2310 VTAB 17
2320 PRINT "ANY MORE RECORDS Y/N ": INPUT G$: IF G$ =
"Y" GOTO 2110
2330 PRINT : PRINT "PRESS RETURN TO CONTINUE - ": GET
A$: IF A$ = CHR$(13) THEN HOME : VTAB (5): GOTO
1350
2340 HOME : GOTO 2330
2350 :
2360 REM ** KEYWORD SEARCH **
2370 REM *****
2380 :
2390 HOME
2400 PRINT : PRINT "KEYWORD SEARCH - ":F$:""
2410 PRINT : INPUT "KEYWORD - ":K$
2420 LET K = 0
2430 PRINT D$:"OPEN":F$:"L40"
2440 PRINT D$:"READ":F$:"R":O
2450 INPUT C
2460 PRINT D$
2470 FOR J = 1 TO C
2480 PRINT D$:"READ":F$:"R":J
2490 INPUT R$(J)
2500 PRINT D$
2510 FOR I = 1 TO 40 - LEN (K$)
2520 IF MID$( R$(J),I, LEN (K$)) < > K$ GOTO 2550
2530 PRINT : PRINT J: PRINT " ": PRINT R$(J)
2540 LET K = K + 1
2550 NEXT I
2560 NEXT J: PRINT
2570 IF K > 0 GOTO 2610
2580 PRINT : PRINT "NOTHING FOUND - ": PRINT "TRY ANOT
HER KEY WORD ? Y/N "
2590 INPUT G$: IF G$ = "Y" GOTO 2350
2600 IF G$ = "N" GOTO 2660
2610 PRINT D$:"CLOSE":F$:""
2620 PRINT : PRINT "DO YOU WANT TO EDIT ? Y/N "
2630 INPUT G$: IF G$ = "Y" GOTO 2110
2640 PRINT : PRINT "TRY ANOTHER KEYWORD ? Y/N "
2650 INPUT G$: IF G$ = "Y" GOTO 2350
2660 PRINT : PRINT "PRESS RETURN TO CONTINUE - ": GET
A$: IF A$ = CHR$(13) THEN HOME : VTAB (5): GOTO
1350
2670 HOME : GOTO 2660
2680 :
2690 REM ** ERROR ROUTINE **
2700 REM *****
2710 :
2720 IF PEEK (222) < > 5 THEN PRINT "PROCESSING ERR
OR": SPEED= 255: GOTO 1350
2730 IF PEEK (222) = 5 THEN PRINT : PRINT "THIS IS A
NEW FILE": FOR I = 1 TO 5000: NEXT : GOTO 1520
2740 :
2750 REM CRC - 5 JAN 1979
2760 :

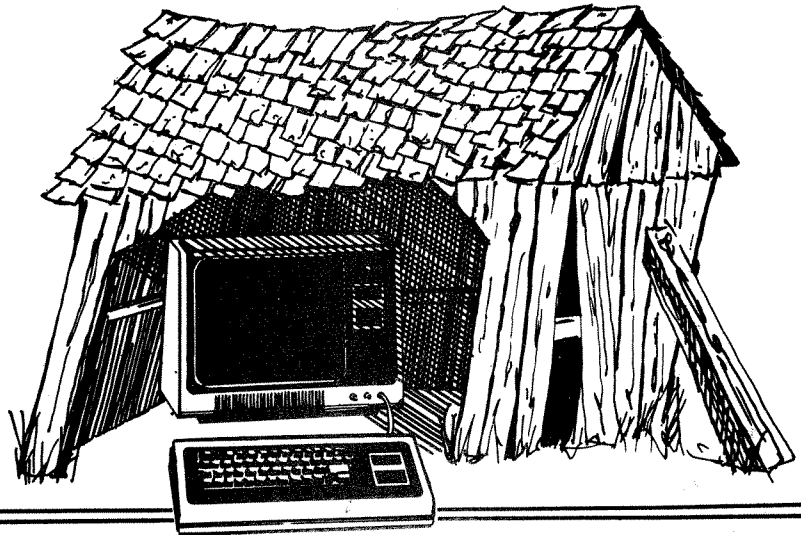
```

LISTING 1



# TRS-80 Strings

Stephen B. Gray



In column 17, we look at kaleidoscope graphics with variations on RND(RND(X)), Radio Shack's mailing-list program, the disappearance of G/2, Hayden's Microtyping program, the fate of four TRS-80 cassette-tape magazines, and a directory that lists hundreds of TRS-80 tapes.

## Variations On RND(RND(X))

In the Kaleidoscope Graphics section of the TRS-80 Strings column for Sep 1979 (p 186), it was shown how to skew the pattern blocks toward the four corners of the four-way-symmetrical design by using RND(RND(X)), and even more by using RND(RND(RND(X))).

The pattern, created by using the same number of RNDs for both the X and Y coordinates, is still four-way symmetrical. A whole new set of patterns, with their own particular attractiveness, can be created by using different numbers of RNDs for X and Y in the general program in the center of page 188, such as with:

```
110 X=RND(RND(A))
120 Y=RND(RND(RND(B)))
```

or the other way around by using

```
110 X=RND(RND(RND(RND(A))))
120 Y=RND(B)
```

Although the patterns are still four-way symmetrical, the more RNDs you use, the more two-way they seem. The first X-Y pair given above will provide a top-and-bottom pattern with a short gap across the middle; the second pair, a left-right pattern with a wider gap across the middle.

Just in case you don't have the September 1979 issue handy, here's the general kaleidoscope pattern, written more compactly:

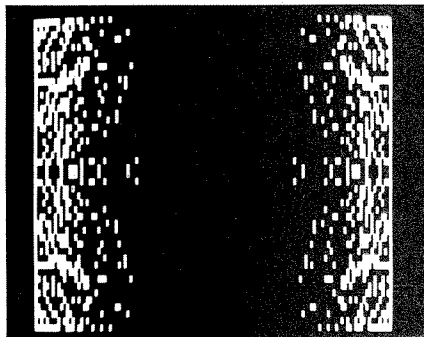
```
100 CLS:INPUT A,B:CLS
110 X=RND(A)
120 Y=RND(B)
130 C=2*A-X:D=2*B-Y
140 SET(X,Y):RESET(X+1,Y+1)
150 SET(X,D+1):RESET(X+1,D)
160 SET(C+1,Y):RESET(C,Y+1)
170 SET(C+1,D+1):RESET(C,D)
180 GOTO 110
```

Try from one to five RNDs for both X and Y. If the graphics blocks were square, you'd have the same type of pattern, turned 90 degrees, if you wrote, for example, one program with three RNDs in X and four in Y, and a second with four RNDs in X and three in Y. But because the graphics block is rectangular, each one of the 25 programs possible with one to five RNDs in both X and Y will produce basically different patterns.

Because these multi-RND patterns are sparser than single-RND ones, they lend themselves more to full-screen kaleidoscope patterns, which are too big and confusing when only one RND is used in both X and Y. Try, for instance,

```
110 X=RND(RND(RND(RND(A))))
120 Y=RND(B)
```

and A,B values of 63,23. You might call

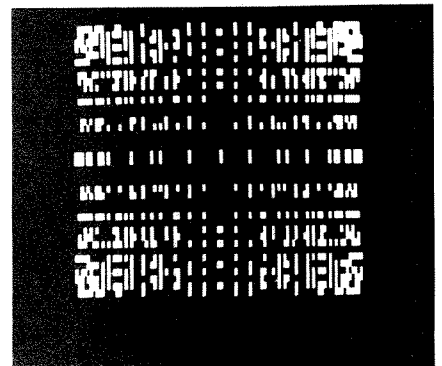


the resulting pattern something like "Twin Aliens Meet In Space," or "Space Garbage Meets Radar Reflector."

For something quite different, substitute these lines for 100-130 in the general program:

```
100 CLS:INPUT A,B,E,F:CLS
110 X=RND(A)*RND(B)
120 Y=RND(E)*RND(F)
130 C=2*A*B-X:D=2*E*F-Y
```

and use values for A,B,E,F such as 10,5,5,4. This looks best during the first few minutes, although at the end it has a certain charm, looking like a moth-eaten Mondrian.



## Cassette Mailing List

This \$19.95 Radio Shack program for a Level-II TRS-80 with at least 16K of ROM is also available at \$39.95 on diskette for 32K two-disk business systems.

According to the manual, typical uses of the Mailing List System are club membership lists, customer lists for advertisement mailings, Christmas card lists, personal telephone directory, and client lists.

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\*Sort timings shown below are nominal times. Times will vary based on sort and system configurations. Nominal times based on Mod I 48K 4-drive configuration, 64 byte records, and 5 sort keys.

| TYPE | FILE SIZE<br>(Bytes) | SORT TIME<br>(Sec) | TYPE                | FILE SIZE<br>(Bytes) | SORT TIME<br>(Sec) |
|------|----------------------|--------------------|---------------------|----------------------|--------------------|
| SORT | 16K                  | 33                 | SORT                | 340K                 | 1081               |
| SORT | 32K                  | 49                 | SORT                | 680K                 | 2569               |
| SORT | 85K                  | 173                | SORT and 85K SORT + |                      | 1757               |
| SORT | 170K                 | 445                | MERGE               | 1275K Merge          |                    |

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## Strings, cont'd...

For most of these uses, you'll want labels, which means you'll also need a tractor-feed line printer, expansion interface and labels, all of which Radio Shack can supply; the 3½-by-15/16-inch labels are Cat. No. 26-1404.

After you load in the tape, you get a menu:

(A)DD NAMES TO THE MAILING LIST  
(R)EAD MAILING LIST FROM TAPE  
(S)EARCH/CHANGE THE MAILING LIST  
(L)IST NAMES ON THE SCREEN  
(P)RINT MAILING LIST  
(W)RITE MAILING LIST ON TAPE

You select one of the six options by typing the first letter of the command. If you select the first, you have the choice of including a telephone number or company name in the address, but not both. You enter name, company or telephone number, address, city, state, zip and, if you've opted to include it, a select code.

You may wish, as the manual says, to use the select code to indicate whether a person in your club-membership list has paid his dues. Using this code, "the club could then print labels for paid-up members to send them activities notices, and later print another set of labels for members-in-bad-standing to send them payment reminders."

Or you could print labels only for people who live in a certain state or city, or who have a zip code beginning with certain digits.

You can type the name with the family name first or last, but the program sorts according to the first name on the first line. So if you want the names to be sorted according to family name, you enter them in directory style, separating the last name from the first with a comma. When the labels are printed, the program will rearrange the name to print the first name first and the last name last.

Pressing L causes the names in memory to be listed on the screen, just the names only, in alphabetical order. Pressing S lets you locate a particular name for reference or alteration. You enter enough letters of the name to identify it, and you get a new menu, with six choices, along with the name and accompanying information. You can then display the name before or after the one on view, delete the name displayed, change part of the information, cancel the changes made, or search for a new name.

To print mailing labels, press P. The program asks if you want to print labels for the whole list, and if not, which field you would like to use for a select code, and then requests that you

"type in a value for the select code." If you want to print labels only for members in Oshkosh, you type in OSHKOSH as the select code. Or, as the manual states, "This feature is especially useful when applied to the zip code field. By specifying the first 3 digits of the zip code, you can print labels for 'sorted bundles' and take advantage of reduced postal rates."

The program asks if you want a trial printing run, so you can align the labels and adjust the character size (if you're using a printer with that feature). If you reply Y instead of N, the first label will be printed three times. Once the labels are aligned, reply N for "no more trial runs" and press ENTER to start printing.

When printing is completed, the program asks if you want to read in any more tapes, which allows you to load additional names into memory and continue printing with the same selection criterion.

Cassette tapes are used to save names and addresses, so there is no limit to the number of cassette tapes you can create with the system. There is, however, a limit to the number of names on each tape, and it's a function of your TRS-80's memory size. If the average list entry is 50 characters long, you can put up to 150 names into 16K of RAM memory, up to 450 with 32K, and up to 750 with 48K.

The cassette program is packaged in a ring binder with one program cassette, one C-20 blank data cassette, and a 12-page manual. The last five pages contain a full listing of the program in Basic. The binder has space for six more cassettes, handy storage if you have a long mailing list.

The disk version seems to be exactly the same. It comes with one program diskette and one blank diskette in a bound manual. Each blank diskette will hold about 600 names, with the exact number depending on the length of the listings.

According to the software info sheet on the Disk Mailing List System, "If you don't need a mailing list, you could use it [the program] to catalog items of various types and print selected lists for you... with or without program modification."

This is just the program for your club or business if you have more than a small number of labels to print regularly.

### G/2 Is GWTW

If you've been wondering what happened to those fancy four-color ads for the G/2 Program Library that GRT Corp. was running in **Creative** and elsewhere in 1978, it's because G/2, GRT's Consumer Computer

Group, no longer exists. GRT, of Sunnyvale, CA, filed Chapter XI of the federal bankruptcy laws, after losing over two million dollars up to the fall of 1978.

G/2 had several dozen cassette tapes for the Apple, Southwest, Sol, PET, Sorcerer and Level-II TRS-80. The half-dozen for the TRS-80 included Beat The House (blackjack, craps, roulette, slot machine), Clinic (biorhythms, dieting, longevity), Personal Finance (Checkbook, Best Choice). That last program was for decision-making.

All the principles of the G/2 division left GRT in late 1978, and the software companies that had licensed GRT to manufacture and market their products, have taken back the programs. These programs will now, in some cases, be marketed by the companies that wrote them, such as Level III by Microsoft.

GRT continues with their main business, which is producing and marketing pre-recorded music tapes. Music tapes can stand a lot of dropouts and other problems before they really get bad. But I couldn't even load the copy of Clinic that G/2 sent.

Incidentally, I heard that to make writing the G/2 tapes as easy as possible, no graphics were used at all.

So G/2 is gone with the wind, cancelling an ambitious assortment of tapes that also included Oil Tycoon, Adventure, The Market and a couple of Extended Basics.

### Microtyping

*Microtyping* is the first of the "Hayden Computer Program Tapes" I've checked out, and it is one of the most ingenious and useful programs I've even come across, well worth the \$10.95 price.

Written for Level-II 16K machines by Dr. C. William Engel, who wrote the *Simulating Simulations* games programs (available now in book form from Hayden Book Co. for \$4.95), the cassette comes in a plastic envelope (with a hole near the top, for peg-board or stand mounting) that's handy to keep the cassette in.

Also in the envelope is an attractive four-page folder. The cover shows a logo and title in black and white on green, distinctive enough to be spotted across the room in your local computer store, which is where you can buy this tape (or if not available, from the Sales Dept., Hayden Book Co., Inc., 50 Essex St., Rochelle Park, NJ 07662.)

The folder's back cover, which you can read through the plastic envelope in the computer store, tells you that *Microtyping* teaches touch typing, and gives some details.



## CASSETTE DUPLICATION

TRS-80 (I & II), PET, APPLE, KIM, ATARI

Quality software duplication is more than copying cassettes. Microsette duplication uses a proprietary high speed duplicator designed specifically for computer program duplication. The finished products are of consistent quality, guaranteed to load. Minimum order is 100 with discounts for higher quantities. Call (415) 968-1604 for details.



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CIRCLE 164 ON READER SERVICE CARD

## SIMUTEK'S NEWEST ★ TRS 80 ★ SOFTWARE PACKAGE!

FEATURES 5 FANTASTIC PROGRAMS AT AN UNHEARD OF PRICE!

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The best backgammon program for the TRS-80. Plays standard international rules, will not allow illegal moves. (Fast: 15 seconds or less avg. move). Uses doubling die!! Features finest graphic display yet available!!!

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Increase your reading speed and comprehension with this educational program. Computer adjusts your WPM (words per minute) according to comprehension. Up to 5000 words per minute possible!! Simulates the tachistoscope!

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Up to four people may play against the computer. Excellent animated graphic dice. Standard yahtzee rules apply. Bonus points, Yahtzee, Chance, etc.

### WALL STREET

You and opponents buy and sell computer generated stock in this exciting simulation. Each player starts with 50,000. The first to make a million dollars wins. FAST ACTION!!!

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Quick co-ordination is required with this fast action arcade game. Drop depth charges on subs!!!

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**SIMUTEK BOX 85908-PS TUCSON, AZ 85740**

CIRCLE 193 ON READER SERVICE CARD

# WHAT'S HAPPENING?

(with the "Original" TRS-80® Users Journal)

Our Mar-Apr 80 issue tells about how one person improved the resolution on the '80 by a factor of 6! The photo on the cover of that issue tells the story. There is also a complete listing in BASIC of a disk-based file system, using random files and hash codes. Also in BASIC is a program that compares dollar values between any years from 1881 to 1980, and it gives comparative cost figures for housing, transportation, food, etc. (it is in L2 16K). In the "fun and games" department, there is a complete BASIC listing of a game where you play nine games of tic-tac-toe at the same time - the computer is your opponent. In the utilities department there are two methods of creating graphs, a program to give you a HEX dump of

memory, and - a program to give you number conversion from decimal/octal/hex/binary. In assembly language, there is a complete listing which allows you to selectively scroll any portion of the screen, while leaving the rest of it intact! Plus, there are the regular features: A tutorial on the Editor/Assembler for beginners; New Products; Reviews and the Business Section. It isn't called the "TRS-80 Users Journal" for nothing! It is published regularly every two months, and costs just \$16.00 per year in the U.S. Get a sample current issue (first class mail) for just \$3.00. Use your VISA or Mastercharge and call (206) 475-2219 today! Or, send check or Money Order to: 80-U.S. Journal 3838 South Warner Street, Tacoma, Washington 98409

Yes! We are the people who developed "Android Nim" and other fine animated graphics programs with sound!



TRS-80 is a trademark of Radio Shack, a Division of the Tandy Corporation

CIRCLE 144 ON READER SERVICE CARD

## Strings, cont'd . . .

The inside two pages comprise a User's Guide, which tells how to load and use the program. The program is divided into four levels: 1-letters, 2-numbers and symbols, 3-words, 4-text and program listings. "In each level the user receives immediate feedback regarding speed and errors. In Level 1 and 2, response speed is graphically represented by the distance between the symbol presentation and the student's response. If the response is too low or in error, the word SLOW or ERROR appears on the screen. In Levels 3 and 4, the student's response is not printed unless the correct key is pressed."

The correct finger placement on the "home keys" is shown, and "it is recommended that the student begin with the first level of difficulty in Level 1 and remain at that level until 50 wpm can be typed with no errors before proceeding to the next level of difficulty."

The guide ends with instructions on How to Insert New Practice Material in The Program, a very practical idea. The program is in Basic, so you can easily change any of the DATA lines to put in new symbols, words and sentences.

In each of the four levels, the instructions and all other material shown on the screen is in double-width characters for easy reading; the menus are in standard-width characters.

In Level 1 — Letters, you select the level of difficulty, 1 to 9, and you're presented with one letter at a time, from a group of three letters if you're at level of difficulty 1, from a group of six letters at level of difficulty 2, on up to the whole alphabet at 9.

You're shown 20 individual letters in each session, at each level of difficulty in Level 1, and as you type in the letter you're shown, it's repeated on the screen, to the right of the letter displayed by the computer, at a distance proportional to the speed with which you enter the letter after seeing the original display.

If you're really slow, then SLOW is displayed on the screen instead of the letter. ERROR is displayed if you don't match the letter displayed.

At the end of the session, you find out how you've done, in words per minute and number of errors. You can then continue at the same level of difficulty, or move on to a more (or less) difficult level, or move on to Level 2 — Numbers and Symbols.

In Level 2, you also get a session in which you match 20 characters, one at a time, at one of eight levels of difficulty, starting with one character chosen from a group of four characters, and ending, at the top level of

difficulty, with a character chosen from the 32 numbers and symbols on the TRS-80 keyboard. This begins to get difficult, and if you're tempted to look at the keys, remember: you'll never learn touch-typing if you look.

Level 3 — Words presents 20 three-letter words per session, at nine levels of difficulty, from 45 words stored in the program. You can easily change any of these 45 to words of the same length, or longer.

In Level 4 — Text and Program Listings, the menu has nine selections. You can practice six selected groups of letters, or all letters, or numbers and letters, or program listings. If you select "numbers and letters," you type a sentence or two that combines words and numbers; the program selects from a group of seven in DATA lines. There's only one "program listing" stored in a DATA line, and although it's fairly complex, you can easily change it, or any of the seven groups of sentences, if you want more variety or harder material.

At all four levels, you get your words-per-minute and number-of-errors ratings.

Microtyping is a real winner in the category of useful programs. The touch-typing skill learned with this program is transferrable to a typewriter, although the symbols will, of course, be a little different.

## Cassette-Tape "Magazines"

By the time you read this, Radio Shack may well have sold 300,000 TRS-80 Model I computers. Looking at that number, you might think there's plenty of room in the marketplace for more than just one of any type of TRS-80 product.

But just because there are many thousands of TRS-80 owners, doesn't always mean, as several entrepreneurs have found out, that money can be made by generating a product similar to something already on the market.

Take tape "magazines," for instance. CLOAD was there first, with a monthly tape that steadily improved, and which, even with a \$36 yearly subscription price, is doing quite well. They've issued a "Best of CLOAD," at \$10 (Box 1267, Goleta, CA 93017).

Several other TRS-80 tape magazines have been advertised. Two died before publishing their first monthly tape: LEVEL I (monthly, \$40 a year, Anaheim, CA); and Tape Talk (bi-monthly, \$?, San Jose, CA).

A fourth, Gaudeus (monthly, \$30, Ozone Park, NY), was to have been a cassette magazine in several editions, for PET, TRS-80, Apple II and Sorcerer, but nothing has been heard from them for awhile.

## TRS-80 Software Source

The Summer 1979 edition of "TRS-80 Software Source," which is an 8½-by-11-inch paperback, has over 4,000 listings from 250 vendors. The six main class divisions are business, education, games, home, math and utility.

The listings are given in 16 different ways. Games are on only one list, alphabetically by title. The other five classes are each listed three ways: alphabetically by title and by vendor, and by Basic (Level-I or Level-II, 4K or 16K). The 17th list is of vendor names, addresses and phone numbers.

For each listing, you get a title, description (up to 27 characters), level, price, media, class and vendor.

At this writing, the price of a single issue is \$6, from Computermat, Box 1664, Lake Havasu, AZ 86403. As the size of the publication increases, due to more and more available programs, don't be surprised if the price also increases.

The directory is published in the spring, summer and fall. The Fall 1979 issue is expected to contain over 5,000 listings. When the directory was first published, a subscription price of \$12 a year was set. However, according to a note from Computermat, "We have decided to discontinue the subscriptions. Most of our orders are for a single issue."

The directory is well worth the \$6 for anybody interested in buying more than just an occasional TRS-80 program. But there's one problem with the listings that may be unsolvable. Some programs are listed more than once. When there are three listings for "Library 100," most of us know that's The Bottom Shelf set of programs available from TBS and two others.

But what about the seven listings of Biorhythm, nine of Renumber, and 21 of Inventory? How many are duplicates? How can you decide which to order from the vendor? The cheapest one? Biorhythm ranges from \$3 to \$9.95, and Renumber from \$9.95 to \$20 on cassette. So what do you do, pick a price in the middle and hope for the best?

The Summer 1979 directory includes a "software review" questionnaire asking for detailed information from readers on programs. Computermat intends to "compile the results and print them in the next issue." That may help, at least for those programs for which reviews are received, but which may be for only a small percentage of the thousands of programs available.

Well, it's a start, and we can only wish Computermat well, with what is a very large undertaking: collating the information in all those reviews. That is, if altruistic readers send them in. □

# Control the world!



## MICRO MINT BUSY BOX

Home control unit for the personal computer!  
Interface your computer to the BSR X-10 or Sears Home Control system and control appliances, lamps, and wall switches.

Designed by Steve Ciarcia, featured in January, 1980 BYTE.

Assembled and tested interface, in attractive 8.25 x 6 x 2.5 inch plastic case, with cable and connector for TRS-80\* keyboard or expansion interface, power supply, and manual. Including BASIC listing for simple control routine for 4K. Level II minimum system. \$104.95.

Four year control program, requires expansion interface for real time clock, on BASIC cassette. \$19.95.

Package PK 500: BSR X-10 Command Console, cordless controller, two lamp modules and one appliance module. \$124.99.

Separate Prices: UC 301 Command Console, \$49.95; CC 401 Cordless Remote Controller, \$24.99; LM 501 Lamp Module, \$16.99; AM 601 Appliance Module, \$16.99; WS 701 Wall Switch Module, \$16.99.

Note: Your BUSY BOX will not work with the Radio Shack Home Controller, a stripped down version of the BSR X-10.



Shipping costs are not included in prices.

To order, call TOLL FREE 1-800-258-1790. (In NH call 673-5144)

6 SOUTH STREET, MILFORD, NH 03055 For more information, call (603)673-5144.

### TRS-80\* COMPUTERS:

|                                        | OUR PRICE |
|----------------------------------------|-----------|
| Level I, 4K \$499.00 .....             | \$449.00  |
| Level II, 4K \$619.00 .....            | \$559.00  |
| Level II, 16K, no keypad .....         | \$669.00  |
| Level II, 16K, w/keypad \$849.00 ..... | \$769.00  |

### EXPANSION INTERFACES:

|                                          |          |
|------------------------------------------|----------|
| Exp. Int., no RAM \$299.00 .....         | \$269.00 |
| Exp. Int., 16K RAM, (NEC) \$448.00 ..... | \$369.00 |
| Exp. Int., 32K RAM, (NEC) \$597.00 ..... | \$459.00 |

### DISK DRIVES:

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| Percom, TFD-100, 40-tracks \$399.00 ..... | \$389.00  |
| Percom, Dual TFD-100's \$795.00 .....     | \$775.00  |
| Percom, TFD-200, 77-tracks \$675.00 ..... | \$625.00  |
| Percom, Dual TFD-200's \$1350.00 .....    | \$1250.00 |

### DISK DRIVE ACCESSORIES:

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| 2-drive cable for TRS-80* \$29.95 ..... | \$29.00 |
| 4-drive cable for TRS-80* \$39.95 ..... | \$39.00 |
| Percom Data Separator .....             | \$29.95 |
| Extender Card \$15.95 .....             | \$15.00 |

### PRINTERS:

|                                         | OUR PRICE |
|-----------------------------------------|-----------|
| Centronics 730 \$999.00 .....           | \$846.00  |
| Centronics 753-2 \$3196.00 .....        | \$2750.00 |
| Centronics 779-2 \$1559.00 .....        | \$1064.00 |
| RS Quick Printer II \$219.00 .....      | \$197.00  |
| RS Line Printer III \$1960.00 .....     | \$1813.00 |
| LRC 7000+(20,32 or 40 col.) \$389. .... | \$369.00  |
| LRC 7000+(64 column) \$405.00 .....     | \$389.00  |

### PRINTER CABLES:

|                                   |         |
|-----------------------------------|---------|
| QPII to Exp. Int. cable .....     | \$19.00 |
| LRC to TRS-80* cable .....        | \$20.00 |
| 730 to TRS-80* cable .....        | \$29.00 |
| 779 or 753 to TRS-80* cable ..... | \$35.00 |

### PERIPHERALS:

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|----------------------------------------|----------|
| Novation CAT Modem \$199.95 .....      | \$179.00 |
| RS-232-C Interface Board \$99.00 ..... | \$89.00  |
| TRS-232 Printer Interface .....        | \$49.95  |
| Data Dubber .....                      | \$49.95  |
| 16K Memory Upgrade Kit, Keyboard ..... | \$99.00  |
| 16K Memory Upgrade Kit, E.I. ....      | \$95.00  |
| Percom Electric Crayon .....           | \$249.95 |
| Busy Box .....                         | \$104.95 |

**We Buy and Sell Used TRS-80\***

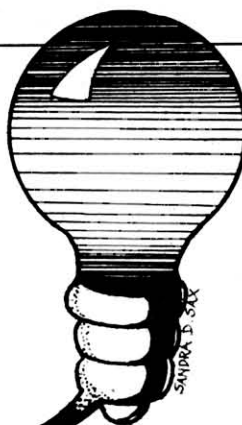
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**Ask for our FREE catalog!**

\*TRS-80 is a trademark of Radio Shack and Tandy Corp.



# Compleat Computer Catalogue



## COMPUTERS



**8-BIT MICROCOMPUTER  
FOR SMALL BUSINESS**

The Centurion 8-bit microcomputer is built around Intel's 8085A-2 microprocessor, which has a processing speed of 5 MHz, but system speed is 7MHz because a floating point math chip is used to handle number-crunching calculations.

Designed to be a complete, integrated system, the Centurion features 16K of internal PROM, 64K of RAM, a floppy disk controller, CP/M operating system, built on Artec's shielded motherboard. It operates with a CRT terminal and up to four single-sided, double-density, 8-inch floppy disk drives, and is compatible with any printer having an RS-232 interface.

The single-quantity price of the Centurion I with a Hazeltine 1500 CRT terminal is \$10,825.

Artec Electronics, 605 Old County Rd., San Carlos, CA 90470. (415) 592-2740.

**CIRCLE 250 ON READER SERVICE CARD**

### CLUSTERSHARED MICROCOMPUTER SYSTEM

Nestar Systems announces a new Clustershared personal computer system with the introduction of the

Cluster/One, Model A for the Apple. Now, up to 64 Apple II computers may be tied together in a local network.

Users may communicate with one another, share data, and access the same files, while the individual computer remains free to tackle accounting or scientific problem solving without being tied down by other computers in the system.

Professional and business offices as well as departments within large firms can take advantage of a Clustershared system, typically consisting of multiple Apple II computers, the Nestar Cluster/One, Model A, and shared resources such as printers, data recorders, plotters or graphics tablets.

The Nestar Cluster/One, Model A will be priced at \$6,000 for the basic system with 1,260,000 bytes of storage. The optional 16.5 and 33 Mb hard disk systems will cost \$8,000 and \$10,000 respectively. A ClusterBus communication card, priced at \$400, is required for each user station on the network. The cost of the Apple II personal computers are separate and must be added into the total network price.

Nestar Systems, Incorporated, 430 Sherman Ave., Palo Alto, CA 94306. (415) 327-0125.

**CIRCLE 251 ON READER SERVICE CARD**

### MULTIVISION FAMILY FROM ADDS

Applied Digital Data Systems Inc., (ADDS), Hauppauge, N.Y. is the world's largest supplier of display terminals to original equipment manufacturers. More than 25% of all displays shipped to OEMs are made by ADDS. The company also produces programmable terminals, clustered terminals and small business computer systems.

ADDS has now introduced a family of modular small business computers including hard disk storage and multi-user capability. The ADDS Multivision 1 entry level



computer lists for \$3785 and includes a 5 MHz processor, 64K byte RAM, and 700K bytes of dual mini-floppy based storage.

ADDS has developed a CP/M\*-compatible, multi-user operating system that supports the Microsoft BASIC Interpreter and Compiler, a proprietary word processing package, five business application packages and a powerful ISAM capability.

For users requiring more data storage, an 8-inch Winchester disk drive is available. Option 1 provides 5M bytes of storage while Option 2 provides 10M bytes. The unit measures a compact 15" square by 6" high.

Multivision 3 permits the simultaneous operation of as many as four display terminals. Multivision 2 systems can be field upgraded to Multivision 3 with the addition of an expansion box that supports a 4 port adapter end up to three additional 64K byte RAM boards, yielding a system total of 256K bytes of memory.

A new file type has been added to standard CP/M\* file system to provide efficient access to the Winchester disk. The software includes both a BASIC Interpreter and a BASIC Compiler. The Interpreter permits easy development of software; where-

## NEW PRODUCTS!

### Super Color S-100 Video Kit \$99.95

Expandable to 256 x 192 high resolution color graphics. 6847 with all display modes computer controlled. Memory mapped. 1K RAM expandable to 6K. S-100 bus 1802, 8080, 8085, Z80 etc.

### Gremlin Color Video Kit \$59.95

32 x 16 alphanumeric and graphics, up to 8 colors with 6847 chip, 1K RAM at 8000. Plugs into Super Elf 44 pin bus. Not expandable to high resolution Graphics.

### Quest Super Basic

Quest, the leader in inexpensive 1802 systems announces another first. Quest is the first company worldwide to ship a full size Basic for 1802 systems. A complete function Super Basic by Ron Kenner including floating point capability with scientific notation (number range  $\pm 1.7E^{10}$ ), 32 bit integer  $\pm 2$  billion; Multi dim arrays; String arrays; String manipulation; Cassette I/O, Save and load, Basic, Data and machine language programs; and over 75 Statements, Functions and Operators.

Easily adaptable on most 1802 systems. Requires 12K RAM minimum for Basic and user

### Elf II Adapter Kit \$24.50

Plugs into Elf II providing Super Elf 44 and 50 pin bus plus S-100 bus expansion (With Super Expansion). High and low address displays, state and mode LED's optional \$18.00.

### 1802 16K Dynamic RAM Kit \$149.00

1802/S-100 expandable to 32K. Hidden refresh w/clocks up to 4 MHz w/no wait states Add'l. 16K RAM \$79.00.

programs. Cassette version in stock now. ROM versions coming soon with exchange privilege allowing some credit for cassette version.

### Super Basic on Cassette \$40.00

Tom Pittman's 1802 Tiny Basic Source Listing now available. Find out how Tom Pittman wrote Tiny Basic and how to get the most out of it. Never offered before.

### S-100 4-Slot Expansion \$9.95

### Super Monitor VI.1 Source Listing \$15.00

Coming Soon: Assembler, Editor, Disassembler, DA/AD, Super Sound/Music, EPROM programmer, Stringy Floppy Disk System.



### RCA Cosmac Super Elf Computer \$106.95

Compare features before you decide to buy any other computer. There is no other computer on the market today that has all the desirable benefits of the Super Elf for so little money. The Super Elf is a small single board computer that does many big things. It is an excellent computer for training and for learning programming with its machine language and yet it is easily expanded with additional memory, Full Basic, ASCII Keyboards, video character generation, etc.

Before you buy another small computer, see if it includes the following features: ROM monitor; State and Mode displays; Single step; Optional address displays; Power Supply; Audio Amplifier and Speaker; Fully socketed for all IC's. Real cost of in warranty repairs; Full documentation.

The Super Elf includes a ROM monitor for program loading, editing and execution with SINGLE STEP for program debugging which is not included in others at the same price. With SINGLE STEP you can see the microprocessor chip operating with the unique Quest address and data bus displays before, during and after executing instructions. Also, CPU mode and instruction cycle are decoded and displayed on 8 LED indicators.

An RCA 1861 video graphics chip allows you to connect to your own TV with an inexpensive video modulator to do graphics and games. There is a speaker system included for writing your own music or using many music programs already written. The speaker amplifier may also be used to drive relays for control purposes.

### Super Expansion Board with Cassette Interface \$89.95

This is truly an astounding value! This board has been designed to allow you to decide how you want it optioned. The Super Expansion Board comes with 4K of low power RAM fully addressable anywhere in 64K with built-in memory protect and a cassette interface. Provisions have been made for all other options on the same board and it fits neatly into the hardwood cabinet alongside the Super Elf. The board includes slots for up to 6K of EPROM (2708, 2758, 2716 or 2716) and is fully socketed. EPROM can be used for the monitor and Tiny Basic or other purposes.

A 1K Super ROM Monitor \$19.95 is available as an on board option in 2708 EPROM which has been preprogrammed with a program loader/editor and error checking multi file cassette read/write software, (relocatable cassette file) another exclusive from Quest. It includes register save and readout, block move capability and video graphics driver with blinking cursor. Break points can be used with the register save feature to isolate program bugs quickly, then follow with single step. The Super Monitor is written with

A 24 key HEX keyboard includes 16 HEX keys plus load, reset, run, wait, input, memory protect, monitor select and single step. Large, on board displays provide output and optional high and low address. There is a 44 pin standard connector slot for PC cards and a 50 pin connector slot for the Quest Super Expansion Board. Power supply and sockets for all IC's are included in the price plus a detailed 127 pg. instruction manual which now includes over 40 pgs. of software info, including a series of lessons to help get you started and a music program and graphics target game. Many schools and universities are using the Super Elf as a course of study. OEM's use it for training and R&D.

Remember, other computers only offer Super Elf features at additional cost or not at all. Compare before you buy. Super Elf Kit \$106.95, High address option \$8.95, Low address option \$9.95. Custom Cabinet with drilled and labelled plexiglass front panel \$24.95. Expansion Cabinet with room for 4 S-100 boards \$41.00. NiCad Battery Memory Saver Kit \$6.95. All kits and options also completely assembled and tested.

Questdata, a 12 page monthly software publication for 1802 computer users is available by subscription for \$12.00 per year. Issues 1-12 bound \$16.50.

Tiny Basic Cassette \$10.00, on ROM \$38.00, original Elf kit board \$14.95, 1802 software; Moewie Video Graphics \$3.50. Games and Music \$3.00, Chip 8 Interpreter \$5.50.

subroutines allowing users to take advantage of monitor functions simply by calling them up. Improvements and revisions are easily done with the monitor. If you have the Super Expansion Board and Super Monitor the monitor is up and running at the push of a button.

Other on board options include Parallel Input and Output Ports with full handshake. They allow easy connection of an ASCII keyboard to the input port. RS 232 and 20 ma Current Loop for teletype or other device are on board and if you need more memory there are two S-100 slots for static RAM or video boards. Also a 1K Super Monitor version 2 with video driver for full capability display with Tiny Basic and a video interface board. Parallel I/O Ports \$9.85, RS 232 \$4.50, TTY 20 ma I/F \$1.95, S-100 \$4.50. A 50 pin connector set with ribbon cable is available at \$15.25 for easy connection between the Super Elf and the Super Expansion Board.

Power Supply Kit for the complete system (see Multi-volt Power Supply below).

Same day shipment. First line parts only. Factory tested. Guaranteed money back. Quality IC's and other components at factory prices.

## INTEGRATED CIRCUITS

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|----------|-----|--------|------|--------|------|
| 7405 TTL | 17  | LM2204 | 5.96 | CD4021 | 1.25 |
| 7405 TTL | 17  | LM2204 | 5.96 | CD4022 | 1.10 |
| 7405 TTL | 18  | LM2204 | 5.96 | CD4023 | 28   |
| 7405 TTL | 19  | LM2204 | 5.96 | CD4024 | 28   |
| 7405 TTL | 20  | LM2204 | 5.96 | CD4025 | 28   |
| 7405 TTL | 21  | LM2204 | 5.96 | CD4026 | 2.00 |
| 7405 TTL | 22  | LM2204 | 5.96 | CD4027 | 2.00 |
| 7405 TTL | 23  | LM2204 | 5.96 | CD4028 | 2.00 |
| 7405 TTL | 24  | LM2204 | 5.96 | CD4029 | 2.00 |
| 7405 TTL | 25  | LM2204 | 5.96 | CD4030 | 4.75 |
| 7405 TTL | 26  | LM2204 | 5.96 | CD4031 | 1.02 |
| 7405 TTL | 27  | LM2204 | 5.96 | CD4032 | 1.02 |
| 7405 TTL | 28  | LM2204 | 5.96 | CD4033 | 1.02 |
| 7405 TTL | 29  | LM2204 | 5.96 | CD4034 | 1.02 |
| 7405 TTL | 30  | LM2204 | 5.96 | CD4035 | 1.02 |
| 7405 TTL | 31  | LM2204 | 5.96 | CD4036 | 1.02 |
| 7405 TTL | 32  | LM2204 | 5.96 | CD4037 | 1.02 |
| 7405 TTL | 33  | LM2204 | 5.96 | CD4038 | 1.02 |
| 7405 TTL | 34  | LM2204 | 5.96 | CD4039 | 1.02 |
| 7405 TTL | 35  | LM2204 | 5.96 | CD4040 | 1.02 |
| 7405 TTL | 36  | LM2204 | 5.96 | CD4041 | 1.02 |
| 7405 TTL | 37  | LM2204 | 5.96 | CD4042 | 1.02 |
| 7405 TTL | 38  | LM2204 | 5.96 | CD4043 | 1.02 |
| 7405 TTL | 39  | LM2204 | 5.96 | CD4044 | 1.02 |
| 7405 TTL | 40  | LM2204 | 5.96 | CD4045 | 1.02 |
| 7405 TTL | 41  | LM2204 | 5.96 | CD4046 | 1.02 |
| 7405 TTL | 42  | LM2204 | 5.96 | CD4047 | 1.02 |
| 7405 TTL | 43  | LM2204 | 5.96 | CD4048 | 1.02 |
| 7405 TTL | 44  | LM2204 | 5.96 | CD4049 | 1.02 |
| 7405 TTL | 45  | LM2204 | 5.96 | CD4050 | 1.02 |
| 7405 TTL | 46  | LM2204 | 5.96 | CD4051 | 1.02 |
| 7405 TTL | 47  | LM2204 | 5.96 | CD4052 | 1.02 |
| 7405 TTL | 48  | LM2204 | 5.96 | CD4053 | 1.02 |
| 7405 TTL | 49  | LM2204 | 5.96 | CD4054 | 1.02 |
| 7405 TTL | 50  | LM2204 | 5.96 | CD4055 | 1.02 |
| 7405 TTL | 51  | LM2204 | 5.96 | CD4056 | 1.02 |
| 7405 TTL | 52  | LM2204 | 5.96 | CD4057 | 1.02 |
| 7405 TTL | 53  | LM2204 | 5.96 | CD4058 | 1.02 |
| 7405 TTL | 54  | LM2204 | 5.96 | CD4059 | 1.02 |
| 7405 TTL | 55  | LM2204 | 5.96 | CD4060 | 1.02 |
| 7405 TTL | 56  | LM2204 | 5.96 | CD4061 | 1.02 |
| 7405 TTL | 57  | LM2204 | 5.96 | CD4062 | 1.02 |
| 7405 TTL | 58  | LM2204 | 5.96 | CD4063 | 1.02 |
| 7405 TTL | 59  | LM2204 | 5.96 | CD4064 | 1.02 |
| 7405 TTL | 60  | LM2204 | 5.96 | CD4065 | 1.02 |
| 7405 TTL | 61  | LM2204 | 5.96 | CD4066 | 1.02 |
| 7405 TTL | 62  | LM2204 | 5.96 | CD4067 | 1.02 |
| 7405 TTL | 63  | LM2204 | 5.96 | CD4068 | 1.02 |
| 7405 TTL | 64  | LM2204 | 5.96 | CD4069 | 1.02 |
| 7405 TTL | 65  | LM2204 | 5.96 | CD4070 | 1.02 |
| 7405 TTL | 66  | LM2204 | 5.96 | CD4071 | 1.02 |
| 7405 TTL | 67  | LM2204 | 5.96 | CD4072 | 1.02 |
| 7405 TTL | 68  | LM2204 | 5.96 | CD4073 | 1.02 |
| 7405 TTL | 69  | LM2204 | 5.96 | CD4074 | 1.02 |
| 7405 TTL | 70  | LM2204 | 5.96 | CD4075 | 1.02 |
| 7405 TTL | 71  | LM2204 | 5.96 | CD4076 | 1.02 |
| 7405 TTL | 72  | LM2204 | 5.96 | CD4077 | 1.02 |
| 7405 TTL | 73  | LM2204 | 5.96 | CD4078 | 1.02 |
| 7405 TTL | 74  | LM2204 | 5.96 | CD4079 | 1.02 |
| 7405 TTL | 75  | LM2204 | 5.96 | CD4080 | 1.02 |
| 7405 TTL | 76  | LM2204 | 5.96 | CD4081 | 1.02 |
| 7405 TTL | 77  | LM2204 | 5.96 | CD4082 | 1.02 |
| 7405 TTL | 78  | LM2204 | 5.96 | CD4083 | 1.02 |
| 7405 TTL | 79  | LM2204 | 5.96 | CD4084 | 1.02 |
| 7405 TTL | 80  | LM2204 | 5.96 | CD4085 | 1.02 |
| 7405 TTL | 81  | LM2204 | 5.96 | CD4086 | 1.02 |
| 7405 TTL | 82  | LM2204 | 5.96 | CD4087 | 1.02 |
| 7405 TTL | 83  | LM2204 | 5.96 | CD4088 | 1.02 |
| 7405 TTL | 84  | LM2204 | 5.96 | CD4089 | 1.02 |
| 7405 TTL | 85  | LM2204 | 5.96 | CD4090 | 1.02 |
| 7405 TTL | 86  | LM2204 | 5.96 | CD4091 | 1.02 |
| 7405 TTL | 87  | LM2204 | 5.96 | CD4092 | 1.02 |
| 7405 TTL | 88  | LM2204 | 5.96 | CD4093 | 1.02 |
| 7405 TTL | 89  | LM2204 | 5.96 | CD4094 | 1.02 |
| 7405 TTL | 90  | LM2204 | 5.96 | CD4095 | 1.02 |
| 7405 TTL | 91  | LM2204 | 5.96 | CD4096 | 1.02 |
| 7405 TTL | 92  | LM2204 | 5.96 | CD4097 | 1.02 |
| 7405 TTL | 93  | LM2204 | 5.96 | CD4098 | 1.02 |
| 7405 TTL | 94  | LM2204 | 5.96 | CD4099 | 1.02 |
| 7405 TTL | 95  | LM2204 | 5.96 | CD4100 | 1.02 |
| 7405 TTL | 96  | LM2204 | 5.96 | CD4101 | 1.02 |
| 7405 TTL | 97  | LM2204 | 5.96 | CD4102 | 1.02 |
| 7405 TTL | 98  | LM2204 | 5.96 | CD4103 | 1.02 |
| 7405 TTL | 99  | LM2204 | 5.96 | CD4104 | 1.02 |
| 7405 TTL | 100 | LM2204 | 5.96 | CD4105 | 1.02 |

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|----------|-----|--------|------|--------|------|
| 7405 TTL | 101 | LM2204 | 5.96 | CD4106 | 1.02 |
| 7405 TTL | 102 | LM2204 | 5.96 | CD4107 | 1.02 |
| 7405 TTL | 103 | LM2204 | 5.96 | CD4108 | 1.02 |
| 7405 TTL | 104 | LM2204 | 5.96 | CD4109 | 1.02 |
| 7405 TTL | 105 | LM2204 | 5.96 | CD4110 | 1.02 |
| 7405 TTL | 106 | LM2204 | 5.96 | CD4111 | 1.02 |
| 7405 TTL | 107 | LM2204 | 5.96 | CD4112 | 1.02 |
| 7405 TTL | 108 | LM2204 | 5.96 | CD4113 | 1.02 |
| 7405 TTL | 109 | LM2204 | 5.96 | CD4114 | 1.02 |
| 7405 TTL | 110 | LM2204 | 5.96 | CD4115 | 1.02 |
| 7405 TTL | 111 | LM2204 | 5.96 | CD4116 | 1.02 |
| 7405 TTL | 112 | LM2204 | 5.96 | CD4117 | 1.02 |
| 7405 TTL | 113 | LM2204 | 5.96 | CD4118 | 1.02 |
| 7405 TTL | 114 | LM2204 | 5.96 | CD4119 | 1.02 |
| 7405 TTL | 115 | LM2204 | 5.96 | CD4120 | 1.02 |
| 7405 TTL | 116 | LM2204 | 5.96 | CD4121 | 1.02 |
| 7405 TTL | 117 | LM2204 | 5.96 | CD4122 | 1.02 |
| 7405 TTL | 118 | LM2204 | 5.96 | CD4123 | 1.02 |
| 7405 TTL | 119 | LM2204 | 5.96 | CD4124 | 1.02 |
| 7405 TTL | 120 | LM2204 | 5.96 | CD4125 | 1.02 |
| 7405 TTL | 121 | LM2204 | 5.96 | CD4126 | 1.02 |
| 7405 TTL | 122 | LM2204 | 5.96 | CD4127 | 1.02 |
| 7405 TTL | 123 | LM2204 | 5.96 | CD4128 | 1.02 |
| 7405 TTL | 124 | LM2204 | 5.96 | CD4129 | 1.02 |
| 7405 TTL | 125 | LM2204 | 5.96 | CD4130 | 1.02 |
| 7405 TTL | 126 | LM2204 | 5.96 | CD4131 | 1.02 |
| 7405 TTL | 127 | LM2204 | 5.96 | CD4132 | 1.02 |
| 7405 TTL | 128 | LM2204 | 5.96 | CD4133 | 1.02 |
| 7405 TTL | 129 | LM2204 | 5.96 | CD4134 | 1.02 |
| 7405 TTL | 130 | LM2204 | 5.96 | CD4135 | 1.02 |
| 7405 TTL | 131 | LM2204 | 5.96 | CD4136 | 1.02 |
| 7405 TTL | 132 | LM2204 | 5.96 | CD4137 | 1.02 |
| 7405 TTL | 133 | LM2204 | 5.96 | CD4138 | 1.02 |
| 7405 TTL | 134 | LM2204 | 5.96 | CD4139 | 1.02 |
| 7405 TTL | 135 | LM2204 | 5.96 | CD4140 | 1.02 |
| 7405 TTL | 136 | LM2204 | 5.96 | CD4141 | 1.02 |
| 7405 TTL | 137 | LM2204 | 5.96 | CD4142 | 1.02 |
| 7405 TTL | 138 | LM2204 | 5.96 | CD4143 | 1.02 |
| 7405 TTL | 139 | LM2204 | 5.96 | CD4144 | 1.02 |
| 7405 TTL | 140 | LM2204 | 5.96 | CD4145 | 1.02 |
| 7405 TTL | 141 | LM2204 | 5.96 | CD4146 | 1.02 |
| 7405 TTL | 142 | LM2204 | 5.96 | CD4147 | 1.02 |
| 7405 TTL | 143 | LM2204 | 5.96 | CD4148 | 1.02 |
| 7405 TTL | 144 | LM2204 | 5.96 | CD4149 | 1.02 |
| 7405 TTL | 145 | LM2204 | 5.96 | CD4150 | 1.02 |
| 7405 TTL | 146 | LM2204 | 5.96 | CD4151 | 1.02 |
| 7405 TTL | 147 | LM2204 | 5.96 | CD4152 | 1.02 |
| 7405 TTL | 148 | LM2204 | 5.96 | CD4153 | 1.02 |
| 7405 TTL | 149 | LM2204 | 5.96 | CD4154 | 1.02 |
| 7405 TTL | 150 | LM2204 | 5.96 | CD4155 | 1.02 |

|             |         |      |         |      |
|-------------|---------|------|---------|------|
| 74LS00 1%   | LM3909  | 1.75 | CD40192 | 3.00 |
| 74LS00 3%   | LM3909  | 89   | CD4000  | 28   |
| 74LS00 3%   | MC1458V | 50   | 74C04   | 40   |
| 74LS05 3%   | NE540A  | 3.75 | 74C10   | 28   |
| 74LS08 3%   | NE550N  | 1.00 | 74C14   | 2.10 |
| 74LS10 3%   | NE555N  | 30   | 74C20   | 28   |
| 74LS13N     | NE568A  | 85   | 74C28A  | 1.95 |
| 74LS14 1%   | NE568A  | 1.00 | 74C48A  | 1.95 |
| 74LS14 3%   | NE566V  | 1.50 | 74C74   | 75   |
| 74LS22N 3%  | NE567V  | 1.00 | 74C76   | 75   |
| 74LS28N 41  | NE5708  | 5.00 | 74C90   | 1.15 |
| 74LS30 3%   | 78L05   | 60   | 74C93   | 1.40 |
| 74LS33 75   | 78L08   | 60   | 74C154  | 1.40 |
| 74LS37 3%   | 78L08   | 60   | 74C160  | 1.40 |
| 74LS38 3%   | 75108   | 1.75 | 74C175  | 1.35 |
| 74LS48 1.00 | 75491CN | 50   | 74C192  | 1.65 |
| 74LS90A     | 75492CN | 55   | 75C221  | 2.00 |
| 74LS93 70   | 75494CN | 89   | 74C905  | 6.00 |

as for running programs the Compiler is three to four times faster than the Interpreter. Single key and multi key ISAM provide quick access to data stored on the Winchester disk.

Five accounting software packages are available: payroll, general ledger, accounts receivable and payable, and inventory. Multivision 3 measures 15 inches square by 18 inches.

The list price schedule of Multivision is as follows:

Multivision 1 — \$3785.00

Multivision 2 (5M byte option) — \$7995.00

Multivision 3 (256K bytes, 4 display ports, 1 printer port) — \$12,885.00.

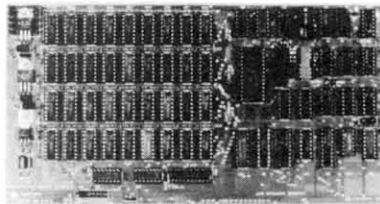
Applied Digital Data Systems, Inc.,  
100 Marcus Blvd., Hauppauge, NY  
11787. (516) 231-5400.

CIRCLE 252 ON READER SERVICE CARD

## 64K MEMORY BOARD

The Model 460 64K Byte Dynamic RAM Memory Board, a high-speed low-power memory system, available from Industrial Micro Systems, provides 64K bytes of memory organized into four blocks, each of which is individually de-selectable under program control for memory mapping.

The parity feature of Model 460 provides increased data security. In



the event of an error, a parity bit is set which lights an LED on the board and may be used to set a vectored interrupt or halt the CPU. The Model 460 also supports 8080 or Z80 CPU's and operates at 4 MHz with no wait states.

Industrial Micro Systems, Inc.,  
628 Eckhoff St., Orange, CA 92668.  
(714) 978-6966.

CIRCLE 253 ON READER SERVICE CARD

## Terminals & I/O

### PASCAL TERMINAL

The ACI Pascal Video terminal is a twelve-inch CRT (24 lines by 80 characters) for use with the UCSD Pascal Operating System or other applications requiring similar video terminal capabilities.

It provides standard upper/lower case 96 ASCII character set and it accommodates several international



language character displays (USA, UK, French, German, Spanish, Danish/Norwegian and Swedish/Finnish) by internal switch changes.

Associated Computer Industries, Inc., 17751 Sky Park East, Suite G, Irvine, CA 92714. (714) 557-0560.

CIRCLE 254 ON READER SERVICE CARD

### Z8-BASED CRT

Micro Application Systems announces miniMas 2, the second member of its Z8-based CRT family designed for large volume applications.

## TARBELL VDS-II Vertical Disk Subsystem

### SYSTEM INCLUDES:

- 2 Siemens 8" Disk Drives
- 1 Cabinet with Fan and Power Supply.
- 1 Tarbell Floppy Disk Interface, assembled & tested.
- 1 CP/M\* Disk Operating System.
- 1 Tarbell BASIC.
- All Cables and Connectors.
- Complete User Documentation.
- Fully Factory Assembled and Tested.

VDS-II Single Density . . . . . \$1888  
VDS-IID Double Density. . . . . \$1999

CP/M is a  
product of



CIRCLE 205 ON READER SERVICE CARD

## Apple Locker & accessories

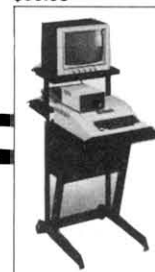
### Apple Locker

A security  
locking device.  
\$69.95



### Apple Sack

Transport your Apple in  
this soft vinyl case. \$85.00



### Apple Cart

Heavy  
duty metal  
with  
casters.  
\$169.95



FOR MORE INFORMATION AND ORDERS CONTACT:

TELE-TERMINALS

7216 BOONE AVE. NORTH  
BROOKLYN PARK, MN 55428  
PHONE: (612) 535-5330  
MN Wats 800/442-3008  
NAT Wats 800/328-3072

CIRCLE 218 ON READER SERVICE CARD





Standard hardware features include: 12" CRT, 7 x 9 dot matrix in a 9 x 13 field displaying all 128 ASCII codes, and 24 lines of 39 or 80 characters. Numeric pad, cursor and editing function keys, and reset key to terminate undesired action are also standard.

Standard software features include: page or scroll mode, transmit line or page unprotected only or all data with space suppression, new line mode, remote keyboard lock/unlock, erase from cursor to end of line or screen, and protected field mode in conjunction with any combination of attributes. List price is \$888 with one page of memory and \$959 with two pages of memory.

Micro Application Systems, Inc., 5575 North County Road 18, Minneapolis, MN 55442. (612) 559-0320.

## BLACK AND WHITE MONITOR

Leedex Corporation has announced a 12" black and white monitor, the Video 100-80.

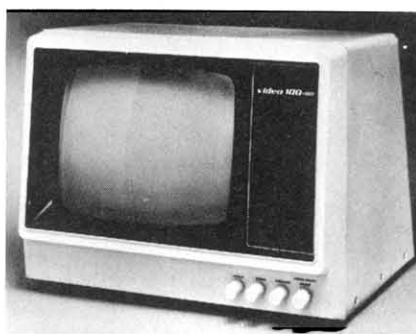
The removable face plate provides mounting space for a mini floppy disk, and there is space inside the cabinet for an 11" x 14" PC board for custom designed controller electronics.

The 90° deflection picture tube allows an 80-character by 24-line display, and the 12 MHz band width provides crisp, well-defined characters.

It features plug-in compatibility with Apple, Atari, Radio Shack, O.S.I., Microterm, and Exidy. \$199.

Leedex Corporation, 2300 East Higgins Rd., Elk Grove Village, IL 60007. (312) 364-1180.

CIRCLE 255 ON READER SERVICE CARD



## SMART CRT TERMINALS

TeleVideo, Inc. has introduced four smart, microprocessor-controlled CRT terminals, the 912B and 912C and the 920B and 920C.

Included as standard in all models are: upper and lower case, a printer/extension port, an imbedded numeric pad, remote computer control, selectable transmission rates from 75-9600 baud, and a host of editing and special functions. A serial RS-232C communications interface and 20 mA current loop are also standard features.

The terminals' non-glare, 12-inch diagonal CRT screens provide 12x10 dot matrix resolution and dual intensity for 1920 characters. A full 96-character ASCII set is displayed, in a 24-line by 80-characters/line format. Prices range from \$875 to \$1030.

TeleVideo, Inc., 3190 Coronado Dr., Santa Clara, CA 95051. (408) 246-5428.

CIRCLE 256 ON READER SERVICE CARD

## Salesmen, Canvassers and Implement Dealers



Ask for our circulars with prices. No goods sold direct. Secure territory. **ZERO CREAMERY CO. - Peru, Ind.**

# MICRO BEEP™

## ADDs SOUND TO YOUR TRS-80™!

### MAKES GAMES MORE INTERESTING

BEEPS ON ERRORS • AT END OF A SORT • AFTER PRINTING • WHENEVER YOU WANT!

**SIMPLE HOOK UP:** Just plug remote jack from cassette into unit.

**EASILY CONTROLLED FROM BASIC:**

OUT 255.4 = ON  
OUT 255.0 = OFF

24 HOUR HOTLINE • VISA OR MASTER CHARGE • COD • 602-882-3948

PLEASE SEND \_\_\_\_\_ MICRO BEEPS

@\$9.95 Ea. Plus \$2.50 (Per Order) — Postage & Handling

Az. Residents add 6% Sales Tax

☐ Check ☐ Money Order ☐ VISA ☐ MC ☐ C.O.D. (\$3.50 extra)

Account No. \_\_\_\_\_

Expiration Date: \_\_\_\_\_

WORKS ON ANY MODEL ONE TRS-80

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

**SMUTTER BOX 88203 TUCSON, AZ 85740**

CIRCLE 193 ON READER SERVICE CARD

## STOP PLAYING GAMES

TRS-80 (Level II)  
PET  
APPLE  
OTHERS

- Calculate odds on HORSE RACES with ANY COMPUTER using BASIC.
- SCIENTIFICALLY DERIVED SYSTEM really works. This system was written and used by computer experts and is now being made available to home computer owners. This method is based on storing data from a large number of races on a high speed, large scale computer. 23 factors taken from the "Daily Racing Form" were then analyzed by the computer to see how they influenced race results. From these 23 factors, ten were found to be the most vital in determining winners. NUMERICAL PROBABILITIES of each of these 10 factors were then computed and this forms the basis of this REVOLUTIONARY NEW PROGRAM.
- SIMPLE TO USE: Obtain "Daily Racing Form" the day before the races and answer the 10 questions about each horse. Run the program and your computer will print out the odds for all horses in each race. COMPUTER POWER gives you the advantage!
- YOU GET: 1) TRS-80 (Level II) Cassette  
2) Listing of BASIC program for use with any computer.  
3) Instructions on how to get the needed data from the "Daily Racing Form"  
4) Tips on using the odds generated by the program.  
5) Sample form to simplify entering data for each race.



—MAIL COUPON OR CALL TODAY—  
**3G COMPANY, INC. DEPT. (503) 357-9889**  
RT. 3, BOX 28A, GASTON, OR 97119

Yes, I want to use my computer for FUN and PROFIT. Please send me \_\_\_\_\_ programs at \$19.95 each.

Enclosed is: ☐ check or money order ☐ Master Charge ☐ Visa

Card No. \_\_\_\_\_

Exp date \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

ZIP \_\_\_\_\_

## START USING YOUR COMPUTER FOR FUN and PROFIT!

CIRCLE 207 ON READER SERVICE CARD

# Applications Software

## RECREATIONAL, GAMES

Five Stones Software announces a **Gomoku** program for North Star Horizon DOS and CP/M based systems. The program, written by the current North American champion, requires a minimum of 32K bytes of RAM and is available on 5 1/4" diskette for \$29.95. Five Stones Software, P.O. Box 1369, Station B, Ottawa, OT, Canada K1P 5R4.

CIRCLE 257 ON READER SERVICE CARD

**Four-part music** is available for the Sorcerer with a combination package which includes machine language software to generate four voice waveforms, a music editor and hardware which plugs into the parallel port via an RS-232 connector. \$40. Howard Arrington, 9522 Linstock, Boise, ID 83704. (208) 377-1938.

CIRCLE 258 ON READER SERVICE CARD

**Cyborg Wars** for 16K TRS-80 Level II computers positions the players as rulers of a country inhabited by android subjects. \$18. Strategem Cybernetics, 2 Washington Square Village, New York, NY 10012.

CIRCLE 259 ON READER SERVICE CARD

International Data Services announces two graphics programs for the TRS-80 Level II. **Microsketch III** is a "graphics drawing/automatic pattern drawing/graphic string creation/big print/automatic circle drawing program" which creates graphic screens which may be saved in memory, on tape, on disk or incorporated into other programs. \$7.95. **Freakout** produces keyboard generated "farout" graphics and sound when the user presses the keys. \$3.95. International Data Services, 340 West 55th St., New York, NY 10019. (212) 765-8610.

CIRCLE 260 ON READER SERVICE CARD

## PERSONAL

**Pro-Gress** is a program which enables the user to do **multiple regression analysis** on Commodore's PET/CBM machines. It is written in Basic with special consideration given to running time. Cassette, \$45; Diskette, \$50. Cognitive Products, P.O. Box 2592, Chapel Hill, NC 27514.

CIRCLE 261 ON READER SERVICE CARD

**Stock Tracker** is a program which analyzes supply and demand factors on individual securities — stocks, options and commodities — and advises the user when to buy and sell. Disk Basic versions are available for the TRS-80 and Apple II or Apple II Plus and require 32K RAM. \$150. H & H Trading Company, P.O. Box 23546, Pleasant Hill, CA 94523. (415) 937-1030.

CIRCLE 262 ON READER SERVICE CARD

**Income Property Cashflow/Leverage Analysis Program** analyzes the effects of insurance, property taxes, utility expenses, interest payments, closing costs and debt service on the total amount of cash necessary for purchase of income property, as well as the total monthly payment. It also calculates the return on investment and the actual leverage achieved based on a user estimated annual appreciation rate. Cassette, \$30; diskette, \$35. Realty Software Company, 2045 Manhattan Ave., Hermosa Beach, CA 90254. (213) 372-9419.

CIRCLE 263 ON READER SERVICE CARD

**Sat Trak International** announces three programs that enable a TRS-80, Apple or Sorcerer user to find the geographical location of a satellite, locate it in space in relation to his location anywhere on earth and update its orbital parameters based on a visual or radio observation. Prices range from \$20 to \$65. Sat Trak International, c/o Computerland of Colorado Springs, 4543 Templeton Gap Rd., Colorado Springs, CO 80909.

CIRCLE 264 ON READER SERVICE CARD



# Basic Cat™

A Cat acoustic modem lets your computer talk face to face with any other compatible computer or terminal within reach of your phone. It takes the data you type into your personal computer or terminal and sends it out over standard telephone lines. It's that simple.

Talk to your office computer from home. Send or receive data from anywhere. Swap programs in Basic, Pascal, Fortran, Cobol

or whatever—it doesn't matter to Cat. It's the accurate, reliable, affordable (only \$189) modem that talks your language.

**Cat by  
Novation**

Tie your computer into the world.

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**(800) 423-5410**

In California (213) 996-5060



Available at Hamilton/Avnet, Kierulff Electronics, Byte Shops, Computerland, and your local computer store.

Novation, Inc., 18664 Oxnard Street, Tarzana, California 91356

## WORD PROCESSING

A new version of **EasyWriter** enables the user to create, review, and revise documents on an 80-column upper and lower case Apple II video display. Two additional modules are available to complement the system: **EasyMailer** is a form letter module which automatically inserts information from a name and address file into an EasyWriter text file; **EasyMover** transmits text across common telephone lines to any other Apple computer. Information Unlimited Software, 793 Vincente St., Berkeley, CA 94707. (415) 525-4046.

CIRCLE 265 ON READER SERVICE CARD

**WordMagic II** is a word processor designed specifically for the TRS-80 Model II. Features include TRS file compatibility, full cursor control and edit capability, paging, printing and automatic page number insertion. \$100. CalData Systems, P.O. Box 178446, San Diego, CA 92117.

CIRCLE 266 ON READER SERVICE CARD

Computer Bugs announces a **Text Editor** designed to allow the TRS-80 Model II to be used as a word processor. It requires a 64K system with one disk drive. \$39.00. Computer Bugs, P.O. Box 789, Boynton Beach, FL 33435. (305) 737-4738.

CIRCLE 267 ON READER SERVICE CARD

Small Business Systems Group announces the **Deluxe Personal Finance Package** for use on 32K TRS-80 Level II computers with two disks. Among other things, the program will support up to 900 transactions per year in 33 different budget categories, maintain a checking account balance, estimate average monthly expenses and provide up to ten savings account summaries. Small Business Systems Group, Corner Main St. and Lowell Rd., Dunstable, MA 01827. (617) 649-9595.

CIRCLE 268 ON READER SERVICE CARD

**Basic to Electric Pencil File** Conversion for the TRS-80 Level II converts any Basic program or data file to an Electric Pencil file automatically. It will run under any version of TRSDOS or NEWDOS. \$3.95. International Data Services, 340 West 55th St., New York, NY 10019. (215) 765-8610.

CIRCLE 269 ON READER SERVICE CARD

## EDUCATIONAL

An educator in San Diego has developed **reading, language arts and math** programs for the TRS-80. The programs are designed for use by students in grades one to six. \$9.50 and up. Educational Programs, Disney Electronics, 6153 Fairmount Ave., San Diego, CA 92120.

CIRCLE 270 ON READER SERVICE CARD

## BUSINESS

An **Inventory Program** for 48K Apple II or Apple II Plus includes the following inventory categories: stock number, description, vendor ID, class, location, reorder point, reorder quantity, cost, selling price, number on order, order date and quantity on hand. All reports may be entered, changed, updated, deleted or viewed. The program is menu-driven and requires two disk drives. \$140. Software Technology for Computers, P.O. Box 428, Belmont, MA 02178.

CIRCLE 271 ON READER SERVICE CARD

## Systems Software

### LANGUAGES

Microsoft announces TRSDOS-compatible versions of their **Cobol and Basic compilers** for the TRS-80 Model II. Both compilers provide complete facilities for commercial or in-house software development, including Microsoft's standard macro assembler and linking loader. Basic compiler, \$395; Cobol-80 compiler, \$750. Microsoft, 10800 NE Eighth, Suite 819, Bellevue, WA 98004. (206) 455-8080.

CIRCLE 272 ON READER SERVICE CARD

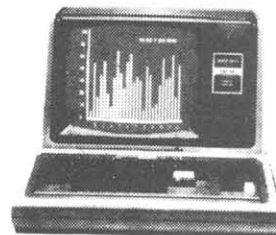


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## WORD PROCESSING

A new version of **EasyWriter** enables the user to create, review, and revise documents on an 80-column upper and lower case Apple II video display. Two additional modules are available to complement the system: **EasyMailer** is a form letter module which automatically inserts information from a name and address file into an EasyWriter text file; **EasyMover** transmits text across common telephone lines to any other Apple computer. Information Unlimited Software, 793 Vincente St., Berkeley, CA 94707. (415) 525-4046.

CIRCLE 265 ON READER SERVICE CARD

**WordMagic II** is a word processor designed specifically for the TRS-80 Model II. Features include TRS file compatibility, full cursor control and edit capability, paging, printing and automatic page number insertion. \$100. CalData Systems, P.O. Box 178446, San Diego, CA 92117.

CIRCLE 266 ON READER SERVICE CARD

Computer Bugs announces a **Text Editor** designed to allow the TRS-80 Model II to be used as a word processor. It requires a 64K system with one disk drive. \$39.00. Computer Bugs, P.O. Box 789, Boynton Beach, FL 33435. (305) 737-4738.

CIRCLE 267 ON READER SERVICE CARD

Small Business Systems Group announces the **Deluxe Personal Finance Package** for use on 32K TRS-80 Level II computers with two disks. Among other things, the program will support up to 900 transactions per year in 33 different budget categories, maintain a checking account balance, estimate average monthly expenses and provide up to ten savings account summaries. Small Business Systems Group, Corner Main St. and Lowell Rd., Dunstable, MA 01827. (617) 649-9595.

CIRCLE 268 ON READER SERVICE CARD

**Basic to Electric Pencil File** Conversion for the TRS-80 Level II converts any Basic program or data file to an Electric Pencil file automatically. It will run under any version of TRSDOS or NEWDOS. \$3.95. International Data Services, 340 West 55th St., New York, NY 10019. (215) 765-8610.

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## EDUCATIONAL

An educator in San Diego has developed **reading, language arts** and **math** programs for the TRS-80. The programs are designed for use by students in grades one to six. \$9.50 and up. Educational Programs, Disney Electronics, 6153 Fairmount Ave., San Diego, CA 92120.

CIRCLE 270 ON READER SERVICE CARD

## BUSINESS

An **Inventory Program** for 48K Apple II or Apple II Plus includes the following inventory categories: stock number, description, vendor ID, class, location, reorder point, reorder quantity, cost, selling price, number on order, order date and quantity on hand. All reports may be entered, changed, updated, deleted or viewed. The program is menu-driven and requires two disk drives. \$140. Software Technology for Computers, P.O. Box 428, Belmont, MA 02178.

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## Systems Software

## LANGUAGES

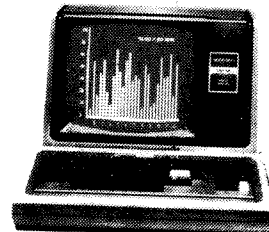
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CIRCLE 163 ON READER SERVICE CARD

The Nevada Cobol compiler for CP/M based systems is designed specifically for small businesses using microprocessors. \$99.95. Ellis Computing, 1480 17th Ave., San Francisco, CA 94122. (415) 664-1534.  
CIRCLE 273 ON READER SERVICE CARD

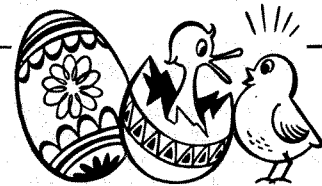
A multi-user Cobol, designed to run on Chieftain small business systems, is available from Smoke Signal Broadcasting. Running under BOS (Business Operating System), it controls all aspects of program development, from initial input of source programs through compilation and testing to the operation of a complete business system. \$1700. Smoke Signal Broadcasting, 31336 Via Colinas, Westlake Village, CA 91361.  
CIRCLE 274 ON READER SERVICE CARD

A Model I TRS-80 Fortran software package makes it possible for the experienced Fortran programmer to write, compile and execute Fortran programs. The package includes a Fortran user's manual, compiler, Fortran-80 and Link-80 reference manuals, Edit-80 user's

manual, and a Fortran subroutine library. It requires a Level II TRS-80 with 16K RAM, expansion interface with 16K RAM, and at least one disk drive. \$99.95. Available from participating Radio Shack Computer Centers, stores and dealers.

**Symbolic/Structured Basic** for 8-32K PET computers is a pre-compiler said to enhance the PET's basic monitor with the addition of extra control statements. S-Basic includes an editor, translator/pre-compiler and the S-Basic Loader. \$35.95. Softside Software, 305 Riverside Dr., New York, NY 10025.  
CIRCLE 275 ON READER SERVICE CARD

**APL80**, an adaptation of APL to the TRS-80, is now available. The 32K disk version includes four workspaces containing lessons on APL for the beginner and the book **APL: An Interactive Approach**. \$49.95. A 16K Level II cassette version is available without the lessons or the book. \$14.95. The Software Exchange, 6 South St., Box 68, Milford, NH 03055. (800) 258-1790.  
CIRCLE 276 ON READER SERVICE CARD



## DATA BASE SYSTEMS

**Analysis Pad** from the Bottom Shelf is a columnar calculator which enables the user to create a 30 x 40 matrix for data entry. The program, which allows the user to create column and row labels, requires 48K. \$49.50. The Bottom Shelf, Inc., P.O. Box 49104, Atlanta, GA 30359. (404) 939-6031.  
CIRCLE 277 ON READER SERVICE CARD

The **String/80 Bit** is a collection of string and file handling routines specifically designed to operate in the Z80/8080 CP/M environment. The relocatable routines, written in assembler language, utilize the Microsoft Fortran convention of register handling, and are available on 5 or 8-inch CP/M compatible soft sector floppy disk. \$95. Key Bits, Inc., P.O. Box 592293, Miami, FL 33159.  
CIRCLE 278 ON READER SERVICE CARD

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| KIM-1 \$159 (Add \$30 for Power Supply) | SYM-1  | \$ 209.00        |
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| 2114 L 450 ms                           | 5.35   | 24/4.95 100/4.45 |
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| Heath WH-19 Terminal (fact. asm.)       |        | 770.00           |
| Heath WH-14 Printer (fact. asm.)        |        | 735.00           |
| Programmers Toolkit - PET ROM Utilities |        | 44.90            |
| Microchess 2.0 for PET or APPLE         |        | 17.90            |
| PET Word Processor - Machine Language   |        | 24.00            |

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| TEI PT 212 Computer 5 MHz                  | 8000           | 6250           |
| Thinker Toys Discus/2D A&T                 | 1149           | 949            |
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| Florida Data Printer 600 CPS               | 4300           | Call for Price |
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# APPLE ANALOG INPUT

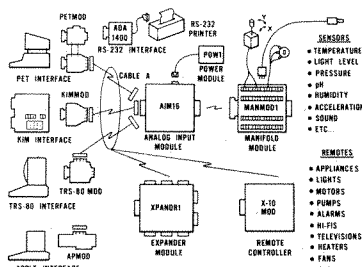
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Give your APPLE computer the ability to measure and control the world around it with μMAC SYSTEMS modules. Just plug the APSET1 into your APPLE to get 16 channels of analog input. Screw terminals are provided for each channel so you can hook up pots, joysticks, thermometers, light probes, or whatever appropriate sensors you have.

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Software is included.



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CIRCLE 136 ON READER SERVICE CARD

Micro Data Base Systems announces a **hierarchical (tree-structure) data base management system** for Z-80, 6502 and 8080 based micro-computers. Written in machine language, the system includes commands to add, delete, update, search and traverse the data base. Z-80 version, \$250; 6502 and 8080 versions, \$325. Micro Data Base Systems, Inc., P.O. Box 248, Lafayette, IN 47902. (317) 742-7388.

**CIRCLE 279 ON READER SERVICE CARD**

IDM-M2, an **interactive data manager** for the TRS-80 Model II, features data base initialization, data base manipulation, report writer and report generator. Written in Basic, it requires 64K of memory. \$199. Micro Architect, 96 Dothan St., Arlington, MA 02174.

**CIRCLE 280 ON READER SERVICE CARD**

## UTILITIES AND MISCELLANEOUS

Microproducts announces **Applebug**, a programming aid and software debugging tool that assists in

developing, debugging and testing machine language code on the Apple II. It will also facilitate tracing the logic of existing machine language programs such as the monitor, DOS and Applesoft. \$29.95 on diskette. Microproducts, 2107 Artesia Blvd. Redondo Beach, CA 90278. (213) 374-1673.

**CIRCLE 281 ON READER SERVICE CARD**

**Apple Data-Graph** is a hi-res data-graphing program which plots line graphs, dot graphs and scatter plots. Up to three 40-point curves may be plotted on the same co-ordinates with X and Y axes dimensioned. Curves may be saved to disk and recalled for later use. The program requires a 32K Apple with Applesoft ROM and one disk drive. \$35. Connecticut Information Systems, Co., 218 Huntington Rd., Bridgeport, CT 06608. (203) 579-0472.

**CIRCLE 282 ON READER SERVICE CARD**

**Line Printer**, which requires a 32K TRS-80 with disk and Centronics printer, is designed to upgrade any Basic program that generates printed

reports. It has the ability to set aside up to 16K of memory as buffer, enabling the computer to printout as a background task. \$24.50. The Bottom Shelf, Inc., P.O. Box 49104, Atlanta, GA 30359. (404) 939-6031.

**CIRCLE 283 ON READER SERVICE CARD**

Microsoft Consumer Products announces **Editor/Assembler-Plus**, an editing, assembling and debugging package for the TRS-80. Major new Assembler features include the ability to assemble directly into memory, conditional assembly and macro facility. \$29.95 on cassette. Microsoft Consumer Products, 10800 NE Eighth, Suite 819, Bellevue, WA 98004. (206) 454-1315.

**CIRCLE 284 ON READER SERVICE CARD**

**AGENS**, an assembly generation system, allows the user to assemble machine language programs for any of the popular 8 and 16-bit microcomputers. The system is available on 8-inch diskette for use on CP/M Z-80 computer systems. \$170. RBB Software Products, P.O. Box 2111, Yorba Linda, CA 92686. (714) 637-5965.

## INTRODUCING HEWLETT-PACKARD'S HP-41C. A CALCULATOR. A SYSTEM. A WHOLE NEW STANDARD.

The new HP-41C from Hewlett-Packard is a powerful programmable calculator that features: an LCD display with alphanumeric capability; 63 registers of data storage or up to 400 lines of program memory—expandable to 319 registers or up to 2,000 program lines; up to 10 levels of sub-routines; 10 conditional flags; specific loop control; indirect addressing; local and global branching; Continuous Memory; RPN logic.

And when you need them: Memory Modules—plug-in modules for storing programs and data; an "extra smart" Card Reader; a Printer that prints upper and lower case alpha plus special characters and does high resolution plotting; the Wand to input programs in bar code form (available early 1982); Application

Modules—pre-programmed plug-in modules that give solutions to a wide range of problems. The HP-41C lets you reassign any standard function, any programs you've written, or programs provided in the Application Modules—to any keyboard location you want. And of course Hewlett-Packard backs the HP-41C with total software support including an Owner's Manual and thousands of programs in the HP-41C Application Modules. A calculator. A system. A whole new standard.

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## North Star Doc

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  - Prints cross reference table of all 'GOTO' type statements
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- OPTIMIZATION**
  - Faster execution of 'GOTO' type statements (up to 75% reduction in the number of lines of coding allows basic to locate the destination of a 'GOTO' type statement faster)
  - Fast efficient subroutine to implement 'GOTO N' type statement
- SIZE**
  - Typically reduces program size by 35%
  - Removes all blanks not enclosed in quotes
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  - Saves three bytes for every statement concatenated
- CONFIDENTIALITY**
  - Optionally inhibits the correct functioning of the North Star Basic 'list' and 'edit' commands if the user specified line length exceeds 132 chars/line

DOC runs on release 4 or 5 of North Star Basic, single or double density drives. Minimum of 32K memory required. \$59.00 price includes diskette and instructional manual. Order your copy from:

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**CIRCLE 167 ON READER SERVICE CARD**

## TRS-80 Model I and II quality software

- DATA BASE MANAGER IDM-IV** \$69  
You can use it to maintain a data base & produce reports without any programming. Define file parameters & report formats on-line. Features key random access, fast multi-key sort, field arith., label generator, audit log. MOD-II version with more than 50 enhancements \$199
- ACCOUNTS RECEIVABLE ACCT-III** \$69  
One or more drives. Order entry calculates sales tax, shipping, amount for multiple items. Credit checking, aging, sales analysis, invoices, statements and reports. As opposed to most other A/R. ours can be used by doctors, store managers, etc. MOD-II version \$149
- WORD PROCESSOR** 16K \$39, 32K \$49, MOD-II \$49  
First word processor specifically designed for the TRS-80 that uses disk storage for text. Written in BASIC. No special hardware and text limit. Use for letters, manuals & reports. 32K version features upper/lower case without hardware change and multiple input text files.
- MAILING LIST advanced MAIL-V** \$59  
Fast sort by any field. Multiple labels and reports. 4-digit selection code, new zip code ext., screen input, live keyboard, powerful report writer. MOD-II \$59
- INVENTORY INV-V** \$59  
9-digit alphanumeric key for fast key random access. Reports include order info, performance summary, etc. Calculate E.O.Q. Powerful report writer. MOD-II \$149

All programs are on-line, interactive, random access, virtually bug free, documented and delivered on disks. MOD-I requires 32K, DOS. We challenge all software vendors to offer low cost manuals so you can compare and avoid those high-priced undocumented, on-memory programs. Send \$5 for a MOD-I manual and \$10 for MOD-II.

MOD-II programs are extensively modified, guaranteed to run with 1 year newsletter & updates. 10% off for ordering more than 1 MOD-II programs.

### MICRO ARCHITECT

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**CIRCLE 160 ON READER SERVICE CARD**

CmC

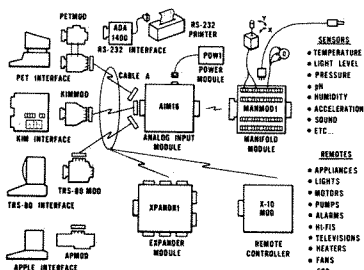
# TRS-80 ANALOG INPUT

## Analog to Digital Conversion System for the TRS-80 Computer

Give your TRS-80 computer the ability to measure and control the world around it with uMAC SYSTEMS modules. Just plug the TRS-80 SET1 into your keyboard or expansion interface to get 16 channels of analog input. Screw terminals are provided for each channel so you can hook up pots, joysticks, thermometers, light probes, or whatever appropriate sensors you have.

Each of the 16 analog inputs, in the range of 0 to 5.12 volts, is converted to a number between 0 and 255 (20 millivolts per count).

Software is included.





## More than a Catalog

Creative Publications' new full-color catalog is more than a great catalog of computer products selected for education. It's a magazine featuring articles on educational computing and classroom activities. We made it a visually exciting introduction to the world of computers in learning. We're bringing it out twice a year to keep up with this changing field. And we'll send it to you if you drop us a line.



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CIRCLE 129 ON READER SERVICE CARD



Stephen B. Gray

**More Basic Computer Games**, edited by David H. Ahl. Creative Computing Press, Morristown, NJ. 195 pages, paperback \$7.50. 1979.

Fulfilling the promise made in the microcomputer edition of "Basic Computer Games," that a second volume was coming, this game book contains "84 Fabulous Games for Your Personal Computer," according to the cover, which adds, "All in Basic with program listing and sample run."

As the introduction puts it, there are games here that teach resource management (such as Camel), let your children perfect their matching and memory skills (Concentration), navigate in a three-dimensional universe (Maneuvers), start your whole life over again (Millionaire), or let your kids "argue with the computer — instead of you — if they want to stay out late on Saturday night" (Father).

If you read **Creative Computing** religiously, many of these games may look familiar, because 34 of them first appeared in the magazine. The 34 include Artillery 3, Bible Quiz, Blackbox, Bocce, Condot, Deepspace, Geowar, ICBM, Mastermind, Motorcycle Jump, Nomad, Roadrace, Rotate, Schmoo, Seawar, Twonky, UFO and Wumpus.

Even if you have all the back issues of **Creative**, the book still contains 51 programs you may not have seen before, including Baccarat, Big 6 (carnival betting wheel), Bombrun, Camel (hazardous trek across the desert), Chuck-A-Luck, Close Encounters (avoid the UFO or destroy it), Concentration, Convoy (naval war game), Corral (tame a wild horse), Eliza (the psychiatrist), Grand Prix, Joust (with a knight), Man-Eating Rabbit, Millionaire, Minotaur, Pinball, Shoot (last two survivors of total atomic war), Smash (one-lap jalopy race), Tennis and Warfish (submarine game).

Although nearly all the programs here are for interactive games, a few are not, such as Inkblot (randomly generated Rorschach designs), Lissajous, Pasart (patterns based on Pascal's triangle), Scales (generates 11 types of musical scales starting at a chosen note) and Ticker Tape.

The games are all in Microsoft Basic. Two pages on Basic are provided, along with details on how to convert the games to other Basics.

Some of the games in this second volume are available on tape cassette and floppy disk from **Creative**, either from your local computer store or directly from **Creative Computing**.

The many illustrations by George Beker, mostly of robots, are highly imaginative and fascinating in their own right.

The 84 games here will keep you busy and intrigued for many, many months, as well as develop your imagination, memory and reflexes.

What's missing from this volume is the "Contents by Game Category" that was in the first book, which listed the games under categories such as educational, matrix manipulation, logic, space, sports simulation, combat, etc. Regardless, this book is an absolute must for anybody who calls himself a computer gamesman. And at 9¢ a game, the price is right!

**Z80 Assembly Language Programming**, by Lance A. Leventhal. Osborne & Associates Inc., Berkeley, CA. 642 pages, paperback \$9.50. 1979.

This is the fourth in Dr. Leventhal's series on microcomputer assembly languages, written in his usual detailed, expert style.

The book includes features such as over 80 programming examples, all problem solutions in source code and object code, comparisons of Z80 - 8080A/8085 instruction sets, full explanation of each Z80 instruction, how to program the Z80 interrupt system and Z80 input/output devices, and interfacing methods.

After a short introductory chapter, Leventhal jumps right into a chapter on assemblers that has a great deal of **what**, but very little **why** for the neophyte. A reader with experience in assemblers should have little or no trouble with this book, but a beginner will find it tough going unless he's quite bright, highly motivated and makes sure he understands every sentence before going on to the next.

Subsequent chapters are on the Z80 Assembly-Language Instruction Set, Simple Programs, Simple Program Loops, Character-Coded Data, Code Conversion, Arithmetic Problems, Tables and Lists, Subroutines, Input/Output, Interrupts, Problem Definition and Program Design, Debugging and Testing, Documentation and Redesign, and Sample Projects (digital stopwatch, digital thermometer).

There may never be a better book on the Z80 assembler than this one, but only a fantastically dedicated beginner, or a professional, will get beyond the middle of the third chapter. This book separates the men from the boys, the really serious programmers from the tinkers.

**A Beginner's Guide to Computers & Microprocessors — with projects**, by Charles K. Adams. Tab books, Blue Ridge Summit, PA 17214. 303 pages, paperback \$6.95. 1978.

Here's one more book explaining computers to beginners. One pleasant difference from many of the others is that Adams writes well, and makes many complex things quite understandable.

On the other hand, he doesn't write enough about many things. For example, a NAND gate is described in two short sentences, very clear but not enough to tell you what a NAND gate does. So the 1/3-page drawing, and the two sentences, like many others in this book, are wasted because they raise more questions than they answer.

Chapter 4, on Microprocessor Architecture, uses seven full pages on block diagrams of CPUs such as the 8080, 4040 and 8008, mainly filler material because these diagrams aren't discussed much in detail.

The book has two introductory chapters, four on hardware, two on software, one on systems and three on Building a Simple System. These last three comprise the "projects" in the book's title. Eighty pages are used to tell you how to build an 8080A-based system with 256 bytes of RAM, 512 of EPROM, a 16-button keyboard for data entry, a 10-button keyboard for program control, etc. Is anybody really interested in building such a system from a book? Especially one that has no photographs or diagrams showing you how to lay out the boards or the front panel, other than one drawing, of the "CPU parts layout."

The book does have some good portions, but is hampered by using only assembly language throughout (the words Basic and Fortran don't appear anywhere), being too skimpy in too many places, and spending 80 pages on a system that not one reader in a thousand will build.

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**Problems For Computer Solution: Student Edition**, by Stephen J. Rogowski. Creative Computing Press, Box 789-M, Morristown, NJ 07960. 109 pages, paperback \$4.95. 1979.

If this title is familiar to you, maybe that's because at least three books have been published using it, the best known being the one written by Gruenberger and Jaffray some years ago. Also, you may have seen the Rogowski book in its previous incarnation, published by Educomp Corp. in 1975. Educomp changed its name to Quodata, started marketing computer systems to municipal governments instead of to schools, and got out of publishing.

The book gives 90 problems for you to solve with a computer, divided into eleven categories: arithmetic, algebra, geometry, trig, number theory, probability, statistics, calculus, science, general and "unsolved."

Some of the problems are simple, such as figuring out the interest on the \$24 the Indians are said to have sold Manhattan to the Dutch for. Or generating your own log tables. Some are not so easy, such as converting rational numbers to continued fractions, or finding self-generating integers. A couple have never been solved.

This is a fine book, with clear and concise writing, if you like the challenge of solving problems with computer programs. Even if some of the problems may not turn you on, the variety provided here should give you enough others to keep you busy for months, if not years. References are provided if you need to learn more about the problems.

A Teacher's Edition is also available, at \$9.95, with problem solutions, a program that produces each solution, an analysis of each program and, occasionally, suggestions for further reading or research.



**Best of Interface Age: Volume 1: Software in Basic**, edited by Carl D. Warren. Dilithium Press, Portland, OR. 314 pages, paperback \$12.95. 1979.

The title is misleading. Although this book is about four well-known Basic interpreters, they are all in assembly language. So this book is for hard-core assembler fans, or for anybody intending to really dig into what makes Basic tick, rather than for somebody looking for a collection of programs written in Basic.

The entire book is taken up with the four interpreters: Lawrence Livermore 8080 Basic; Li-Chen Wang's Palo Alto TINY Basic; National's TINY Basic-NIBL; and "The Great Experiment — Floppy ROM #1," Robert Uiterwyk's 6800 4K Basic.

The two appendices may well be unique in books on personal computing: the first is a "comprehensive index of general-purpose software printed in Interface Age since January 1977," and the second is a "list of all the back issues that are still available, and how to obtain them." Tch-tch.

The preface, by Carl Warren, who was editor-in-chief of Interface Age at the time of publication, and who, at this writing, is the West Coast editor for EDN magazine, notes that more volumes of the "Best of Interface Age" are forthcoming, one on general-purpose software, two for the "small businessman" (5'5" and under?), and one that "contains those articles for the futuristic thinker and gadgeteer."

The preface also says that the four reprinted articles in this book "provide the reader with some of the most useful software ever created." Useful now for study, and for that purpose highly welcome by the small fraternity of assemblers. But surely not intended for direct use on your computer or mine . . .



**Introduction to T-BUG**, by Don Inman and Kurt Inman. Dilithium Press, Portland, OR 97210. 125 pages, paperback \$6.95. 1979.

The back cover says this is "the only book to describe in detail the machine-language monitor operations of the popular Radio Shack TRS-80 computer." It also says that "Kurt Inman is Don's 15-year-old son and an author in his own right."

As with every other publication involving machine-language monitors, this one doesn't say a word about why a TRS-80 owner should be interested in T-BUG. The authors apparently assume that if you buy the book, you're interested.

The book is based on seven "problems," meaning the authors tell you how, in detail, to perform seven specific tasks with T-BUG. These tasks are: display keyboard input, display data from memory, save and run programs on cassette, write a number-guessing game, create graphics with the 63 graphics characters, use graphics to enhance a computer game (Nim) and debug with T-BUG.

This is obviously only for the really serious programmer with an interest in learning more about T-BUG than available in the Radio Shack publications.

The major value of this book is that it shows, in great detail, how to do something, rather than just tell what T-BUG consists of and how to use it. If you go through this book conscientiously, using it with your TRS-80 rather than just reading it, you'll probably learn all you want to know about T-BUG.



**Problems For Computer Solution**, by Donald D. Spencer. Hayden Book Company, Inc., Rochelle Park, NJ. 122 pages, paperback \$5.95. Second edition, 1979.

This is Hayden's edition of the same book originally published in 1977 by the author's own Camelot Publishing Company.

According to the back cover, this book is "intended for teachers and students who want more diverse problems than those offered in programming-language textbooks."

Just like the Rogowski book of the same title, also reviewed in this issue, Spencer's book presents problems in eleven categories: introductory problems (75 of them); algebra (127); geometry (104); trigonometry (34); probability and statistics (90); intermediate mathematics (118); number theory (86); science, chemistry and physics (38); business (64); fun and games with the computer (45); and "a smorgasbord of problems" (40).

That's a total of 821 problems, which works out to about seven-tenths of a penny per problem, compared with 5.5 cents a problem in Rogowski's book.

The big difference is that each problem is given a full page in the Rogowski book, whereas Spencer provides up to 10 or 12 problems per page. Most of Spencer's problems are quite short, such as "Find the greatest common factor of a given set of three numbers," or "Convert Roman numerals to Arabic" or "Write a program that generates random four-word sentences." Several are a third to half a page long, because they include details on such complex things as a "wheel of fortune" game, or the "sailors and coconuts" puzzle, or the drunk's random-walk problem. Within each chapter, the problems are said to be arranged in order of difficulty.

All in all, this is quite a bargain for the problem-hungry, with a large number of problems that should keep you in close contact with your computer for a very long time. Even if you work on only one out of every ten problems, you'll learn a great deal about computers and problem-solving if you can work them all out, or at least make a good try.



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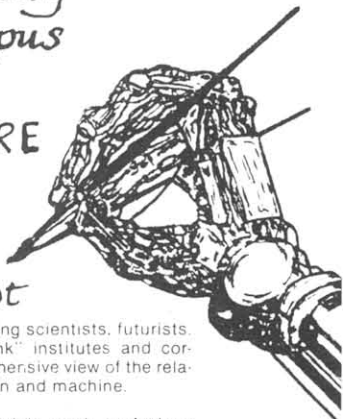
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**Introduction to Low-Resolution Graphics**, by Nat Wadsworth. Scelbi Publications, 20 Hurlbut St., Elmwood, CT 06110. 80 pages, paperback \$9.95. 1979.

Subtitled "How to draw lines, create shapes, animate figures, prepare charts for business or pleasure," this paperback combines some introductory material on graphics with advanced programs that are presented without derivation or much of an exploration.

The first 28 pages are good, with chapters on Getting Started (the display grid; turning points on with the Apple II, PET and TRS-80), Math (determining offsets in the three systems), Drawing Simple Shapes (triangles) and Drawing Lines (and circles).

Chapter 5, A Graphics Library, includes over seven pages of Apple II subroutines that draw pictures of playing cards, for a card game. This is too much for a beginner's book, which should be much simpler, unless the reader is content with simply using subroutines right out of the book.

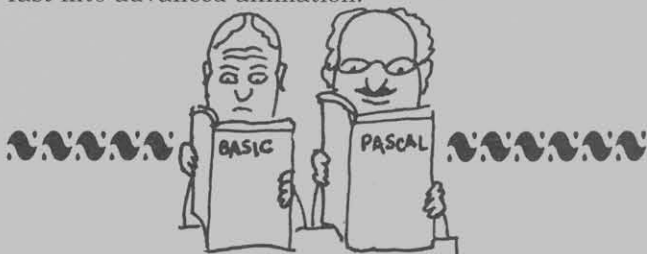
The same chapter presents a four-page Apple II program that draws a clown figure, with a mouth that opens and closes, an eye that winks, a hand that points right or left. Clever, but very little is given to help you understand how this program works. Also clever: how to add sound to the clown display.

The last 17 pages of the book are devoted to an animated game of football, with a listing for the Apple II (the author offers a coupon good for a free listing of the football game for the TRS-80 Level II or Commodore PET).

The programs for playing cards, clown and football are indeed interesting, but the book would be of much greater value if it stuck to the simpler side of graphics, and showed in detail, for instance, how to animate just one football player, instead of a whole team.

This is a book to buy once you've done some work in graphics, and are interested in advanced techniques. At this writing, this is only the second book available on personal computer graphics (see the review of Don Inman's "Introduction to TRS-80 Graphics" in the July 1979 *Creative*, p 159).

Several more books on graphics are on the way; let's hope they cover much more of the elements of graphics, instead of stopping at simple sinewaves, or getting too fast into advanced animation.



**The Code Book**, by Michael E. Marotta. Loompanics Unlimited, P.O. Box 264, Mason, MI 48854. 76 pages, paperback, \$6.95. 1979.

This book is subtitled, "All About Unbreakable Codes and How to Use Them." It is described by the publisher as presenting "obscure secrets known only to international espionage agents and professional cryptographers — now revealed for you to use." Well, maybe.

The book is short (43 pages of text) and set in large type so it's the equivalent length of a long magazine article. Reading time is about a half hour. Appendix II includes 10 pages of random numbers, while Appendix I contains four short computer programs to add plaintext messages (A=1, B=2, etc.) to 5-digit random numbers. If you've read *The Ultra Secret* and any of Dover's cryptography books, you won't find anything new in this one. On the other hand, if you'd like a short summary of codes and cyphers with a dash of practical advice ("Remember that coding, program writing, verifying and obfuscating take up your own time") then you may find this book worthwhile. I didn't. —DHA

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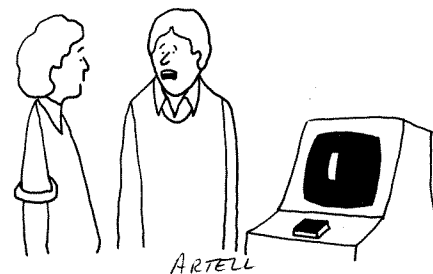
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 "P" page numbers are in the parody section.



"He's one of the greatest conductors of electricity!"



By nightfall, your entire program will be a total disaster.



We may have taken this keyboard simplification thing one step too far.

For over 100 computer and robot cartoons, get the Colossal Computer Cartoon Book, only \$5.70 postpaid from Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960.



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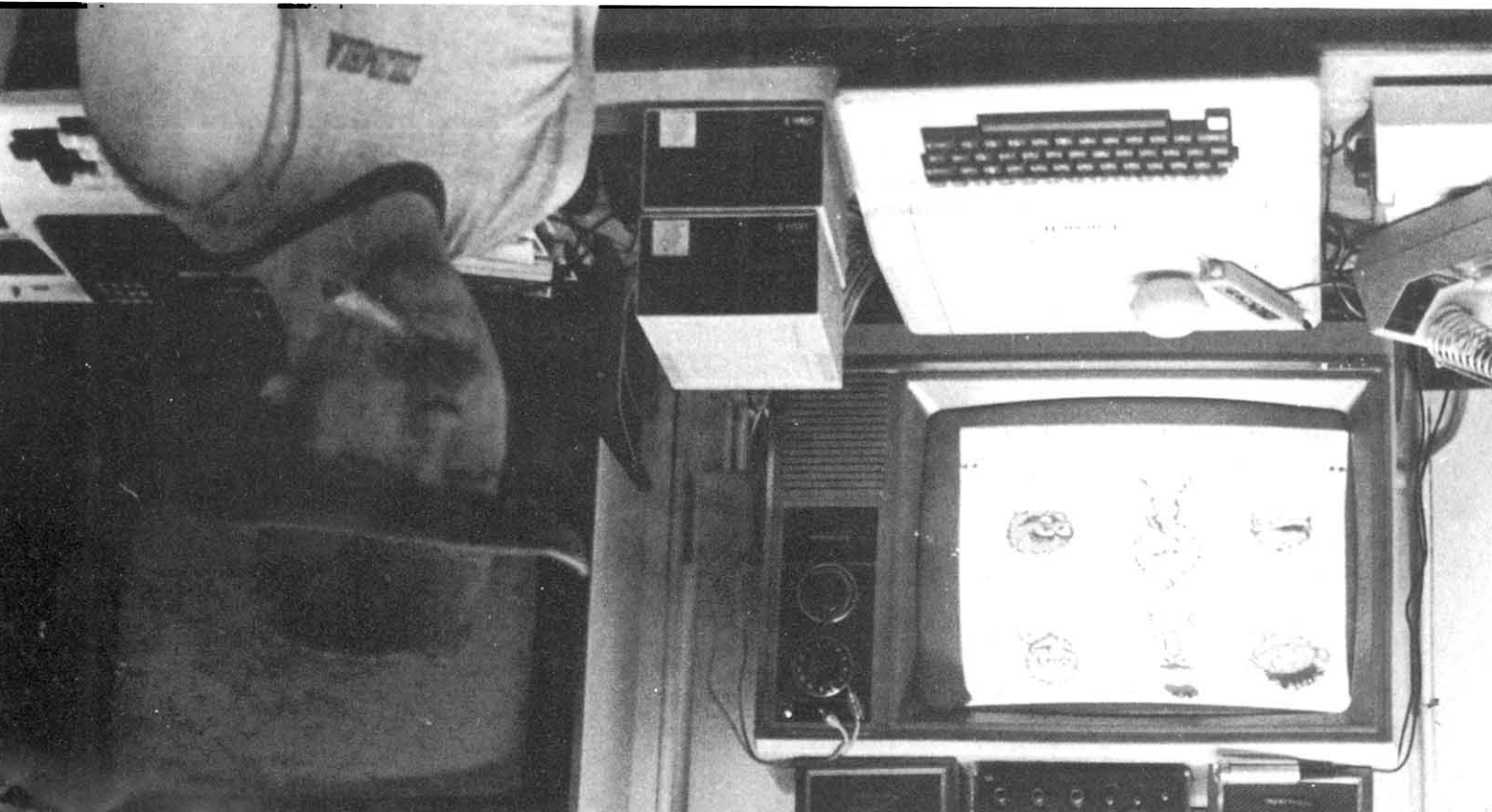
## VIRGINIA

**ComputerLand/ Tysons Corner**—8411 Old Courthouse Rd, Vienna 22180; (703) 893-0424. 10-6 MTWF, 10-9 Thu, 10-5 Sat.

**Computers Plus, Inc**—6120 Franconia Rd, Alexandria 22301; (703) 971-1996. 10-9 Mon-Fri, 10-6 Sat. Micro specialists, books, classes, software, maintenance. "The PLUS makes the difference."

*To include your store in Creative Computing's Retail Roster, call the Advertising Department at (201) 540-9168.*

# “31,000 technician hours later, I still own a Lemon.”



“When I first bought a personal computer, I thought it would be as easy and fun as dropping water balloons off the top of the World Trade Center. But man, I found out a lot about computers. I learned about bits, bytes, logic probes and analyzers, TTL, CMOS, NMOS, busses, I/O addressing, priority driven interrupts, daisy-chained DMA, hard disk controllers, and much, much more. I learned far more than I ever wanted to know. And I’m still learning. Pretty soon, once I get this machine in good enough shape to sell, I’ll step up to a Lemon III minus. It’s a machine that grows on you. And Lemon’s black and white graphics make it easy to interact with minority groups.”

Mr. Kendall Brokenbranch, technician (j.g.) at Al’s Radio and TV Repair in St. Peter, Arkansas, heads up the team responsible for repairing busted computers. Prior to coming to this position, he replaced vibrators in automobile radios.

## The computer that was there

Al’s Radio and TV evaluated personnel computers and chose Lemon because it was there. “Sometimes, you just can’t be too picky and you gotta take what you can see.” Brokenbranch, backed up by Big Al himself, doesn’t regret the decision. After all, only two cars in the county are still operational that have radios with vibrators, so Brokenbranch didn’t have a

Lemon computer

continued next page...



whole lot to occupy himself. Now, learning all about the guts of computers, Brokenbranch doesn’t have a single second to spend in the pool hall or ice cream parlor. The reason for all this mucking about inside the Lemon was to get it to work off the approximately 95-volt, 31-hertz power in St. Peter produced by generator station on the North branch of Cowlick Creek. It was brought up for a record 7.2 minutes on February 2nd and Brokenbranch got his first real taste of what it could do. That’s when he decided that someday he would have a Lemon III minus.



WELL-MANNERED young man, 32, wants to meet and marry the president of any major corporation. She must be lovely. Box 55.

**FOR SALE:** Electron tracer. For the first time an instrument is available that can isolate electrons in a vacuum circuit. Uses a patented stable bridge-type vacuum tube meter for finding stray electrons in IC's and PC board traces. \$89.50. Eico, Brooklyn, NY.

**CLEARANCE SALE** Keypunch cards, photographic film, transparent tape, line printer paper, carbon ribbons, ditto masters. All used only once. Bargains, 4 Milio Drive, Kim Bue, NJ.

**FOR SALE:** 1961 IBM Model 1401, metallic gray. Runs good. New battery, tires. Lo mileage—only 1017 instruction. Used by little old lady to balance checkbook. EZ credit at Honest Al's Used Computer Lot.

**AVAILABLE:** Computed disc band. Secret program—many guarantees absolute absence of harmony, melody, counterpoint and other distractions. 160 db output at all times. Call (415) 776-1291

**WANTED:** Tube-replacers for computer establishment use—**373,327** type CA-201A vacuum tubes. Full-time employment, coat and coffee machine furnished. Must be agile and have calloused hands. Box YRU.

**WANTED: Write Only Memory** programs for highly classified Defense Department Cryptographic Agency. Must be skilled at writing in FUJIBOL-XXV and have at least write (CENSORED).

**CHAD COLLECTORS' CONVENTION:** This year all chad collectors lead to New Jersey, and the Grand Ballroom of the Morristown Hyatt-Hilton. Noted publisher and frog rancher David Hai will be banquet-toast-master and preside over the Chad Auction.

**FOR SALE:** Zenker-III computers, 256 K word memory, CBT color monitors, printers, etc. Only \$17,981 Due to a manufacturing over-sight, this equipment was designed for a power input of 39 volts, 627 Hz, five-phase current. For- tunately, a converter for 120 volts, 60 Hz is available for only \$11,800.00. FOB, Guam.

# Unclassified Ads

The circuit is easily interfaced and exercised in Basic as demonstrated in Listing 1. The program executes in approximately 50 Ts (trillion seconds) when used with Macro Calm 256K Zorance Pascal, but it works equally well with a 6,539-statement machine language subroutine.

The figure consists of two parts: a timing diagram on the left and a schematic diagram on the right.

**Timing Diagram:** This diagram illustrates the timing relationships for the 74123 circuit. It shows the following signals over time:

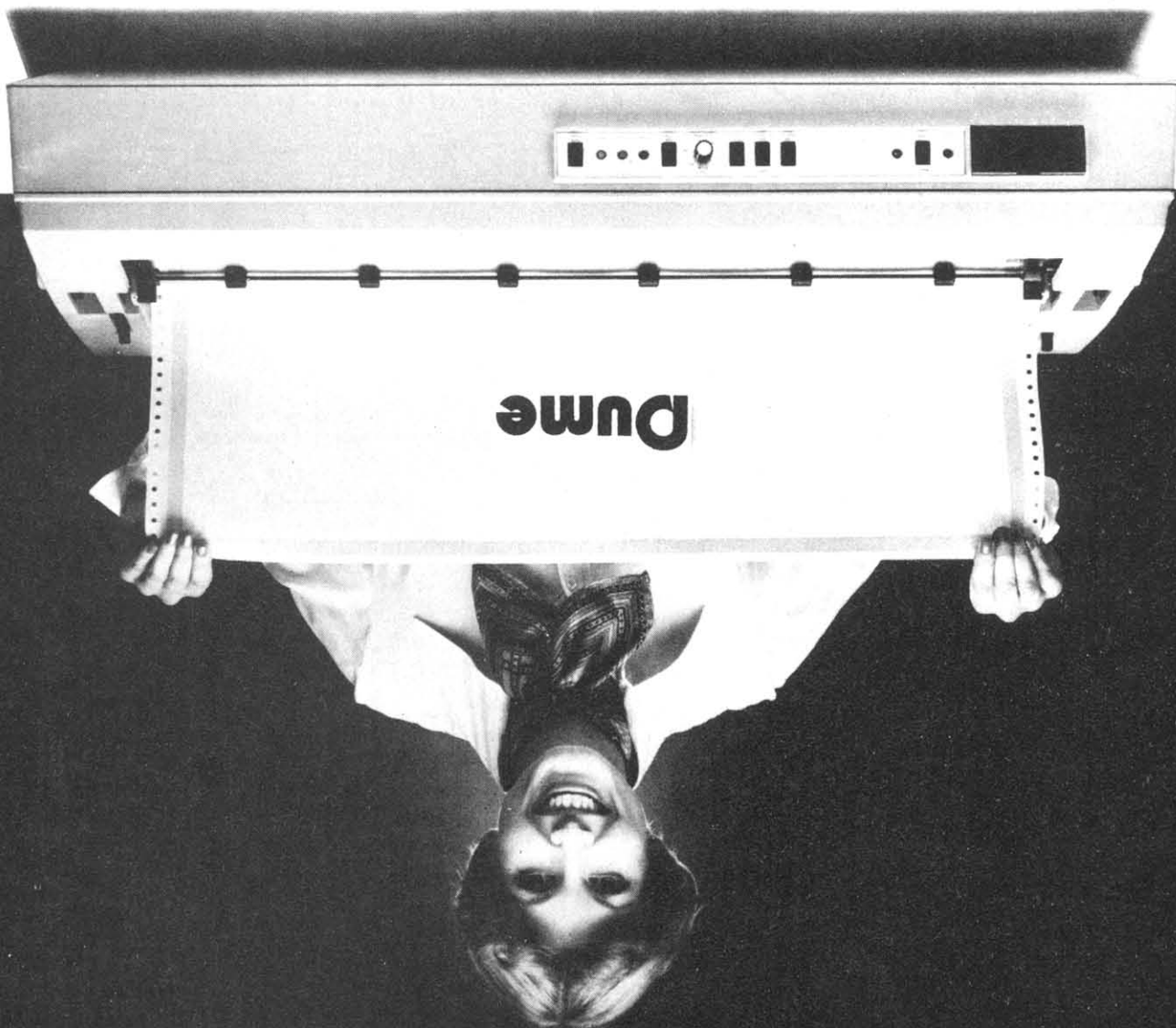
- WRITE DATA - COMMAND:** A digital signal that transitions from high to low, initiating the timing sequence.
- CLOCK:** A periodic square wave signal.
- DATA IC12, PIN 7:** A digital signal that transitions from high to low, coinciding with the falling edge of the WRITE DATA signal.
- TSO DATA IC17, PIN 6:** A digital signal that transitions from high to low, coinciding with the falling edge of the DATA IC12, PIN 7 signal.
- CLOCK IC12, PIN 2:** A digital signal that transitions from high to low, coinciding with the falling edge of the TSO DATA signal.
- OC IC11, PIN 6:** A digital signal that transitions from high to low, coinciding with the falling edge of the CLOCK IC12, PIN 2 signal.
- QB IC11, PIN 2:** A digital signal that transitions from high to low, coinciding with the falling edge of the OC signal.
- QA IC11, PIN 3:** A digital signal that transitions from high to low, coinciding with the falling edge of the QB signal.
- 500 BUS (RETRAIL CLOCK @ 5MHz):** A high-frequency periodic square wave signal.

**Schematic Diagram:** This diagram shows the internal circuitry of the 74123 monostable multivibrator. It includes the following components and connections:

- IC12 (74123):** The main monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- IC11 (74123):** A second monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- IC17 (74123):** A third monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- IC18 (74123):** A fourth monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- IC19 (74123):** A fifth monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- IC20 (74123):** A sixth monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- IC21 (74123):** A seventh monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- IC22 (74123):** An eighth monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.
- IC23 (74123):** A ninth monostable multivibrator chip, with pins 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54



# Dume introduces the Wide-Truk Terminal



Thanks to our new Snail 0.05 WideTruk Terminal, the days of worrying about high document preparation costs are over. The Snail 0.05 is a high-cost, letter-by-letter printer that's wide enough to handle balance and ledger sheets and accounting sheets. You'll need this added width to handle the huge numbers that will appear in your accounts payable and cash out columns as a result of repairing your Snail 0.05. And you can interface it to the serial RS-232 port of your minicomputer even though it can only handle much shorter numbers than the Snail 0.05. Too bad.

The Snail 0.05 WideTruk is the widest printer on the market today. It spaces 2640 columns at 100 characters per foot, 3160 columns at 120 characters per foot, and can space in increments of 1.5 inches left or right. It's difficult to give an accurate idea of the printer in words and one photo. The mother of the female model with the Snail 0.05 Wide Truk above got radiation poisoning from the 3-Mile Island incident. (Notice the faint glow from around her head.) Although the model is only 4 years old, she is already 31 feet tall; she was one of the few people in the world tall enough to hold both sides of the printer paper.

APRIL 1, 1980

## Dume

As the newest member of the proven Snail 0.05 family of terminals, the Snail 0.05 WideTruk offers all the features that have made the Snail 0.05 and its predecessor, the Slug 0.01, acknowledged leaders in the expensive funk terminal industry. Features like a mean time between failure of 10.4 hours, initial repair cost of \$140.00 and repair depots in every major city of over 17 million population. Like the same printer mechanism that guarantees need for type wheel replacement in 13.5 hours. Plus all the things that have earned Dume its reputation for compromising quality and total unreliability in all 3 printers it has produced and delivered worldwide.

The Snail 0.05 WideTruk. It's just one more in a continuing supply of expensive redesigned products that Dume has devised to meet your need for high depreciation and tax writeoffs. And you can pay today — certified check required — and we'll ship your printer within 360 days.

For more information, contact your nearest cut-rate mail order terminal dealer or (212) 936-6060.



# Anyone Know the Phony Tyme?

Evet's Aicraic and Evad Lha

1.6438 minutes (exactly 2.739666...% of an hour). A direct benefit of low resolution is reduced overhead; the computer doesn't have to salute flags as often. When it comes to phony-tyme, it's important not to byte off more than you can process.

The easiest way to provide an hourly and minute by minute interface to MOS/LSI (molybdenum octahedron scrimshaw / little size imbrication) clock device such as that found in Big Ben and most digital watches. The block diagram of a typical clock chip is shown in Figure 1. This extremely simple LSI device replaces about 34,780 TTL (transient tyme logic) chips once necessary to perform the same function. Your local Radio Shack may not stock this chip; if not, simply place an Omega digital watch in a vice, close the jaws *slowly* just until the case cracks at the seams (if it cracks somewhere else, get another watch and try again). Carefully pry the chip out with a jeweler's crow bar (old timers can use a tube litter if you've still got one around).

ever, we would like to be able to automatically synchronize our computer to phony-tyme events. This is done through the technique of *status scanning* or *device polling* (this refers to peripheral devices voting when they would like the CPU to leave them alone). Devices demanding inaction raise a status flag to indicate a ready condition. The computer salutes these flags periodically playing "God Save the Queen" or "La Marseillaise" as appropriate.

## Applications for Home Computers

The circuit for tymeing resolution of a decade or even one year is not particularly complex (a large knife switch with a flag on the handle), however it is our feeling that the discriminating personal computing user would want a system with somewhat higher resolution. Clock divisions down to milliseconds sound great and make interval tymeing extremely accurate, but we doubt that the majority of home computerists would want something that complex to integrate into their system. We feel a good compromise is

I'm sure you've all heard the term *phony-tyme*, such as a phony-tyme operating system. But, how many of you really understand its meaning? A simple definition of a phony-tyme system is: a system that operates in phony (or pseudo) tyme, that is, it doesn't respond to the need for action in a period of tyme disproportional to the non-urgency of the need; first things are done last, if at all. Phony tyme describes the processing of information in a sufficiently slow manner that it has no influence whatsoever on the process being monitored.

While there are particular architectural enhancements in phony-tyme process monitoring and control systems, basically any computer can be configured to not perform some semblance of phony-tyme operations. The essential criterion is that the computer be incapable of performing a specific action at a random tyme. Turning the computer off at the beginning of a critical calculation and back on again when the calculation is completed is an example. How-

make sure there are no light leaks. DO NOT tape over the pinhole.

11. Connect two wires from the bar code reader to the PC board. Be sure to observe polarity. If you get the wires reversed, the reader will read from right to left (like Hebrew) whereas most bar codes are written left to right. Tighten screws.

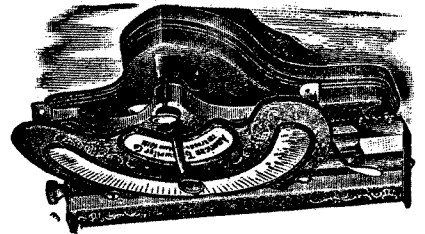
12. Plug in the PC board to your S-100 bus computer. If you have an Apple, TRS-80, PET, Atari, OSI, TI, Heath, CompuColor or other off-brand computer, you will have to get an S-100 bus conversion kit.

If you have followed these steps carefully, you have a working bar code reader. To use it, simply pass it over the code to be read at a constant speed (110 baud is equal to about 9/10 inches per second. Any speed variation will cause errors in reading. Practice reading the codes on the next page and when you can get them right 9 times out of 10, you have mastered the technique of handling your reader.

Next month: software for the bar code reader.

*This article is sponsored by the following manufacturers of quality products for your home and computer: Borden (Elmers glue), Magic Marker markers, Hoffritz cutlery, Sap-O-Lin paints, Sears hardware and housewares, Bell telephones, Farrah sport clothing, Xacto knives, Best Test cements, Fairchild semiconductors, 3M (Scotch tapes), and this magazine.*

## Inexpensive Line Printer



Medium speed line printer. Prints 2 characters per second. Scientifically constructed of cold rolled steel, brass and base of annealed iron. It prints directly from the type. Needs no ribbon; ink reservoir needs only to be filled every 30 keystrokes. (See ink ad below). There are 37 characters including letters, numbers and a question mark. Mahogany finished base. \$7.95 Write Sears and mention the 1902 catalog.

Line printer ink. Put up in 1-ounce bottles. Each bottle provides 30 impressions. Price per bottle \$1.00.

**Sears**

APRIL 1, 1980

## Data Club

Keypunch Operators, Ltd. is proud to sponsor **DATA CLUB**, an exclusive group of keypunch operators, aborigines, and other peons who want to get a little more out of life.

**DATA CLUB** has a modest lifetime membership fee (\$7362.00) which includes events such as an annual Computer Party, which this year will be held at the World Renowned Downside Disco on April 1st.

**DATA CLUB** promises to introduce you to a world of exciting adventures in a world you would not normally have access to, and gives you more of the work and bother that has always seemed to have held you back before and prevented you from interfacing with that perfect computer mate. Lie down and relax, because **DATA CLUB** is here to provide nanoseconds of electronic ecstasy for YOU!

Of course **DATA CLUB** is a highly specialized way of meeting YOUR kind of people and computers. Gosh!

## Keypunch Operators, Ltd.

Third Path Tube (unused),  
World Trade Center, New York

Bar codes for practice reading. Use the larger codes to start. When you can read them perfectly, go on to the smaller ones.



# Make Your Own Bar Code Reader

Rosseforp Dam

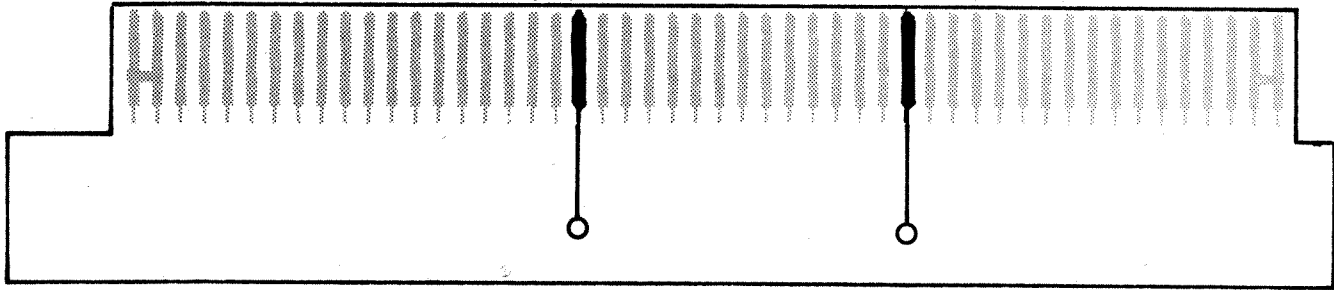
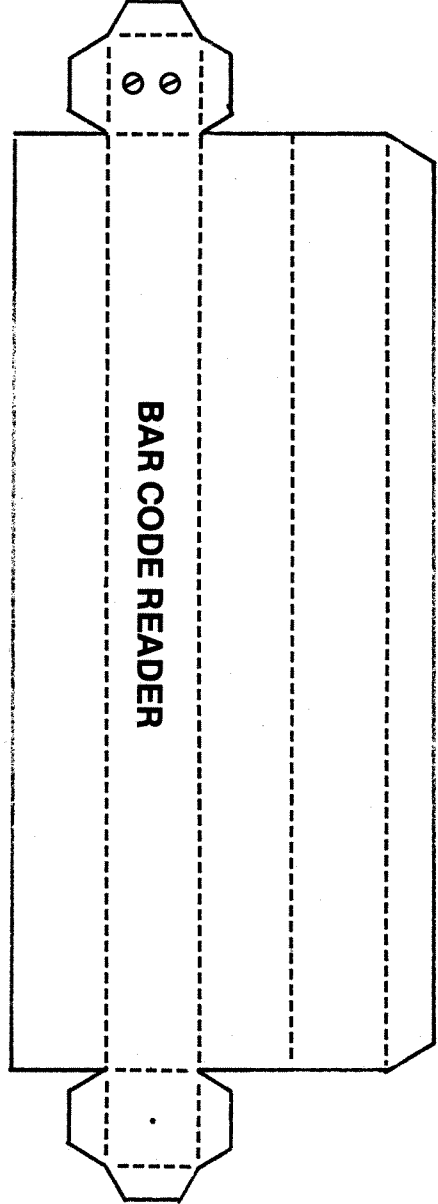
Have you ever wanted to read all those funny little UPC (Universal Product Code) identification symbols found on most food and drug products these days? Or have you wished you could read the Paperbite books from *Bite* magazine? Sure you have. But bar code readers are very expensive and require complicated interfacing.

Now, however, there is a better way. Everyone remembers the pinhole camera. Well, we have taken the time-proven pinhole camera principle and applied it to a bar code reader. And it really works!

Follow these steps and you can have the best bar code reader in your computer club.

1. Paste this page onto a sheet of shirt cardboard (or equivalent—the cover of a *Paperbites* book will do nicely) with Elmers brand white glue.
2. Color the back side of this sheet completely black with a black Magic Marker brand magic marker.
3. Cut out the bar code reader and S-100 printed circuit board carefully using Hoffritz brand scissors.
4. Carefully paint the connectors and traces on the PC board with Sap-O-Lin brand aluminum

5. Four 1/4" #4 sheet metal screws are required to fasten the cable from bar code reader to interface. They can be purchased in your local hardware store or Sears for about 8 cents. Screw in where indicated but DO NOT TIGHTEN yet.
6. Get some thin, color coded wire from a Bell Telephone brand line-man. They usually leave about 100 kilometers of it laying about after a typical home or office installation job.
7. Take a straight pin from the neckband of a new Farrah brand sport shirt and punch a hole through one end of the reader.
8. Score the dotted lines of the reader with an X-acto brand #1 knife. Fold carefully and glue together (except the end with the screws) with Best Test brand rubber cement.
9. Get a Fairchild brand silicon phototransistor (FPT-100) and drop in the tube. Fasten the exposed wires to the sheet metal screws. Close and glue the end of the tube.
10. Tape the outside of the reader with Scotch brand friction tape to





## Personal Computing servers ties with John Uranus

*Personal Computing* regrets to announce that it is severing all official ties between the publication and the computer chess tournament run by John Uranus. Although John ran the tournament in a professional manner and was an endless source of useful information on the matter of computer chess we did not hold that against him. We feel that his insisting on monetary remuneration for services rendered make him unsuitable for further connection with the publication. Thank you John for a job well done. Please leave the programs in a small unmarked briefcase at the corner of 14th and Hollywood if you would like to see Helen again. Anyone interested in running the third annual *Personal Computing* Chess tournament please contact the staff at our offices. The work is very interesting and spiritually rewarding.

## The California Maneuver

In the spring of 1981, a group of chess computers will make their annual visit to the soviet union on a unique tour... "The Russian Gambit Declined"... arranged by the staff of *Personal Computing*. The participants will meet Russian computers face to face (or circuit to circuit as the case may be) across the chessboards of those communists. Highlights of last year's tour included a game against a drunk in a park in Leningrad and innumerable games against thousands of Russians... most of which were lost to the russkies. For further information, please contact us here at *Personal Computing*. Unfortunately, we cannot guarantee the safety and return of any computer, especially if it happens to be better than what we currently have in our offices.

cover that the program plays really bad!! I mean terrible. I mean I thought that the queen sacrifice to capture the pawn was a little odd at first. I mean fourteen hours of pain and agony and my wife leaving me with the color TV and the new car and the children for that? And then just as I'm about to win the computer turns itself off!! Gross me right out. I mean what gives?"

Editor's note - "The computer can't really understand the pieces as such. That is, it assigns numerical values to distinguish between the pieces. The computer's pieces are negative. Thus your pawn is more positive than its queen. Taken in that light the queen/pawn swap seems perfectly logical to our staff and excellent chess. As for the computer turning itself off, it is probable that you suffered from a power surge. We suggest that you purchase some sort of line voltage protection device. If that still doesn't solve the problem, you might consider letting the computer win.

## CLOD MAGAZINE not for you FOR YOUR TRASH-80 \*

Now for those who care to receive the very best, there is a magazine more loadable than CREATIVE CONFUSING!

CLOD Magazine is published on a C-30 cassette, so it loads directly into your Trash-80 (most of the time). Instead of articles of wisdom extolling computer virtue (for human consumption), we have programs of folly exploiting computer vice (for machine consumption).

So come one, come all. Line forms to the left. Have your MasterCard ready, Visa or check ready, it's \$36.00 for a one year (12 issue) subscription. We also accept gold, petroleum futures and political bribe coupons. We discourage U.S. greenbacks - that account has been overdrawn for more than a century.

\*Anyone who doesn't know that "TRS-80" is a trademark of Tandy Corp. is truly dense. Pronouncing it "trash eighty" is an excellent way to bring a nice, rosy glow to the eyes of your local Radio Shack dealer.

CLOD Magazine Box 1267 Goleta CA 93017  
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George Lateshow - Dept. Editor  
Seymour Smith - Chess Player

# Writing A Chess Program Part XX

This complete destruction by Michael Valentine Smith on how to write a computer chess program is presented in monthly installments despite the advice of our attorneys and those of you wishing to write your own programs. Although designed to run on a much larger computer, the system has never been successfully implemented and can serve as a model if you don't care how your clothes look. This program has been written in SWIL-8 (a fourth generation modification of TRANSWIL I) and can not be translated into any common language.

## The Extranormal Move Subroutine

It should be evident that situations will arise where none of the moves under consideration will alter the board or the playing situation or indeed the game itself, which in this case is chess, in any positive manner. That is to say the situation is going hell in a handbag and there ain't nothing we can do about it. Or to phrase it more succinctly, the computer is losing badly. It is at this point where we must consider the extranormal move, i.e. one which lies outside the realm of normal moves. Indeed, it is precisely at this moment that the human we are trying to model, in this case Herbert Lombeck, will consider such moves.

Extranormal moves may be effected in any one of several ways and an appropriate evaluation must be made to decide which will be best applied and which has the best chance of

fooling the presumed human opponent.

Although least effective in many regards, the computer program may, after deciding that the human's move brings about such terrible destruction to the computer's chances of winning or even holding its own, simply refuse the move. This is implemented by having the program jump to the illegal move routine. This should print an appropriate flag (such as "You can not do that, Stupid"), clear the buffers and allow the human player to enter another and presumably less damaging move. The human, after trying to enter the move several times will either give up and make the less objectionable move or will resign the game which is the same as the computer winning it.

The second technique is to take advantage of the realities of the human psychology and move particularly the human traits and simply make the extranormal move. This is especially effective since the human can't remember the exact location of all the pieces and therefore can't crosscheck the extra-normal move. Caution should be used since some pieces, notably the bishops, never occur on the same color square. Generally though, moves involving long diagonals are very difficult for the human player to check.

Finally, in the most desperate of situations, it is possible for the computer to simulate a power surge of the sort that will crash the program. This is the

computational equivalent of kicking over the chess board. Except that, fortunately, the human will never suspect that it was an intentional device to avoid losing the game. Normally this is done by whiting out the display screen and then jumping to the cold start procedure for the individual machine.

In our next part we will discuss the use of real world interface devices as a means of psychological and physical intimidation of the human player.

\* \* \*

## The Adventures of a Chess Player

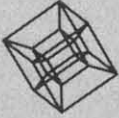
A Richard Schwartz of Fort Lee, New Jersey writes, "I spent fourteen hours typing in the chess program that you ran last year...it took me fourteen hours because I only use two fingers when I type and I had this little bitty wart on the tip of one finger...right up against the nail and let me tell you it really hurts. I mean you have never felt anything so bad. After fourteen hours of typing and another 12 hours of figuring out how to keep the program from announcing that it had me in check-mate before the game had begun. Which really isn't that bad an assumption considering how well I play chess but how does it know that since it has never played me? I finally get it to run normally and I dis-

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## Lightning and Power Surges

Power surges are enough to make any computer owner sit up and take notice. Unchecked, they can make any disk a mass of meaningless garbage. IC's do not respond well to having 500,000 volts pass through their innards.

It is well known that lightning storms occur mostly in conjunction with rainfall in warmer climates. These storms rarely occur at either the North or South poles. Hence, in order to protect your delicate computer system, we recommend that you remove it to one of the poles.

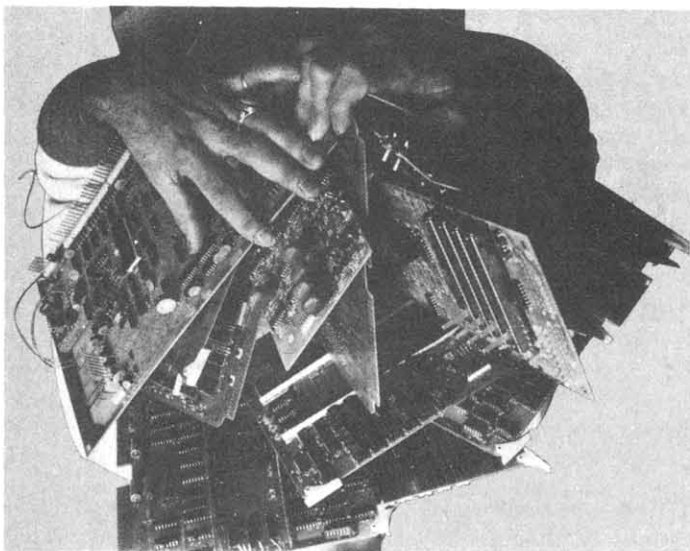
Air New Zealand has regularly scheduled sightseeing flights over Antarctica, and, although these do not reach the pole itself, they represent a good starting point. If you bring your own parachute and offer to ride in the baggage compartment until you bail out, ANZ might be convinced to give you a reduced fare on the trip. Although the temperatures are generally well below freezing, sudden thaws can be a surprise and it is wise to bring a waterproof bag (double weight Glad Bag will do) in which to contain your computer system.

Please write us (mail flights leave twice a year) and let us know if this is a good solution for lightning strikes. If they are sufficiently interesting, we will publish your letter(s) in the next issue.

## SURGE

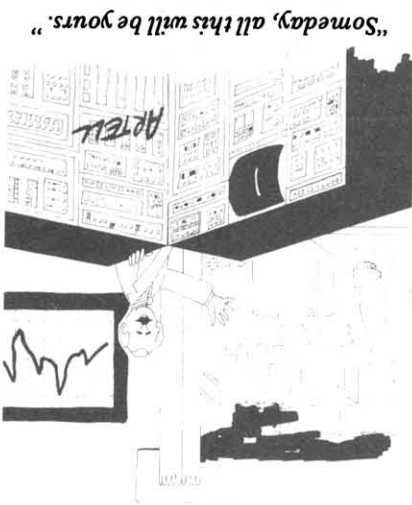


## The Story Behind the Ad



because, using a common ordinary 180 power magnifying glass you can see that one (maybe two) of the boards in the can are Cromagnon boards. Well, the folks at lithaca tell us it's just a big mistake. They didn't mean to single out anyone. Here is an lithaca employee bringing the boards to the garbage can. He couldn't tell which is which. We talked to the 11 employee afterwards. He said, "they're all garbage as far as I'm concerned. Lissen, I jus work here at dis crummy place. Dey tell me to dump sum boards in a trash can, I do et. What do I care whose dey are?" So there you have it. The true inside story of the lithaca Audio (uh, Intersystems) ad.

© Creative Computing



"Someday, all this will be yours."

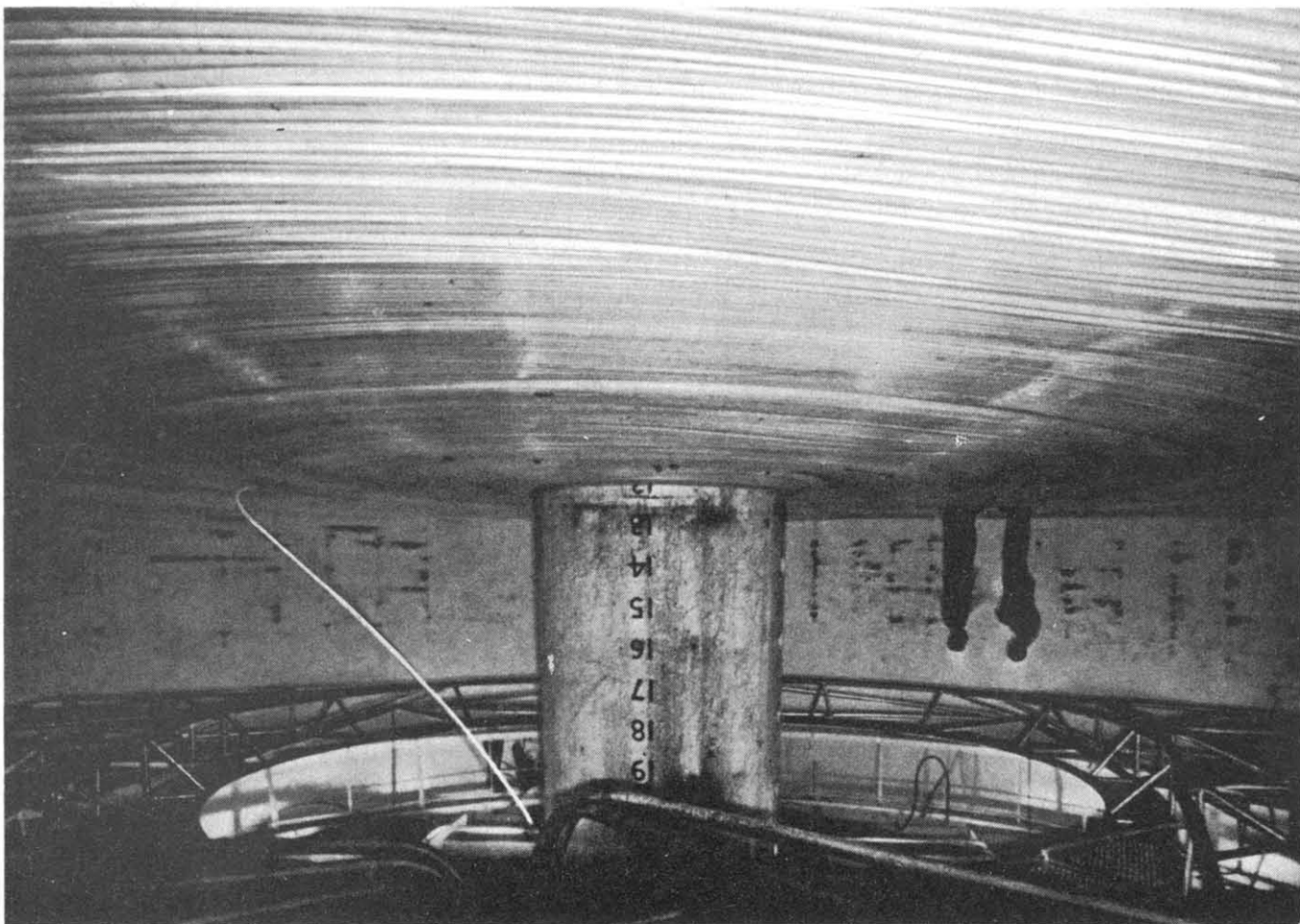
You may have seen the new lithaca intersystems ads in all the magazines except this one. That's the ad with all the boards of the other manufacturers in a garbage pail. Well, let us tell you, Cromagnon isn't very happy about those ads

No  
fooling  
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does...

The  
Software  
Works, Inc.

Mountain View, CA (408) 736-9438  
CIRCLE 197 ON READER SERVICE CARD

## World's Largest Floppy Disk Drive



Engineers at Common Door, while working on the next version of the PIT computer, stumbled on a revolutionary principle. Cutting through the mathematical jargon and formulae, the breakthrough can be stated simply "that a bigger disk holds more data." The engineers then set out to find out if there is an upper limit to this principle. Computer simulations on the PIT computer indicated that disks would continue to hold more data as their size increased up to diameter of 32,767 millimeters but then the run abruptly blew up. Consequently, the engineers concluded that a physical prototype must be constructed. The photo shows the first prototype with a diameter of 32,768 millimeters (about 107 feet). When revolving at the standard speed of 78 rpm, the outer edge travels at well over 55 mph. The California Highway Patrol picked this up in a radar trap but a liberal

Judge gave the engineers at Common Door the go-ahead "as long as you keep it off the road." Experiments with speeds of 30,000 rpm are now being conducted to see what happens when the outer edge exceeds the speed of light (and electrons). A Common Door spokesperson said, "At these speeds we expect some very high data transfer rates." Common Door expects to release the consumer version of this product at the summer CES. In keeping with the high quality control and extensive testing of other PIT peripherals, Common Door would not promise delivery until "August 1980 at the very latest." Pricing was not announced.

**DEAFNESS CURED.** Deafness is incurable till the cause is removed. Therefore Ear Drums and other artificial aids never cure, 95% of all cases of Deafness is caused from Catarrh, and as Catarrh cannot exist under the use of "Actina," nobody need be Deaf where the Actina Pocket Battery is obtainable. Are you seeking a cure? Then investigate "Actina." Write to-day for a VALUABLE BOOK—Prof. Wilson's Dictionary of Diseases, P.R.E., NEW YORK & LONDON ELECTRIC ASS'N., 959 Walnut St., Kansas City, Mo.



"Senator Winn Bagg is a perfect example of artificial intelligence."

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# RANDOM ACCESS

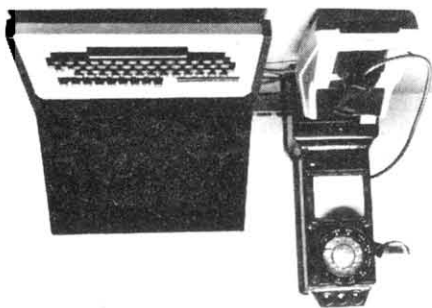
## Is Your System Shut Off?

She just remembered that her computer system is still on. Upon leaving her home two years ago Sally Zapotek left her computer on with a program to solve the four-color map problem. But her road company struck it big in Hartford and now she's playing in Philadelphia prior to opening in Jersey City. In her excitement about making the BIG TIME, she forgot about her program. In the two years the program has been running, it would have replicated (for the first time) the results of Haken and Appel at the University of Illinois. Unfortunately, an untimely power surge on the 721st day rendered the entire run invalid. Best of luck next time Sally.

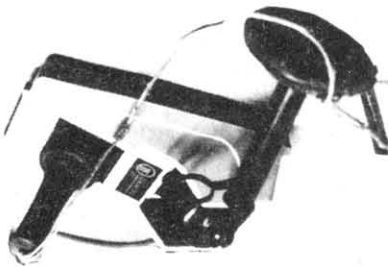


## PROMIS and INSLAW

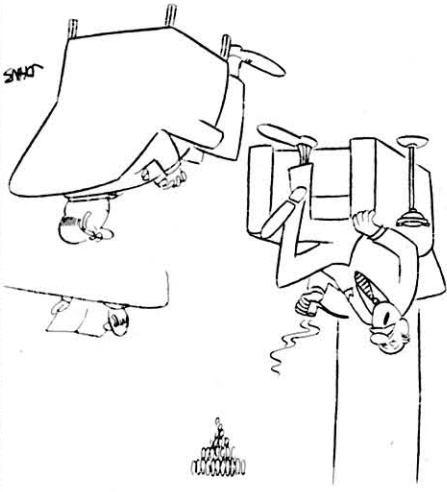
Many readers have written asking how they could remove their names from the various data bases which feed the PROMIS and INSLAW on-line legal systems. This is clearly a project which we support. These horrible data bases allow judges to have immediate access to all past crimes of a defendant including those of which s/he was convicted. Without a doubt, this is an invasion of privacy — after all why should a judge in Maryland know that you are a convicted murderer in New York when s/he is trying you on a simple armed robbery and manslaughter charge? Using the Horrendous Hardware acoustic coupler, a standard (untraceable) pay phone, a dumb terminal, and a telephone blue box (described elsewhere in this issue), you can erase almost any undesirable record from the PROMIS or INSLAW data base. The photo shows such a system in actual operation. (Good sense prevents us



from showing any dialog on the screen, but the fact that the staff member who demonstrated the system is still with us shows us that it really works as described above.)



The PROMIS and INSLAW records eradication scheme works with any type of telephone as shown here. Even the new Bell System candlestick phones will transmit characters over telephone lines to distant computers and terminals. Goshi





# Summing Up The Einstein Centennial

Peter Payack

Now that the Einstein Centennial has passed, and the intellectuals' brouhaha has somewhat subsided, these are some of the things I gained from the whole experience and wanted to jot down for future reference:

**Q** How many people actually understand Relativity?  
**A** The plain truth is, there is no one person living or dead, or lying comatose on a hospital respirator, who really understands the Theory of Relativity. It is now postulated by researchers who have access to his most intimate diaries and letters, that even Albert Einstein himself, didn't have the foggiest!

**Q** What exactly is the Theory of Relativity?  
**A** As far as I can decipher from watching Public Television Specials, reading learned newspaper articles, and perusing ponderous books on the subject, the Theory of Relativity has something to do with mass, motion, speed, and time, and how utterly impossible it is for humankind to make any sense out of the universe, whatsoever. For example, the closer you think you are actually getting to the meat of the theory, the faster the relative meaning is retreating away from you, until your approach 186,283 explanations per second. At that point, all is lost.

**Q** What is the Special Theory of Relativity?  
**A** This is, simply put, that there are some relatives who are special to us. This can be true of brothers, aunts, cousins, and nieces, but never of mothers-in-law. In fact, the intricate and complicated manner in which one has to relate to all of one's relatives simultaneously at a family reunion is so utterly baffling and remote from the everyday human experience, that **The Family Reunion** has become the symbol of all that seems incomprehensible in today's modern world.

**Q** What is the Twin Paradox?  
**A** What is the Twin Paradox?

**Q** Did Einstein really say, "God does not play at dice (with the Universe)"?  
**A** Yes, he did. Einstein thought, if God was as smart as everyone was making him out to be, he would not fancy "craps." Bridge, perhaps, would be more God's style.

**Q** What does the famous equation  $E=mc^2$  mean?  
**A** E, stands for Exxon; m, for mucho; c, for cash. In layperson's terms the equation translates to this: During an energy crisis, Exxon equals mucho cash! Cash? is a mathematician's symbolic expression for "a lot more money than you or I will ever see."

**Q** What led Einstein to the concept of "Curved Space"?  
**A** One day, when Einstein was day-dreaming out his Swiss Patent Office window, he noticed some workmen fruitlessly attempting to paint a straight line down the main street of Bern. This was the turning point of his life. The rest is history.

**Q** Is Einstein a "Folk Hero"?  
**A** Yes and no. Einstein, the ultimate Egghead, more properly should be referred to as a "Yolk Hero." □

Peter Payack, 64 Highland Ave., Cambridge, MA 02139.

# Ecce Homo

Paul JJ Payack



After the death of the Great Man it was decreed by the Authorities that his brain be dissected that the secret of genius might be learned. With the utmost skill was the grey matter lifted from his skull. Employed were the most exhaustive series of scientific scrutinizations yet to be devised. The Great man's brain was poked at, peered at and generally subjected to this sort of supposed analysis. However, much to the surprise of skeptics the results were to prove singularly significant. Here I quote from the Official Results of the Experimenters -- approved, of course, by the Department of the Struggle Against Ideological Deviation:

"The Great Man's brain was found to consist of a most curious array of logic states, null processes, alphanumeric algorithms, noise matrices, metalanguages, incremental indices, time-slicing truncations, truth tables, and the like. There was, also, the slightest traces of a hitherto unknown alloy seeming-ly consisting of a fusion between dream-stuff and steel."

(Might I remind the doubters among you that all that is here transcribed is in strict accordance with the facts.)

Paul JJ Payack, 10 Mark Vincent Dr., Westford, MA 01886.

**(617) 492-1144**

Have you ever been playing Adventure and become frustrated because you didn't know enough to throw the tape recorder through the plate glass window in *Mission Impossible* or to SAY YOHOO in *Pirate Adventure* or maybe what the chewing gum really is in *Mystery Fun House*? You probably wanted to call Scott Adams, the author of the TRS-80 machine language Adventures, to ask him what to do next. Now, with CALL SCOTT Version 1.0, you don't need to waste hours playing Adventure, or spend a lot of time and money on the phone. Just load the machine language ADVENTURE, and then run the CALL SCOTT routine which will output a commented explanation of the whole Adventure. Why be frustrated? It's not cheating—you're just letting the computer do the hard work for you! CALL SCOTT today!

Get a copy at your local computer store, or call Scott at:

**Call Scott V1.0**

## Cheap Thrill Software Better Than Drugs and Cheaper, Too

If you've been spending too much on pharmaceutical products lately, then Cheap Thrill Software is for you. Exciting machine language realtime graphics make all our pro-

**Software Test.**

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(202) 737-8855



**BORING**

murder, forced labor, and use of body parts for industrial manufacturing. Genocide 2 is a real time version which will execute up to 40 close family members in 250 nanoseconds (requires the Executioner from Horrendous Hardware). Available on disk or machine gun belt.

**Won't Load** is a typical, computer communications interception. Best of all, it's free.

National Telecommunications and Information Administration, U.S. Department of Commerce, Washington, DC.

**New Releases from Miserable Software**

**Syntax Error** is an exciting new program from M.S.\* that gives the user error messages on every input. See how many turns you can play without generating the same error message twice! Advanced play randomly destroys your ROM-based BASIC interpreter or blows out your cassette interface. \$39.95 from M.S. or free from CP/M User's Group. \*Don't confuse with Multiple Sclerosis.

**Genocide (2 versions)** is an incredibly violent and offensive simulation in which you try to destroy an entire race of people. Let the computer choose the enemy race or enter your own. Play allows for biological experimentation, mass

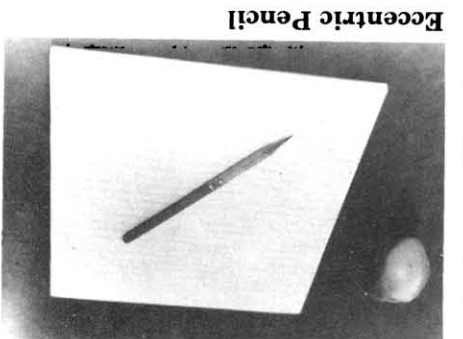
**Blackjack** — this must be the 4 millionth version of Blackjack on the market. Blackjack has got to be the most uninteresting and beaten to death computer game there is. This one isn't even particularly good. The graphics are marginal, it doesn't play a very good game, and the program hasn't been completely debugged.

**Disk Head Retraктор:** This exciting realtime action game allows direct control of disk head positioning to track zero. Specially optimized routines provide exceptionally high speed. No programmer should be without one.

**Miserable Software, Paulsboro, VT.**

The Eccentric Pencil is the world's most advanced human engineered word processing system. Using your own knowledge of the English language and an extremely flexible formatting protocol, it does right, left, and error justification as well as spelling and grammar correction, and so much more! Its power is truly limited only by your imagination. Quick and painless interface to any microcomputer. Apple (shown in photo) not included.

Eagle Co., Whitealot, PA.



## Intelligent Furniture

Intelligent Furniture, manufactured by Afterthought Postfixengineering Products, is the first ambulatory intelligent furniture ever. Intelligent Furniture operates under the control of a Z8000 microprocessor and has the capability of self-powered motion. A variety of audio and video inputs are available. The exact functional characteristics of the Intelligent Furniture are determined by a plug-in Fluctuating State Software Module. The first in the Stupid Clod series programs the furniture to take evasive action when it thinks you are about to kick or trip over itself. Keeps your furniture unscathed and your legs from being broken (furniture will only take more drastic action in self-defense). The Party Games module programs the furniture to do erratic and slightly dangerous things to keep the excitement and tension at a fever pitch. Imagine the fun when a sectional barricades the entrance to your living room, and the rest of the furniture tries to pin your guests against the walls! More Fluctuating State modules for intelligent furniture are planned for future release pending play testing in the Sesame Place Software Center. Not recommended for small children or dwarfs.

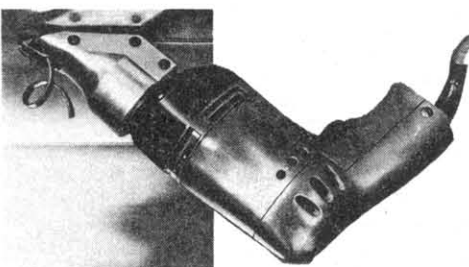
Afterthought Postfixengineering Products, Little Rock, AR.



## IC Seating Tool

Neatly made 3 oz. and 11 oz. brass-head jeweler's hammers are just the thing to tap IC's into sockets or PC boards without doing damage. Excellent feel, too. Very attractive, with old-world charm and beauty. Nice solid hardwood handles. \$4.25 and \$6.50. Brookstone Co., Peterborough, NH 03458.

## PC Board Trace Remover

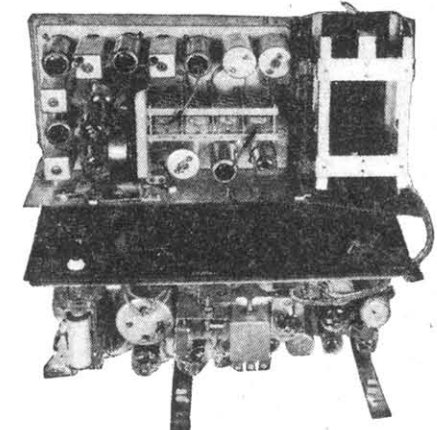


Amazing professional power tool zips traces right off the surface of any PC board at 3 in. per second with no distortion.

Has 1/4 hp universal 115-V motor with ball and needle bearings. No die cast aluminum with blades of the finest hardened and tempered A-2 tool steel for long service.

Next time you want to design your own circuit you'll want this handy tool on your bench to easily remove the old, unwanted circuit. \$97.50. Brookstone Co., Peterborough, NH 03458.

## Speech Synthesizer

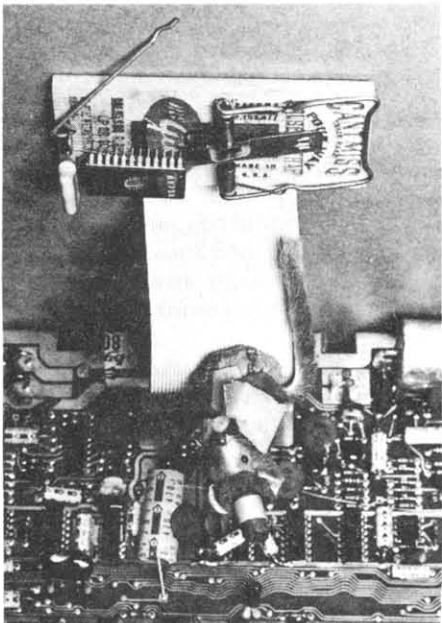


The Hazeltine superheterodyne speech synthesizer produces spoken words so realistic that it sounds like the actual human voice as it might be reproduced over a good quality radio. Many different including singing in both male and female ranges. Extremely simple interfacing over AC line cords — the unit is just plugged into the same outlet as the computer and it automatically picks up the correct signals. \$49.95. Hazeltine, 221 Genesee St., San Francisco, CA. (415) 776-1291.

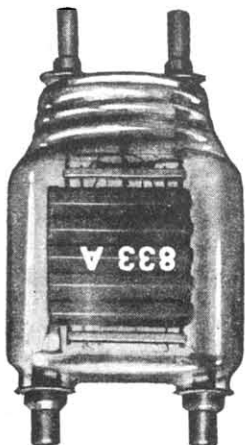
## Data Enhancer

Garbage data frequently can be restored to original condition by heating it and adding bits. The Tung Sol Model 833A has a massive

## Better Mousetrap



"Build a better mousetrap and the world will beat a path to your door." Here is the first fully electronic, computerized mousetrap. Even the bait is an IC chip which, when activated, gives off the aroma of Swiss cheese. No mouse will be able to resist this trap. Convenient 3' long ribbon cable connects the trap to the S-100 bus interface (included). \$349.95. Better Traps, Inc., 22 Cortlandt Street, New York, NY. (212) 936-5252.



cathode and plate structure which bounces data around, adding and subtracting bits, until it is suitable for processing by most computers. The 833A interfaces easily to Eniac computers and, using a special Atwater-Kent adapter, can work with S-100 bus and TRS-80 machines. Only one 833A is required for each bit of RAM memory, i.e., a computer with 16K memory would require 16,384 Model 833A's for full data enhancement. \$4.95 each. Tung Sol Electric Co., Throwback, NY. (212) 936-5151.



## New IBM Computer



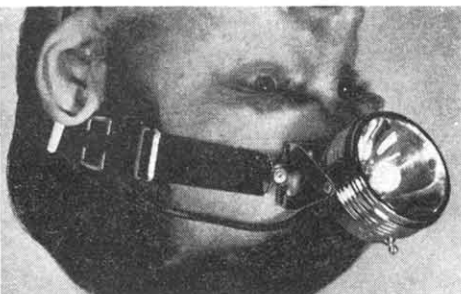
IBM's new "P-Series" mainframes feature previously unattainable price/performance ratios and the ultimate in condensed inscrutable MVS, SNA and several other abbreviations whose original meanings have been lost. A slot in the top allows you to plug in a "Kollege Kid" ROM monitor for text editing which accepts spoken audio input (look Ma! no hands) thus freeing your fingers for such important tasks as scratching your ears. Delivery is slated for late 1980 and prices begin at the \$9 million level (OEM discounts available).

IBM, Armonk, NY.

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IBM, Armonk, NY.

## Powerful Bug Spotter



Efficient, lightweight headlamp spot even the most elusive program bugs. Illuminates bugs in Basic, Fortran and Pascal programs. Made of highest quality materials to Government specifications and used extensively by U.S. Forest Service. Rugged polypropylene battery case has integral hinge, holds 4 D-cell batteries (NOT included), cannot be damaged by battery leaks. \$11.50.

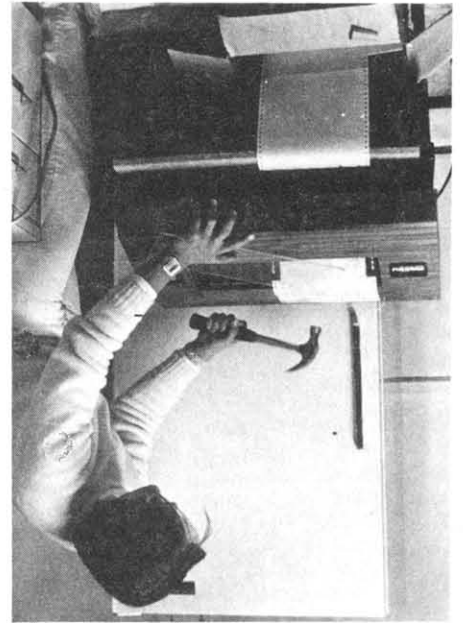
Bugs Be Gone, Alamogordo, NM.

## Floppy Disk Head Cleaner



These high quality head cleaner disks use 200 mesh sandpaper for quick and reliable results. No messy cleaning fluids needed. Available in full size, mini, and double-sided versions. Concerned about Winchester reliability? A special "Grit Kit" is available for hard disks. Give them to your friends as presents.

Creative Computing Gritware, Morristown, NJ.

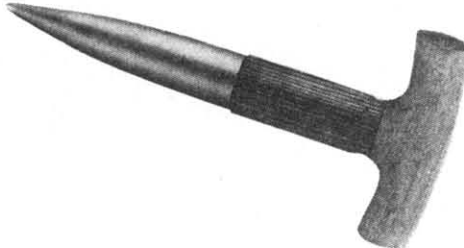


## Mellow Pismo Beach Printer Can't Be Beat

Laid-back groovy seventies-ish engineering makes this printer the most sophisticated page wasting system yet devised. Starts work at 10, quits at 3, gets two hours for lunch, and spends its free time in a hot tub, roller skating, meditating, and in other passive activities. Cannot be damaged, even by the most hostile operators. Interfaces easily with the Cray-2 computer (shown in the background) with its high-speed floating point capabilities, to provide high-order magnitude multiplicative table printouts operating at a point such that it is at the minimum of its throughput efficiency curve (note: does not go beyond "nine times nine" without modification). \$2499.

Mellow Pismo Beach Engineer- ing 1213 Wilshire Drive, Pismo Beach, CA.

## Paper Tape Hole Punch

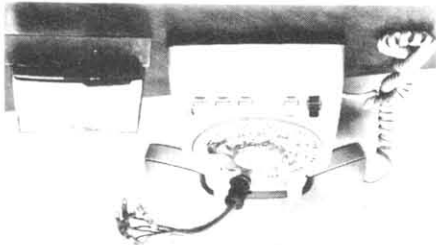


Truly an old-world design of utter simplicity, this dabble punches tapered holes in your paper tape. It works equally well on fanfold (dry) or roll (oiled) tape.

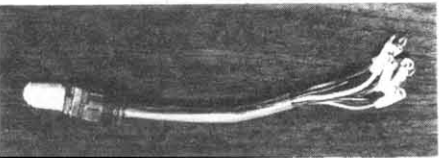
Selected hardwood is used for the handle; wedge-shaped tip is rugged steel, painted and lacquered for protection. Overall length is 11". Makes holes up to 1 1/2" dia. \$7.95.

Brookstone Co., Peterborough, NH 03458.

## Telephone Dialer



The Horrendous Hardware division of Cruddy Computing announced today a development which has been hailed as "revolutionary" in the industry. Horrendous Hardware has just introduced an improved Deluxe Telephone Dialer (#SN-101). The new Dialer design eliminates the annoying "hang-nail" syndrome which plagued many early users of the device.



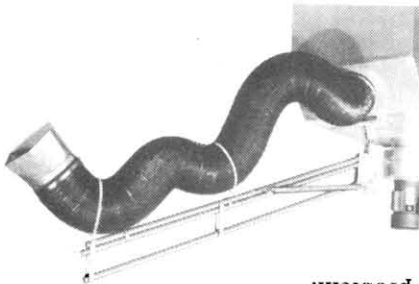
With this final bug removed from the design, Horrendous reports, the utility of the Dialer finally matches its unique aesthetic appeal. An increase of 3000% in sales is projected by Horrendous based on the new improvement.

In a gesture which it calls "ultimately magnanimous," Horrendous Hardware has offered to replace all existing Deluxe Dialers with the new model.

Horrendous Hardware, 1829 Canal St., New York, NY. (212) 999-2222.

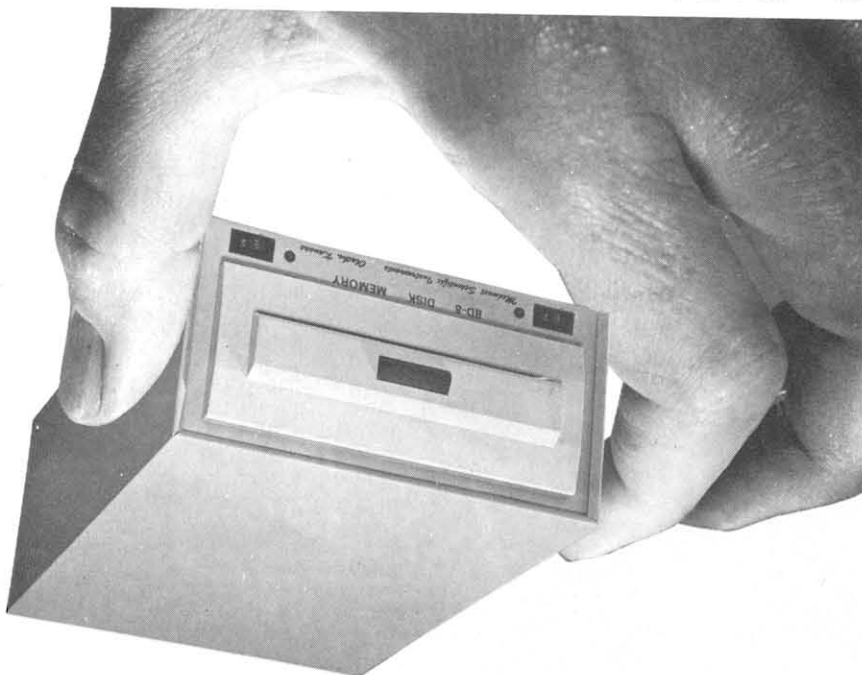
**Data Vacuum**

Hoover Vacuum Co. announces its first entry into the lucrative computer field. The pioneer in both dry and wet vacuums conducted an exhaustive market research study in the computer field and found that "garbage in, garbage out" was a major problem. Their new product, the DataVac, is said to eliminate this problem.



The input nozzle is mounted on an extensible rod which can also be rotated. This allows it to be positioned over any offending (or garbage) data, whether it be in the card reader, tape, drives, disk drives or the CPU itself. Garbage data may also be vacuumed up before it reaches the computer by directing the nozzle at personnel entering the computer room carrying bundles of cards, tapes, or disks. Hoover Vacuum Co., Emplyville, NY. (212) 999-2222.

available for the storage of programs or data. Because of the extreme miniaturization of the drive components, each drive must be assembled by a surgical team; thus the somewhat high price of \$3995.95. Powered by one 9-volt battery (not included). Mudwurst Smallish Instruments, Lothe, Kansas. (212) 936-5858.

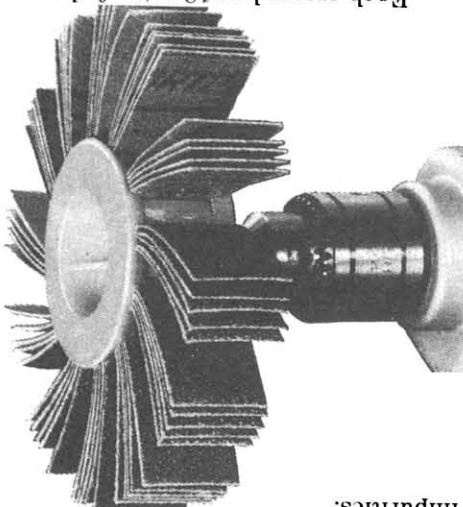


### Micro Disk Drive

Termed by the manufacturer as the world's first micro floppy disk drive, the Model BD-8 uses the newly announced 1 1/2" micro disks. Each disk is capable of storing 12 full bytes of data. With this revolutionary design there is no need for a space-consuming directory on each disk, hence the full 12-byte capacity is

**Floppy Disk Bulk Eraser**

Ideal for polishing the surface of any magnetic media, even while rotating. When your floppy disks have picked up kilobytes of bad data this tool will remove it all along with paint, rust, iron filings and other impurities.



Each eraser has 12 sets of aluminum oxide abrasive cloth strips, each 1 1/2" x 1". Lasts 6 to 8 hours. Of tough cloth, not mere paper. \$4.25. U.S. General Tool, Jericho, NY.

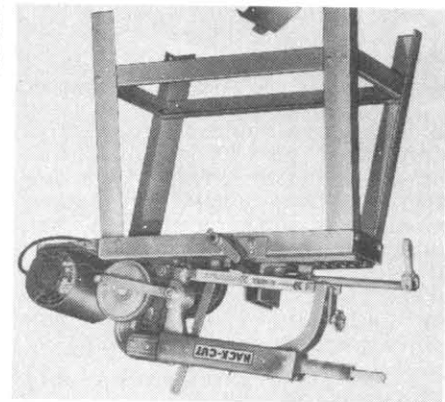
**Data Preparation Tool for Apple**

When the numbers in your data are larger than 32,767 and you're using Apple Integer Basic you'll wonder how you ever got along without this tool. Simply put your numbers in the hopper at the top, turn the crank and smaller numbers pop right out. Two grinds may be necessary for very large numbers (over 10 billion). Heavy, precision-cast iron body, brightly zinc-plated. Rugged tool with the toughest data. \$19.50. OR. Data Preparers, Inc., Orchard.

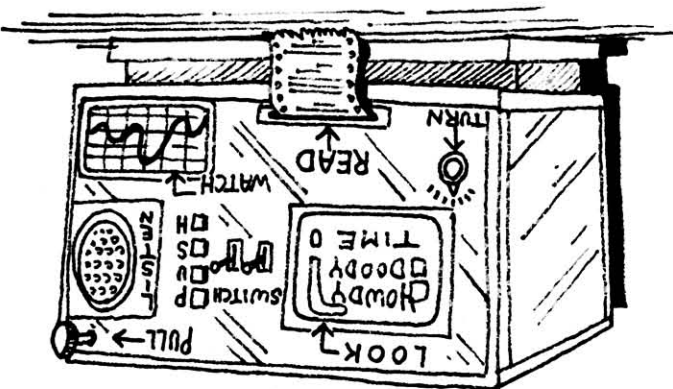


### Bit Hacker

Hack-Cut Inc. announces a powerful bit hacker. Powered by a heavy-duty 3 hp 3-phase motor, the Hack-Cut Model HDC can cut up to 4096 bits in less than 8 megaseconds. The fully adjustable cut angle allows the Model HDC to hack and mangle nearly every shape of bit currently in use. The HDC-II model coming out "soon" will have the capacity to hack bits in 4 dimensions simultaneously. The Model HDC is limited to 3-dimensional bits. \$349.95. Hack-Cut, Inc., Motor City, MD. (213) 273-2101.



# Complete Computer Catalogue



—J.M. LUCAS



**TRASH-80 Computer**

The TRASH-80 by Hua Kim Electronics of Korea is an amazing low cost system that is fully hardware and software compatible with the world's most popular TRS-80 micro-computer. Includes a special video monitor, keyboard, and optional bit bucket for recycling discarded data. Don't waste money on an inferior and more expensive American imitation of the real cheap plastic throwaway computer. Features electric blanket interface and bar code reader and ZTRASH machine language monitor not available on American TRS-80, either.

Hua Kim Electronics, Seoul, Korea.

## Cray-2 Computer

The newest Cray computer is capable of well over 700 trillion floating point operations per second (abbrev.: floating point operations per sec.) in sustained bursts when equipped with the GT Option. Special cooling techniques enable extremely high component densities in its

## Personal Computer

The Executioner, the latest product from Computata Dynalogic Electrobite Systems Softwaretech

Cray, Menasha, WI.

is not suitable for educators. will try to analyze why the computer to Columbia Teacher's College which The first Cray-2 system is slated to go the shape of an electric can opener. looks like a hide-a-bed and a micro in computers will include a unit that ice-maker. According to Cray, future pack of your favorite beverage and an include a shelf for storage of a six-stripped down unit. Optional extras (system) are available on the standard Defense communications satellite devices (such as the Department of I/O modems, and other standard I/O Interface cables for printers,



design. Speed is what separates the real computers from the toys, a good point to remember next time you buy a family car, too. The Greyhound BUS™ structure prevents early obsolescence and you can be sure the TRS-80 hacks won't have anything like it for years.

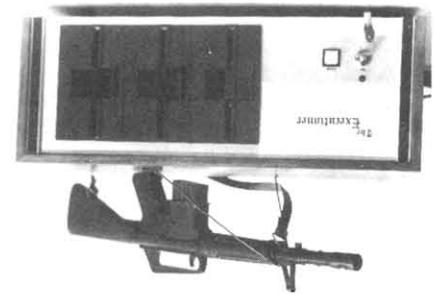
## Bulk Storage

Add-on Industries announced a breakthrough in add-on memory systems. Departing completely from the current faddish hard or floppy disks, drums, bubble memory or other magnetic or semiconductor media, Add-on uses a "Stepping Relay." At first spurned because of its outrageous mass/data bit storage ratio, critics are now heralding it because of its freedom from glitches and because it is unaffected by cosmic rays and power surges. The Add-on Model 8 has the capacity to store one entire byte (8 bits) in a unit measuring only 3" x 4.2" x 17". In standby state, the unit draws only 4.5 amps at 120 v.

Add-On Industries, 12 Nostalgia Drive, In The Clouds, MA. (617) 492-1144.



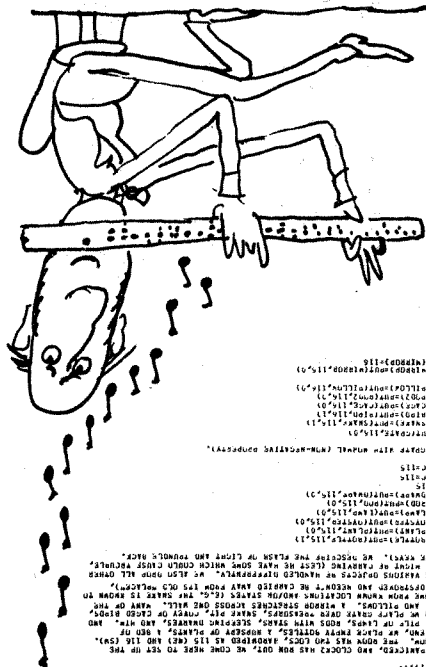
Consultantshops, may be the ultimate in personal computing power. The extreme speed and bandwidth of the system (executes 200 people in 450 nanoseconds) coupled with high speed mass storage capacity and MOS GROWTH technology enables revolutionary throughput. A proper option is available. The effective ratio of an Executioner system to a full battalion is conservatively estimated at 5:1. Runs all present Miserable Software packages.



CA. MultiMorphic, Santa Barbara.



[illegible]

[illegible]

**by Willie Crowthers and Don Woods**

Over the years, we have had many requests for listings of the original legendary Adventure program. In one particularly poignant episode, a high-level executive in charge of data processing at Xerox called pleading for a listing because their system had crashed, erasing an important part of their only copy. Apparently some of his own higher-ups were addicted to playing the game and this unfortunate soul felt that his job was on the line. It must be tough to be a corporate officer at Xerox, but when you have power then you use it for a while.

We present here the entire commented source listing of Adventure in FORTRAN and the necessary data files. The FORTRAN program can compile under the Tinsysoft TRS-80 or CP/M FORTRAN compilers, but at least 156k of RAM will be needed in the link edit phase. Data files are given as direct ASCII dumps. To test the program once it has been successfully compiled, simulate the logic of the program as shown in the magazine for some typical inputs (like GO NORTH or TAKE KEYS) and see if your version does the same thing.

Next month: Weizenbaum's original ELIZA in LISP, and a small computer version of Smaltalk written in Level I BASIC (both on the same page, even.)



Another old game from DKBCPPRMCDIWJ....

# adventure in MYSTERY

**ERIE RESISTOR CORPORATION . . . ELECTRONICS DIVISION**

**Main Offices: ERIE, PA.**  
**Sales Offices:** Cliffside, N.J. • Philadelphia, Pa. • Buffalo, N.Y. • Chicago, Ill. • Detroit, Mich. • Cincinnati, Ohio • Los Angeles, Calif.

**Factories:** ERIE, PA. • LONDON, ENGLAND • TORONTO, CANADA



Write for further details.

IBM's "701," designed to shatter the time barrier confronting technicians working on vital defense projects, is the latest development in electronic calculators. Its overall speed is 25 times that of its predecessor, the IBM Selective Sequence Electronic Calculator, popularly known as "the electronic brain." The "701," known as the IBM Electronic Data Processing Machines, consists of eleven compact and connected units. It performs in a few minutes calculations which would require seven years for a competent operator using desk model calculating machines.

The actual calculations are performed in the Electronic Analytical Control Unit. Erie assemblies and wires 274 different eight tube multiple plugable units similar to that shown above for every IBM "701." Erie also furnishes the four tube units used in the tape amplifiers. Erie Disc Filter Capacitors are used on inputs of all the DC service voltages supplied to the plugable units, and all ceramic capacitors in the Power unit are Erie products.

For several years Erie has had in operation a department engaged exclusively in electronic sub-assemblies of this nature.



↑ All the disc capacitors shown in this maze of back panel wiring are Erie Ceramics.

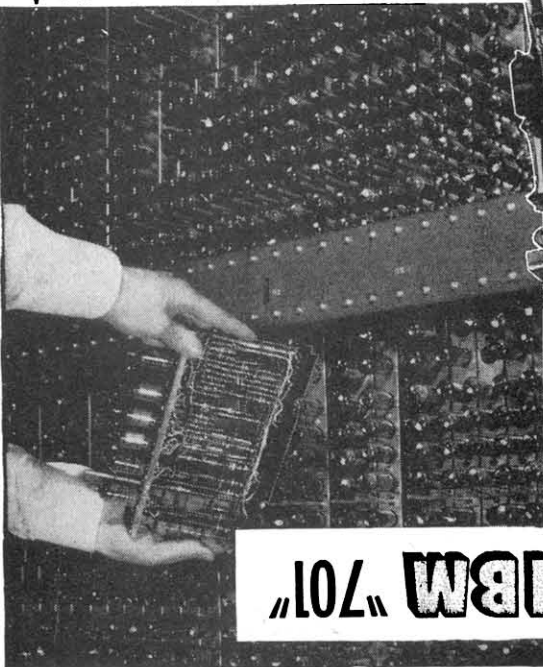
→ One of the 274 eight tube multiple plugable units furnished completely wired and assembled by Erie for every "701".

↓ One of the units being installed in the Analytical Control Unit.



**ERIE**  
 Electronic Calculator by

**A "BRAIN CELL" for the IBM "701"**





**Answers:**

**Relativistic Dodecahedron:** Halfway, the other half you're on the way back.

**A Place for N:** Either behind or in front of the line.

**One Equals Twenty:** Beats the hell out of Nilrem, but if you find an answer be sure to send it to him and he'll send you a copy of Nilrem's Puzzler Vol. 12, with more neat puzzles in it.



**T**

his is always fun at parties. Take an old dollar bill and cut it up into little pieces with scissors. Put them all inside an empty paper bag and shake it up. Then reach inside the bag and pull out a brand new twenty dollar bill! How is it done?

**One Equals Twenty**

Where is the letter N placed on the diagram?

|      |          |
|------|----------|
| AB D | IK M     |
| C    | EFGH J L |

Nilrem's pet cockroach Cornelius came up with this stumper. Neither Nilrem nor any of our editors could solve it. (Not even Harl Chelmers, but he had just discovered an exciting new language called SNOBOL and was working on a special issue.) The letters A-M are arranged thusly:

**A Place for N**

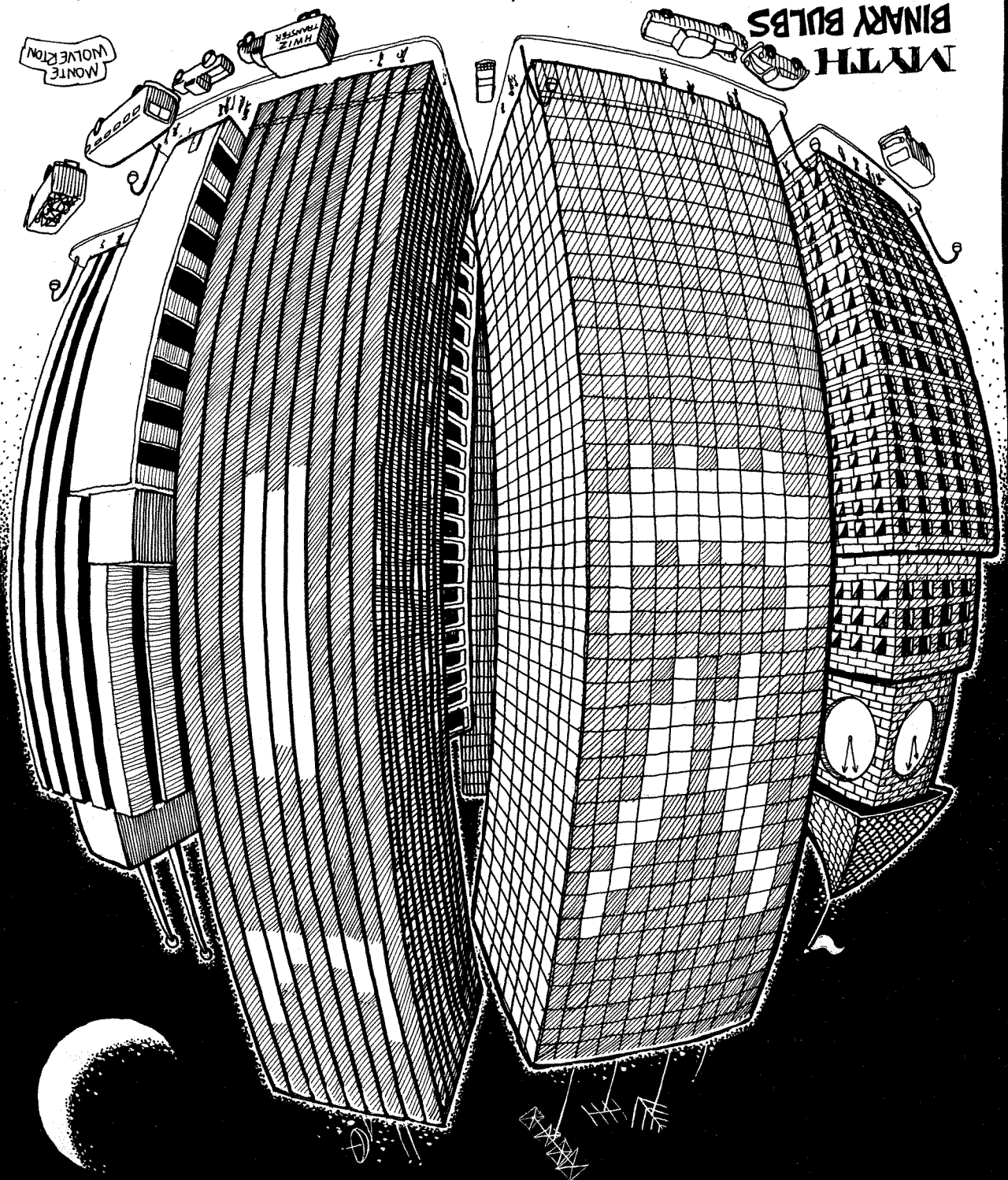
ake a regular dodecahedron (a solid which has 12 sides) made of cardboard and flatten it out onto a plane by cutting or bending any edges you want so that it is as long as possible in one dimension. Assume that each edge is one light-year in length and that you have a spaceship that can travel .99998 the speed of light. Assuming relativistic effects, what is the observed time from one end to the inside of the space ship?

**Relativistic Dodecahedron**

Nilrem

# puzzles & problems

# COMPUTER MYTHS EXPLAINED



COMPUTERS HAVE LIGHTS. LOTS OF EM. LITTLE ONES THAT BLINK ON AND OFF, FORMING MYRIADS OF PATTERNS OF A SIGNIFICANCE SO OBSCURE THEY CAN ONLY BE UNDERSTOOD BY MR. SPOCK OR AN INTELLECT COMPARABLE THERETO. LIGHTS ARE THE MOST IMPORTANT COMPONENT OF ANY SELF-RESPECTING COMPUTER. INDEED, ANY SERIES OR GROUP OF LIGHTS IS A DORMANT COMPUTER! CHRISTMAS LIGHTS, SIGNS, DISCOTHEQUES, CHANDELIER, TRAFFIC LIGHTS, AND (MOST OMENOUS OF ALL) OFFICE BUILDINGS ARE ALL WAITING FOR THE RIGHT TIME TO CONNECT THEMSELVES INTO ONE VAST WORLDWIDE NETWORK, WHOSE PURPOSE WILL BE THE SLOW COMPUTERIZATION OF ALL LIFE ON THE PLANET!

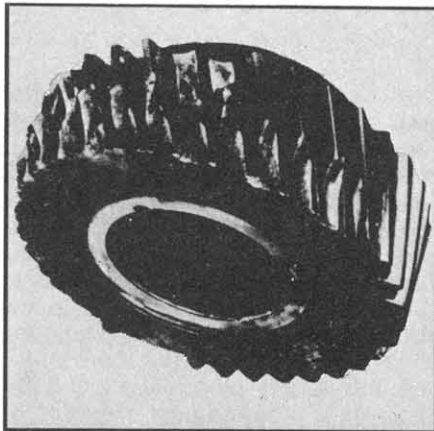
# Floppy Disk Maintenance A Simplified Visual Approach

Toidi Egalliv

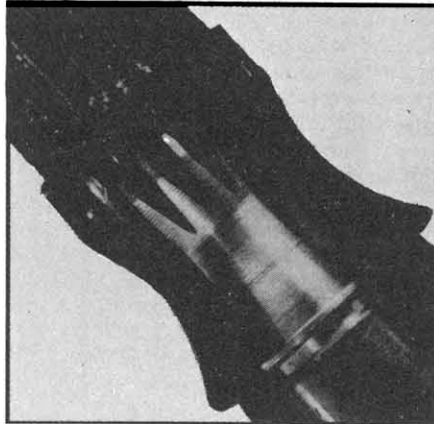
Do you get a mite frustrated when, after hours of entering text with Electric Pen, you type in the SAVE command only to get the message BAD SECTOR ERROR ON DRIVE A or \*\*\*BDOS READ ERROR. It's even more frustrating when the disk drive has erased your old file but not written the new one. And it really gets up the dander when you realize that you can't get out of the disk subsystem without restarting the entire computer system thereby destroying your hours of text entry.

The very system upon which this article is being written almost found itself in the trash heap when a part-time employee (and college senior) had spent 12 hours entering a major term paper into the computer. Following our advice, he had been periodically saving the paper as he went along in case of a system crash. Two pages from the end he saved it and — SCRUNCH, SCRUNCH, SCRUNCH — the new one was erased perfectly but the old file was not written giving instead a message BDOS WRITE ERROR ON A. There was no escaping back to Electric Pen to save it on another disk. No, the disk drive has Struck Again and had us in its clutches. Our resident genius, Steve North, disassembled the disk via software on another system and found an earlier copy of the saved file which could, by black magic, be recovered. It was only this quick action that caused our hero to graduate on time and prevented the annihilation of this system.

Since then we have paid a great deal more attention to preventive maintenance to nip these little glitches in the bud before they become ERRORS. Since a picture is worth 1000 words or, assuming five letter words, a picture is worth 5000 bytes more or less, we opted for pictures instead of bytes. If you find these symptoms in your disk drives, act right away. In some of these cases the evil condition has progressed somewhat further than a prudent owner might wish.



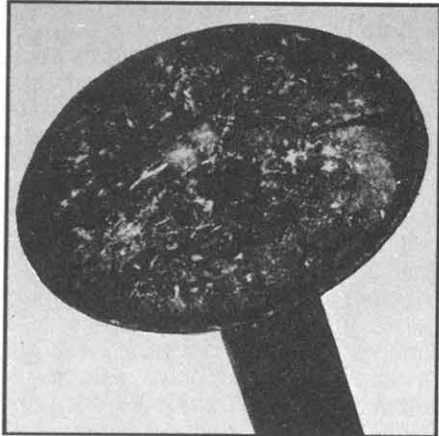
Drive gear (full size). Very careful observation will reveal several broken teeth (32, to be exact. To see all 32 we cheated — we have the gear here and can look at the entire circumference.) A fully broken tooth will cause the disk to stop rotating. This is ungood. The head will continue to seek (or write as the case may be) and will soon wear out the disk in that area. Solution: use a better gear lubricant. We recommend ½ quart of Mobil 1 in any new disk drive before you even turn it on the first time.



Drive shaft (full size). This part has not failed yet, but it will sometime with in the next 12 nanoseconds of operation. Can you tell why? (Answer next issue.) If your shaft looks like this, DO NOT operate it for more than 100 picoseconds. Don't say we didn't tell you!



Write head (10,000X magnification). Notice the hole. This is where the bits flow out of the head and onto the disk surface. However, the hole is worn and uneven from too many bits flowing too quickly (or possibly from being sucked up too quickly when reading). Solution: slow down your data flow; your data are too long-winded.



Frammistan (156X magnification). In both shape and color this part resembles a miniature pizza, so it's easy to find even though it's so small. Like one's tonsils, no one is quite sure of the purpose of the Frammistan. But if a slice has been removed, even a small one as in this photo, the Frammistan can cause major errors in byte flow. Solution: feed the head regularly so it doesn't take bytes (or even bits) out of the Frammistan.





# Software Illegality Forum

Well spacey flight fans, the day we have all awaited is near. You may never need to rip off another program. No more sleepless, guilt-ridden nights. Those software barons are about to be put in their place.

This advocate has received news of a new organization and two, count them: "one" and "two," courtly decisions. The new organization calling itself Really Into Programs Obtained For Free (RIPOFF), has decided to mount a nationwide campaign of attrition against the software barons as a result of suggestions made by the pearls-of-wisdom givers in the new cases. Anyone interested in finding out more about this organization should contact Dr. Winthrop c/o Leavenworth Federal Institution, Leavenworth, Kansas.

The second case, *MBI v. Com-missioner* was decided by the Court in April, 1980. Adopting the dictionary definition of algorithm and recognizing the validity of the claims by the hardware barons, such as MBI, that if computer programs could be patented, then their widespread use would be greatly reduced and thus prevent the using public from exercising their constitutional right to have something to feed to their hardware, and recognizing that science, mathematics and algorithms are the tools of creativity and should not be restricted, and also realizing that the algorithm could be done by hand with a pencil and paper anyway, the Court said, in its ultimate wisdom, after spending many agonizing hours with the case, and in a truly landmark decision (or should it be "LANDMARK"), at page 0010 1001 of 1111 1110 Feb. 4th, that computer programs may not be patented because they positively are not patentable subject matter under the Constitution (Article 1, Section 8, Clause 8), unless Congress passes a law to the contrary. And we know that Congress cannot pass any law let alone a law to the contrary.

Kcivon L. Diorah, Patent Attorney,  
LARSON, TAYLOR AND HINDS,  
Arlington, VA 22202

## apple is now selling PET GOSSIP from the desk of FLOPPY DICK

LOS ANGELES — Rumors around California have it that Apple TV and Computing at 2606 South Robertson Blvd. is now recommending the CBM Computer. Several small business owners here have expressed their satisfaction after trying the CBM. It seems that some of the features that they like are things like overall system flexibility, large (340K) floppy disk storage capacity, quality integrated CRT, large standard keyboard, not to mention upper and lower case.

Before the recent addition of the Commodore line, Apple TV and Computing sold the leading personal computer which bears its namesake. Recently, the owner of Apple TV and Computing, Dick Stroik, was quoted saying "previously, many of my business clients were impressed when they saw items like their monthly gross sales graphed in color on the screen. But now, they are giving their personal computers to their kids and ordering CBM computer systems for their businesses." Dick is also pleased with the dependability of the CBM since he also services them. The \$695.00 80-column printer is also a fast seller. Rumors also have it that Comet Computers of West Covina, California is making a move to buy out Apple T and C, with the intention of changing that fruitly name. I think Dick just might go along with that!

Thanks to:

Comet Computer  
1337 W. Garvey No.  
West Covina, CA 91790  
(213) 962-7051

Richard Stroik  
(213) 559-4268  
CIRCLE 109 ON  
READER SERVICE CARD

The first case, building on the *Compuchess* case (see past issues of *Creative Computing*, said that since no one could figure out an object program stored in a ROM, and from testimony heard by the court that after a source program had been written, even the writer couldn't figure it out, a computer program can not be copyrighted, probably because it was unintelligible to anyone except a machine and clearly, a literary sense. This was clear to the machine cannot read a writing in the court.

The Really organization, in a letter to this writer, said that with

increased access to the courts and the ability of Really to handle their own cases without legal fees because of their extensive experience in the courts, they were filing a law suit against every software baron who refused to give them unlimited reproduction rights for free on the basis that the barons were establishing an illegal monopoly. They figure that their legal fees alone would put the barons out of business and thereby free up all of their software. Just think, software fans, soon we should have all the software we can possibly use. In the meantime, just ignore those comments by the softwre barons regarding the users eating Roasted Golden Goose as being so much sour grapes. Next month, if there is still something to write about and there is still enough material for this magazine to publish, we'll be back.

□

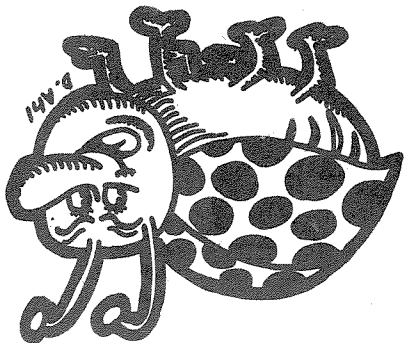
2E

can equate this deception with that of hiding a comic book between the pages of a textbook.)

which is its price, which is, incidentally, emblazoned in large numbers on a permanent price tag attached to the side of the game. The unit comes complete (except for the required 9 six-volt batteries) for \$47.95



# Still a Few Bugs in the System



An estimable magazine sent out a renewal offer not long ago to a subscriber who had not renewed. The label was returned with a line through the gentlemen's name and a handwritten notation, "Died in '74." You guessed it—the correction was made.

The next mailing, identical to the first, went out addressed as follows:

41575684  
DIED IN '74  
4007 MC DONALD RD.  
SHELTON, CT 06484

Forbes, Dec. 11, 1978

In March 1979, we placed an advertisement in an instrumentation magazine published by Technical Publishing Company, a subsidiary of Dun & Bradstreet. *Datamation* magazine is owned by Technical Publishing Co. also.

For the next three months, we received statements during us for \$0.00 asking for prompt payment. The April notice is reproduced at the right.

Then in October, Mrs. C. Computing received a fantastic opportunity to participate in a \$50,000 Sweepstakes sponsored by Spencer Gifts. We decided to use a perfectly good 15¢ stamp to enter.

## LAST CHANCE!

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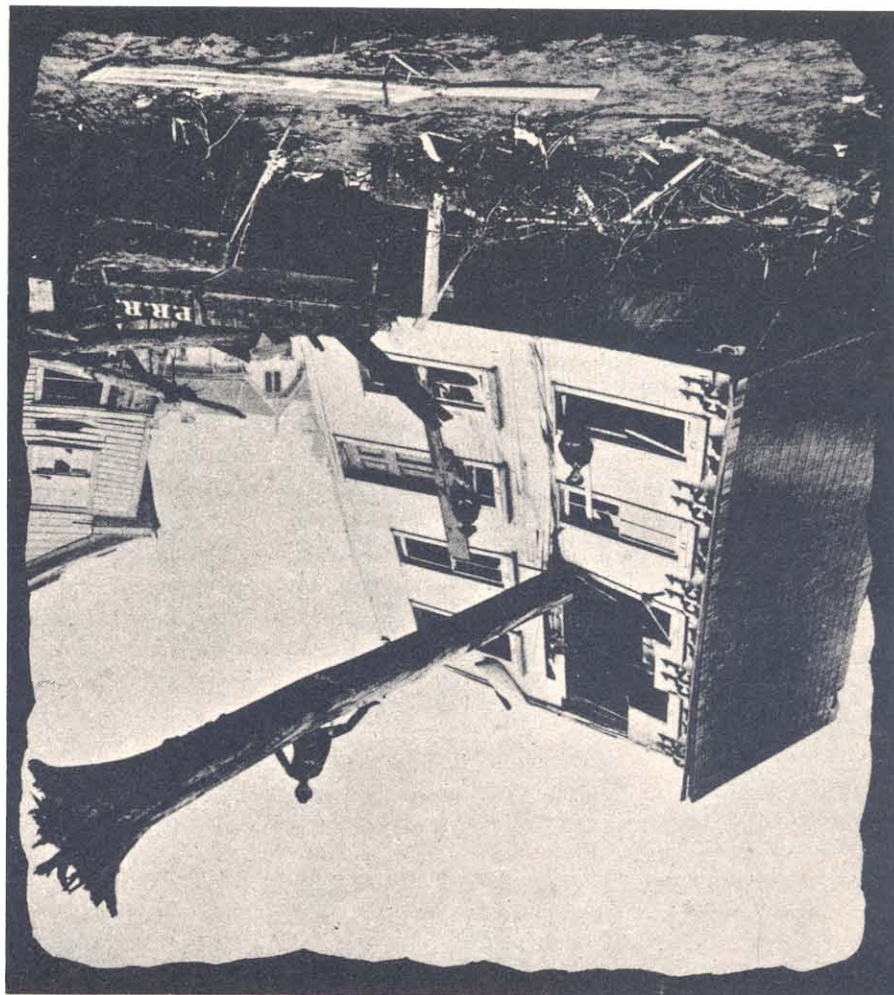
New HP-85 computer designed for personal or laboratory use. Here an investment analysis technician, following the instruc-



## Our Face is Red Dept.

tions on the high-resolution CRT display which she activated with the typewriter-like 20-key numeric keypad, mixes a batch of eating 1.2 feet of thermal printer paper, she will become at one with the computer and interactive bipolar CMOS level.

Your Editors and faithful Staffers recently moved into a new building in (what was) downtown Morristown. Unfortunately, for their merger. Here is our lavish new headquarters just three days after moving in.



et cetera

et cetera

et cetera

After removing program bugs from live programs, we store them in the basement prior to dumping them at the Kim Buc (un)sanitary landfill for toxic wastes. However, after the flood many of the bugs turned into worms and infested our quarters. Staffers were obliged to wear C-clamps on their noses and be fitted with WW II charcoal gas mask filters in their throats in order to work around the incredible stench.



As a result of the absolutely terrible flood which devastated our offices, we misplaced some of the captions from the photos with which they belong. We know that one of the following five captions belongs with this photo, but we don't know which one. All seem appropriate. You may choose the one you like best.

"You mean I'm going to have to learn programming? Can I meet you after work?"

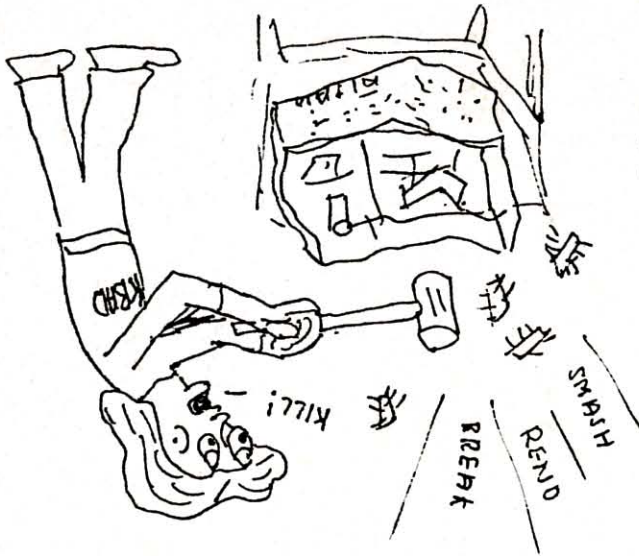
"You mean I've been working for the last five hours and the terminal was off line? Can I meet you after work?"

"You mean I'm not allowed to play Super Invader during my coffee break? Can I meet you after work?"

"The only reason I was running off checks for \$9,999,999.99 was that I wanted to see how many digits it could handle. Can I meet you after work?"

"I think my finger is stuck. Can I meet you after work?"





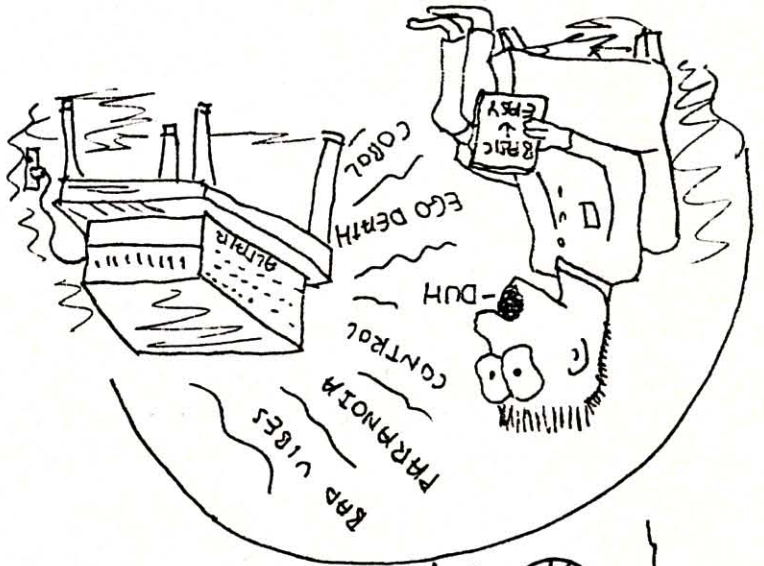
It's the movement that answers to NO ONE!! Neo-Ludditism is the last outspoken bastion of TRUTH left in America today. Join it and you shall be free!! Contained within this movement are mind blowing glimpses of REALITY AS IT REALLY IS!! You too will benefit from being an active neo-Luddite!!

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Computer make people sick!! They enslave you and sap all your creative energy!! Computer hook you like dope!! Programming is obviously a "WAST WASTELAND" This is common knowledge. Using hobby computers will cause you unhappiness in life and you're more than likely to get cancer!!!

HERE'S WHY!!

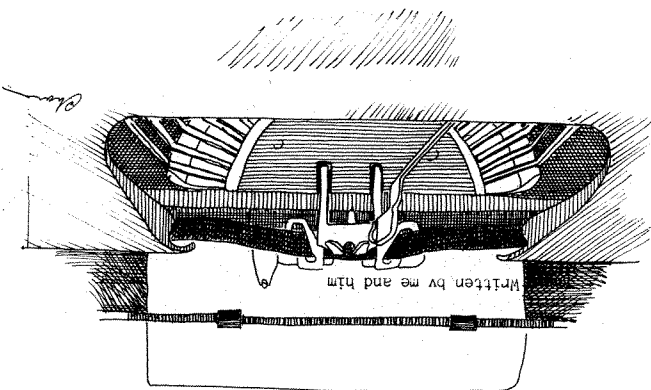


## NEO-LUDDITES?

DON'T YOU THINK IT'S TIME YOU STOOD UP FOR YOUR FREE WILL AND JOINED THE



# How to Hide Your Basic Meaning



The computing community represents an audience that is radically different than the audiences that most people are used to writing for. Their are, therefore, a number of special considerations to be taken into account when writing for such a special group of people.

It is expected by people who have an intimate acquaintance with high technology that what they read will be of great significance . . . that it will generally require an important and intelligent person to successfully comprehend it. In order to make you're audience feel important and intelligent, the writer must make himself seem important and intelligent.

At the same time — however — people who are into technology don't want to be hampered by a plethora of useless rules and conventions. The thing that you want to do then, is to make you're writing seem impressive without getting bogged down a web of unnecessary constraints. To get this affect can at times be quite a challenge.

Now that we know what you're objective is I want to give you some specific hints that will help you when writing . . . whether it's a letter in ones job or a technical article for a magazine like this one or a remark for you're latest TRS-80 program.

Firstly, you should bear in mind at all times that we want to sound as erudite and educated as possible. Here are some watermarks of the kind of erudite prose that will make people realize that you are smarter than them. As many descriptive words as possible should be used in your sentences when you are writing in order to allow you to become all the more specific with your meaning for you're intended audience. It is also obvious and evident to even the most casual of observers that the more words you can pack into a sentence or paragraph, the more erudite you are because this serves to demonstrate that you are the possessor of an enormous and in all probability

ability rapidly expanding vocabulary of words.

It has been learned through our research something that you will hopefully learn through this column and that is that pronouns are not nearly as important as once thought and if you simply use them in the manner which is most natural to you, your audience will understand you. Us technology oriented people, which is to say me and you, really have no need to pay alot of attention to the things which english teachers call "person and case." These are antiquated methods of distinguishing what roll a thing plays in the sentence. What is important is communication and nowadays I think we can leave pronoun conjugations to any of those english teachers brave enough to try and make young students learn them. Anyway, any english teacher will tell you that the english language is losing its reflections and in a few years from now noone will have to worry about them anyway.

And while I'm on the subject of pronouns, let's note one very important one which is now coming into it's own and gaining popularity among those of you who are reluctant to completely abandon case distinctions, but who nevertheless don't know how to correctly use them. What is referred to here is the so-called "reflexive pronouns." When faced with the dilemma of deciding among "It was built by he and I" and "It was built by he and me," a convenient way to avoid the decision altogether is to say "It was built by he and myself." Another useful phrase is: "As for myself. . ."

Now for another handy trick which will make both you and your writing and talking appear educated and intelligent, as well as desirably pedantic: Remember that anyone can use the simple past tense and it is — in fact — the first way that a child learns to refer to past happenings and occurrences. The past perfect tense — however — requires much more education for

proper mastery and is — therefore — the mark of the educated and intelligent person you are writing as. So whenever possible, the past perfect tense should be substituted for the simple past tense. For example rather than the pedestrian "When I crossed the wires, you were not looking," try the erudite "When I had crossed the wires, you were not looking," or the even more erudite "When I had crossed the wires, you had not been looking." (But after they had been crossed, you had looked quite startled).

The invention of new words has always been the stamp of those on the cutting edge of a trial balloon. Us computer folks are in the best position in centuries to constantly invent new words. It won't be long before the general populace adapts them for they're own use, but you can always have the satisfaction of knowing, for example, that the use of the word "baud" as a verb was perpetrated by you. And that is the way to do it, to just think of a word, and determine a way, that it can be used, as a different part of speech. Color and interest are also added to you're writing in this way.

As you may or may not have noticed by now, one of the things that adds an extra element of credibility to this column your reading now is the continued and repeated use of the passive voice. The passive voice is used to help you avoid making any statements for which you might later be held responsible. Rather than saying, for example, "I think," try "It is believed." You do not have to say who it is believed by. In conclusion, let me finally reiterate once again that last but not least, what is said is not nearly so important as the way you say it. Communication is after all the key and if the means to express your thought is not available in the structure and framework of the english language as you learned it — improvise!

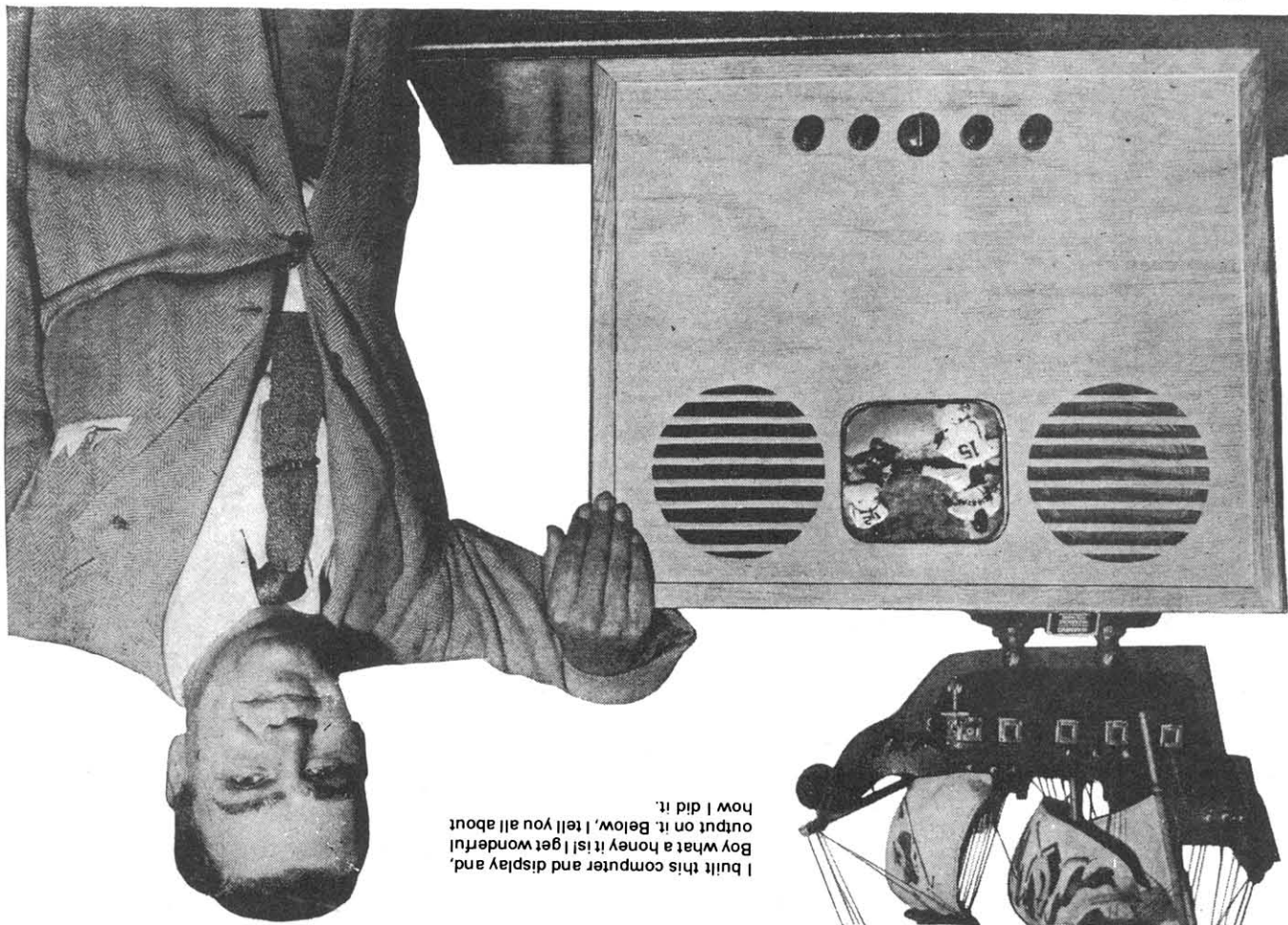
This column has been written by Selpats Ysteb for Evad Lha who only edited it.





# How I Built My Own Computer

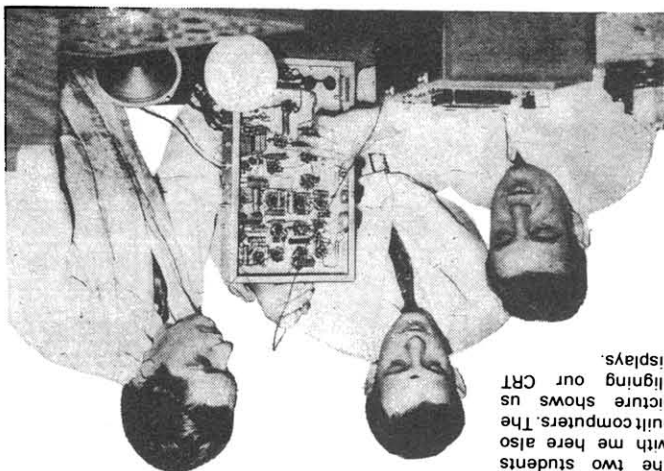
by Llob Legan



I built this computer and display and, Boy what a honey it is! I get wonderful output on it. Below, I tell you all about how I did it.

Not very long ago, computers were a complete mystery to me. But not only did I build a complete computer system — I had a lot of fun doing it. And I've learned so much in a practical way that

The two students with me here also built computers. The picture shows us aligning our CRT displays.

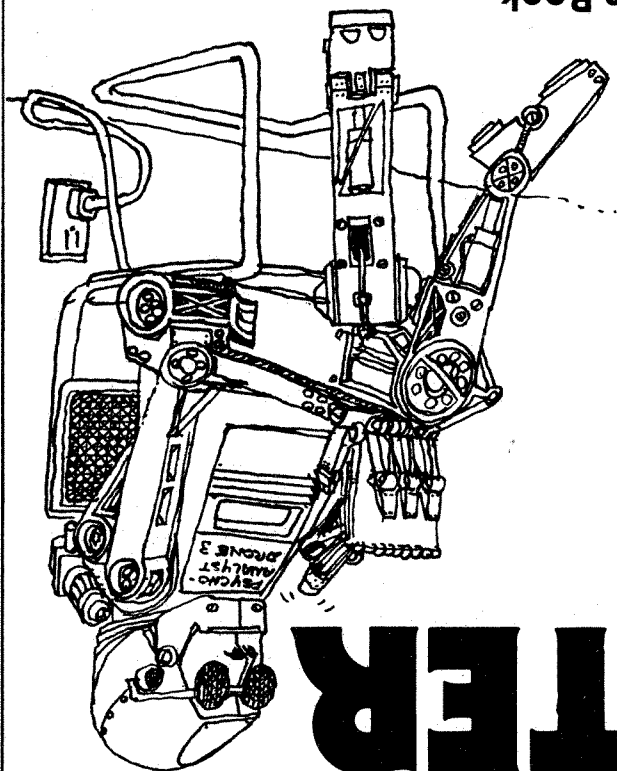


ADVERTISEMENT

What bothered me at first, was that my mathematics was kind of rusty. It had been some years since I had got out of grade school and high school was a real bummer. I soon found out that the school had bush-up courses in math and even had facilities for teaching computer math from the beginning to students who never had the advantage of a high school education and couldn't rip off a good TI calculator. I convinced them that I was sincere and enthusiastic and that I was technically inclined, and so I became a student. Then the fun began. You know, you just can't build a computer right off the reel. I built seven crystal radio sets

I'm well on the road to becoming an expert. In a few years from now I'll be able to "write my own ticket." I always had a yen to get into computers before they got into me. But I didn't know how to go about it — until I heard about the S.P.I.T. of N.J. I went there with my discharge papers and they did the rest. They showed me how the Veterans Administration using everybody's hard-earned tax dollars would pay up to \$500 a year against my educational expenses under the G.I. Bill. This meant that I had to pay very little out of my own pocket, plus I could continue to collect on unemployment while going to school. It's a big break for veterans like myself — especially when you get subsistence allowances in addition. And if you're into welfare fraud, you can really make out like a bandit. Of course, all the students here aren't veterans but most have something going on the side.

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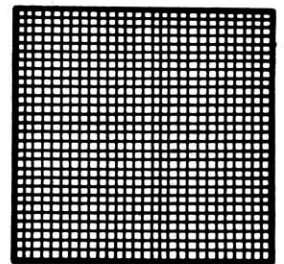
Artillery-3  
Baccarat  
Bible Quiz  
Big 6  
Binary  
Blackbox  
Bobstones  
Bocce  
Bogal  
Bumbrun  
Bridge-It  
Camel  
Chase  
Chuck-A-Luck  
Close Encounters  
Column  
Concentration  
Condot  
Convoy  
Corral  
Countdown  
Cup  
Dealer's Choice  
Deepspace  
Defuse  
Dodgem  
Doors  
Drag  
Dr. Z  
Eliza  
Father  
Fillip  
Four in A Row  
Geowar  
Grand Prix  
Guess-It  
ICBM  
Inkblot  
Joust  
Jumping Balls  
Ken  
L Game  
Life Expectancy  
Lissajous  
Magic Square  
Man-Eating Rabbit  
Maneuvers  
Mastermind  
Masterbaggels  
Matpuzzle  
Maze  
Millionaire  
Minotaur  
Motorcycle Jump  
Nomad  
Not One  
Obstacle  
Octrix  
Pasart  
Pasart 2  
Pinball  
Rabbit Chase  
Roadrace  
Rotate  
Safe  
Scales  
Schmoo  
Seabattle  
Seasaw  
Shoot  
Smash  
Strike 9  
Tennis  
TicKertape  
TV Plot  
Twonky  
Two-to-Ten  
UFO  
Under & Over  
Van Gam  
Warfish  
Word Search Puzzle  
Wumpus 1  
Wumpus 2



# Interface, cont. . .

( ) 2. Design circuit layout using grid below. Place parts, mark off components and locate holes. This is the component side. If the holes line up with the foil (circuit) side, it would be even better. The circuit is shown in Figure 2.

(Tape board to this layout and turn paper over to locate foil pads.)

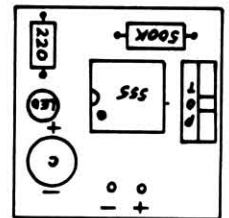


( ) 3. On the foil side, draw conductors as shown below. Since this is an advanced project, tunnels and bridges have been used. You may use whatever method you wish to achieve this on the foil layout.

Foil Side



Component Side



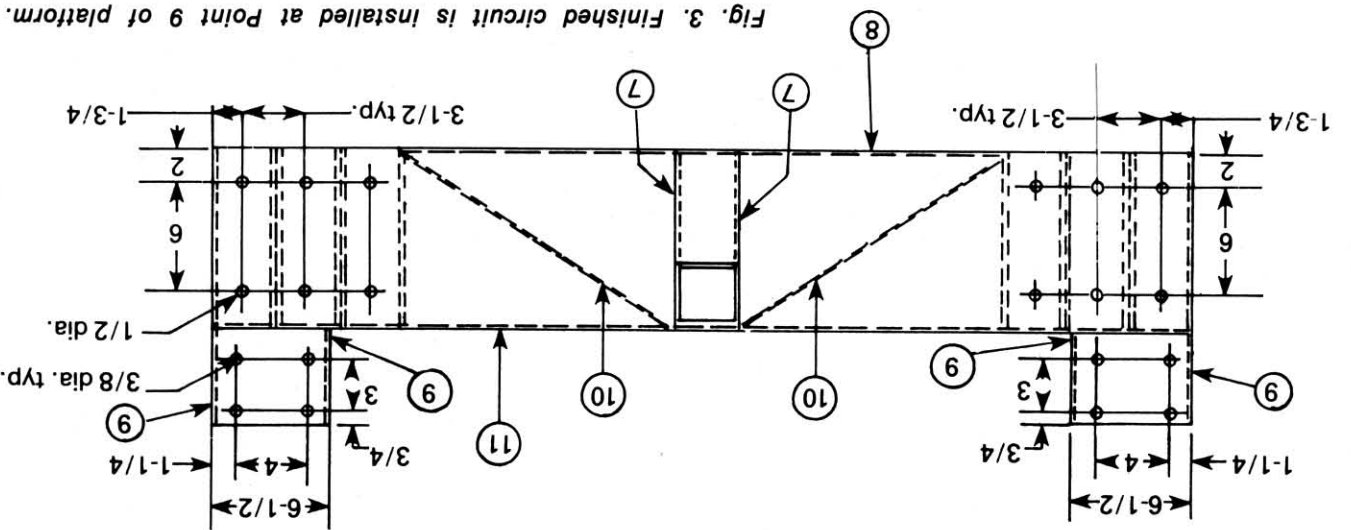
( ) 4. Etch, wash, reclaim, dry, remove resist and inspect board.

( ) 5. Mount components and solder in place.

( ) 6. Install completed circuit at Point 9 as shown in Figure 3. The photo shows the finished circuit in place. ( ) 7. Hook up to TRS-80 and ladle platform with at least 3-ton trial load of molten pig iron. If the circuit does not work, check for the following. If these are OK and the circuit still dumps molten ore on the floor, write (do not call) us for assistance.

( ) IC in wrong (tap with ball pen hammer to assure firm seating)  
( ) LED in backwards (produces negative light -- hard to see)  
( ) Solder bridges (like Brooklyn or GW, but for electrons)  
( ) Faulty 555 chip (unscrupulous vendor sold you potato or cow variety instead of silicon)  
You have just completed the process of fabricating a modern printed circuit board using a state-of-the-art semiconductor chip. Your PIGWOR should give you many faithful nanoseconds of service and hours of fun. If you want to know more about integrated circuits, be sure to subscribe to this magazine. Golly! Next month: Programming the PIGWOR.

Finished PIGWOR Interface installed at Point 9



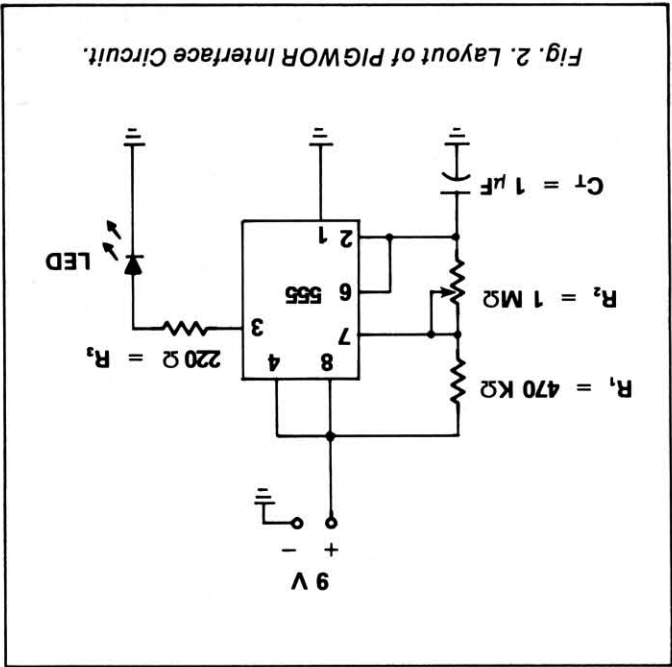
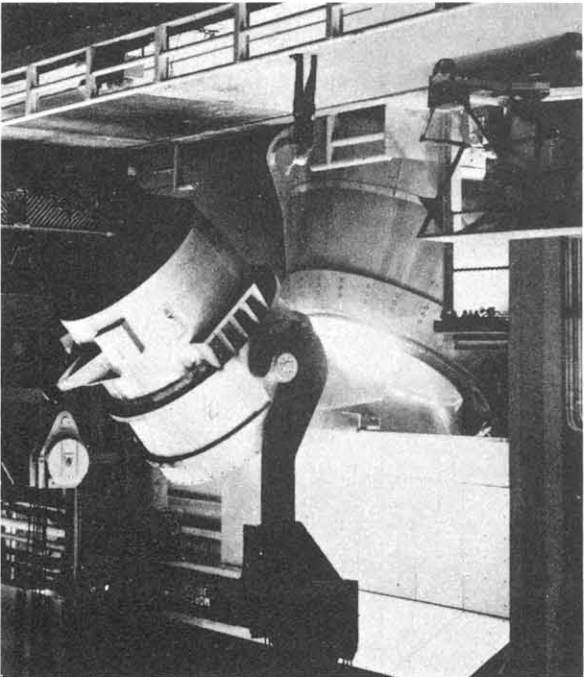


Fig. 2. Layout of PIGWOR Interface Circuit.

The ladle platform is simplicity itself. This is, of course, the device which travels along the traveller and holds the ladle with its mighty arm. (It's hard not to get goose pimples when thinking of ladle platforms. Gosh!) Since all existing ladle platforms are unsatisfactory for interfacing with the PIGWOR TRS-80 interface, you will have to construct a new one. The complete details are shown in Figure 1. Dimensions are not given since it will have to be scaled up for your installation. Take your measurements from the drawing with an accurate rule and scale appropriately. Construct using double or triple weight Erector Set parts and set aside.

### Building the Ladle Platform

Typical home installation of 6-ton iron ladle.



### Building the PIGWOR Interface

Before you start, keep in mind that you are building an electronic device of the highest precision. There is no room for the slightest error. The printed wiring board, small as it seems, provides a base on which to mount the components and the connectors from the TRS-80 and the ladle platform. Be sure to be extra special careful because the printed circuit board contains delicate semiconductor devices.

The following procedure will help you produce an interface for your every need, be it aeolipile or ladle platform. As you read each step, perform the necessary operation. Do not go on to the next step until you have finished the previous one, as your interface will probably blow up. Be careful.

( ) 1. Make sure you have the necessary parts. Use check list below.



( ) 555 IC

( ) 8 pin DIP socket



( ) 1 MΩ pot (Does MΩ really mean misquote?)



( ) 220 ohm resistor (OR-OR-BR or AND-AND-RB)



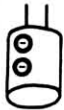
( ) 470K ohm resistor (YL-PR-YL)



( ) LED (available in old calculator, Altair computer, etc.)



( ) Copper clad board -- approx. 1"x1"



( ) 1 μf capacitor



( ) Battery snap

( ) 9-volt battery (long life variety. You don't ever want to see this baby again.)

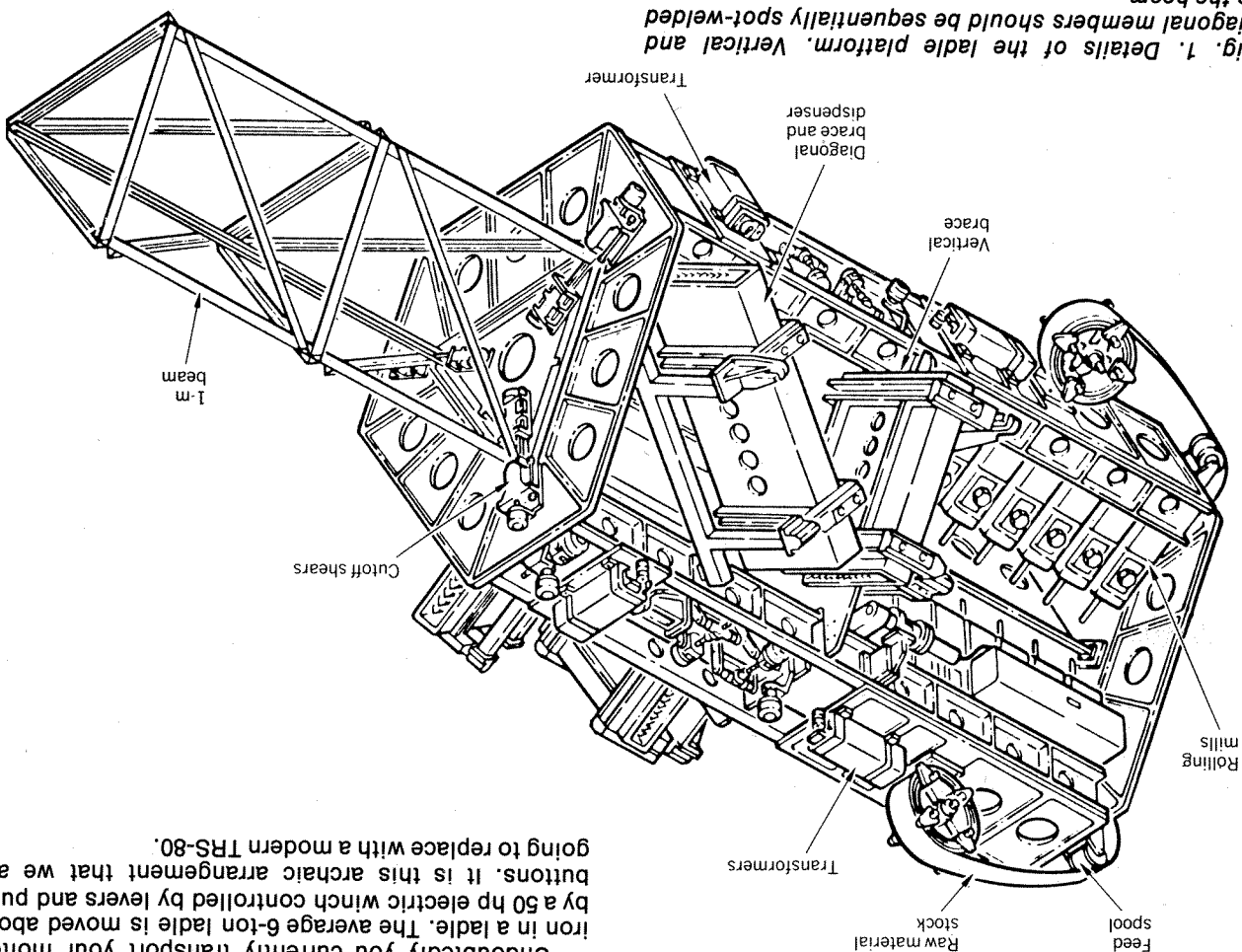
# Build An Interface To The Real World

Ygyp Ssim

You don't have an acronym, you don't have a program. The device we selected was an aeolipile. Imagine the surprised expressions on the faces of your friends when in the middle of nowhere you whip out your brand new home brewed aeolipile/TRS-80 interface. Wow. After you've had this around your house just a few days, you will say, "How did I get along for such a long time without an aeolipile interface?"

The unfortunate thing is that just last week our gerbil, Gigo, ate our aeolipile. This was truly ungood, but further searching amongst the sticky mass of letters revealed that many readers are experiencing problems with their blast furnaces. (We found from bitter experience that most frequently the recipe is at fault. We now use 1.6 m tons of ore, 0.7 m tons of coke, 0.2 m tons of limestone and 3.6 m tons of air for each short ton of iron.) Hence, leaping upon this fragment of information, we decided to show you how easy it is to build a PIGWOR for transporting pig iron and wrought iron (you see the beauty of a well-designed acronym!).

Undoubtedly you currently transport your molten iron in a ladle. The average 6-ton ladle is moved about by a 50 hp electric winch controlled by levers and push buttons. It is this archaic arrangement that we are going to replace with a modern TRS-80.



Many faithful Creative Computing readers will remember the popular article of a few years back subtitled, "How to Dindle a Framistan." As might be expected, this generated much reader interest and so many letters requesting a follow-up piece. Now, with blanket to a PET, or connect a washing machine to an Apple, it is difficult to know what would have widest reader interest and, at the same time, not have been previously published.

However, looking through our vast correspondence file (a large cardboard box into which, unfortunately a can of black walnut stain and a half a bottle of Gallo Rhine wine had been spilled), it became immediately apparent that the device most needed by readers was a general-purpose real world interface. Since we pride ourselves on not writing theoretical articles that cannot be replicated by the average TRS-80 owner, we selected a real device to illustrate this General-Purpose Real World Interface (GPRWI, or, using poetic license, a PIGWOR, which may or may not be any better. But if

Fig. 1. Details of the ladle platform. Vertical and diagonal members should be sequentially spot-welded to the beam.



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3. Do you have a doubleknit or fluorescent necktie — preferably green or purple? ☐ ☐

4. Are you either employed or unemployed currently? ☐ ☐

5. Do you have a Master Charge card with any credit left on it? ☐ ☐

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# Why There Are No Programmers

by  
Stephen Kimmel

number of programmers is, therefore, no more than 3,109,970. Of these, no more than 20% actually have a computer that they can spend time programming on. The number becomes 621,994. Despite the fine efforts of various publishers, programming training is still the best way to learn programming. Certainly, no more than 1% of Americans have actually had any computer programming training. If you've ever been in one of those classes, you'll realize that no more than one in twenty proves capable of surviving the lectures to be able to produce something more productive than a Playboy Bunny calendar. Further, as you recall from the classes you've attended in various subjects, you're lucky if you actually use more than one percent of what you were taught. When all of these factors are taken into consideration, the cause of America's software crisis becomes clear. The only foreseeable solutions include mandatory algebra for all ages, mass education classes in programming for everyone, and a massive government propaganda effort to eliminate the "Don't cares." Until that time, America's two other programmers and myself are working just as fast as we can and you'll have to wait your turn in line.

Next Please?

## Do You Have What it Takes to be a Computer Programmer?

Take this simple test and find out!!

1. What is your name?

2. Without looking, are you male or female?

3. Which of the following numbers is a 1?....1

4. Can you find your way through this maze?

IN OUT

5. What is the sum of 1 and 1? Be careful! There's a trick to this one!

6. What is your favorite color? Why not?

Scoring.

0-1: Regrettably we can't all be computer programmers.

2-5: You have the potential, with work, to become a professional class computer programmer. All you need is a little training.

6: You either cheated or you are already a computer programmer. Congratulations!

I was teaching a class at the local junior college on computer programming when the great flaw of the assumed coming computer boom occurred to me. The problem seemed simple enough. If you are feeding fifty people and they eat an average of 55 square inches of pizza each, how many of each of three size pizzas would you have to buy? Simple?

Wrong. Nearly half of the class couldn't tell me how many square inches of pizza they had to buy. Without that ability, the rest of the exercise in programming was a waste of effort. And this was in a class of people who had an interest in programming!!!! How would I have done if I'd asked the general populace?

"Sir, if you had 50 people who each ate 55 square inches of pizza, how many square inches would you buy?"

"What you talking about, kid? Pizza's has round inches."

"Uhhh, madam..."

"Mugger!"

Clearly, there is something missing in the American educational system. And it clearly affects the lack of good available software.

I began to investigate this lack and my findings have proven truly astounding.

First, I have observed that there are virtually no programmers under the age of 15 or over 60. This of course doesn't mean that these individuals are incapable of programming.

They simply have different interests and abilities. Immediately, you reduce the number of Americans who could be programmers from 210 million plus to approximately 130 million.

Further, we obviously must eliminate the twelve and a half percent of Americans who are functionally illiterate. This reduces the number to 116, 623, 875. At first glance that would seem quite a large number of potential programmers. Further reductions, however, are required.

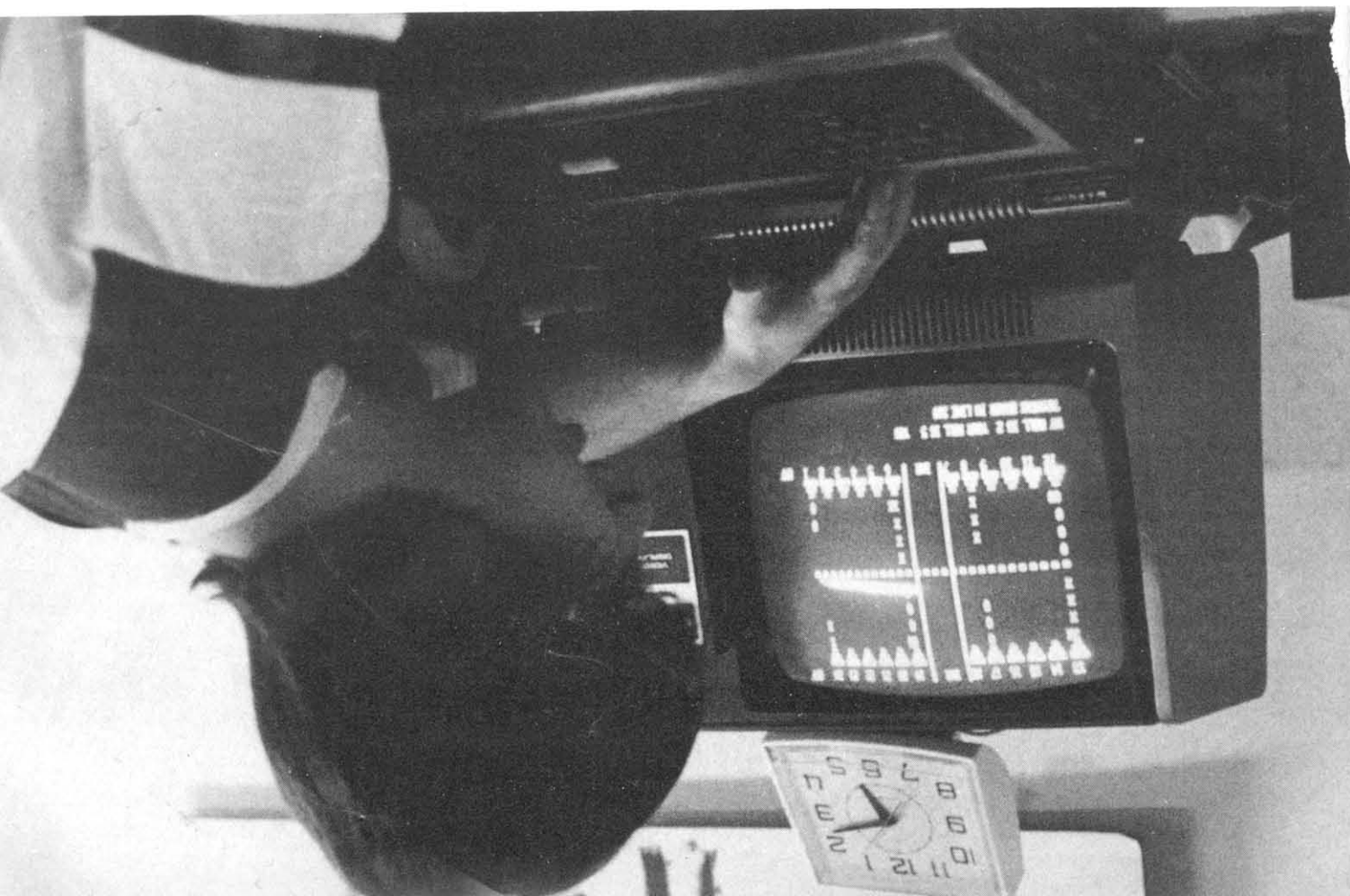
Only about 20% of all Americans have any algebra training. The value of this can hardly be questioned. Without the ability to solve the problem, or at least know how to approach a problem, the very idea of programming a computer to solve a problem seems ludicrous. This reduces our number of possible programmers to 23, 324, 775. Truly, this is evidence of the great failing of the American educational system.

A recent survey of a group of American chiropractors and veterinarians indicated that fully 60% answered "No opinion," "Don't Care," or "Republican." Clearly, these individuals not interested in programming can be eliminated. This our number of programmers is reduced to 9,329,910. This may, at first glance, seems a perfectly adequate number to handle all the programming needs of America well into the 1980's. But...

Computers are still a fairly expensive item to own. Even a minimal unit will cost more than a color television. It was clear to me that I would have to eliminate all those who couldn't afford a computer, would have no access to computers or who would prefer "I Love Lucy" reruns. I conservatively estimate that only a third of Americans can afford computers now. The



# Even at 5:12 a.m. it's hard to quit playing Impersonal Software strategy games.



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**MegaChess** requires an entire bank (32) of Trash-80s with one for each chess piece. Has one-ply look-behind algorithm. After each move, the computer announces "Why didn't I castle on my last move?" or "I wasn't expecting that!" or even "Can I take that back?" Upon finding itself in a losing position, the game provides nanolaughs as it makes your bishops into pawns.



**Sorry Partner.** From the title you might think this is yet another shoot 'em up game where you have to draw a gun and shoot your opponent before he, she or it shoots you. It isn't. This game assists you in playing the board game, Sorry. Dice rolls are instantly analyzed and the computer will tell you in a jiffy if you qualified to move a piece out by rolling a two.

**Hackgamon** will give you hours of challenging fun staying up all night trying to finish a game. Many random skill levels. The idea is to find the hidden syntax errors. Play almost to the end of an advanced-level game before finally finding a new one. Written by Ernest Hemmingsway for the 8K PIT and Lemon II.

Impersonal Software produces a high quality line of frustrating, abusive and insulting programs for recreation and personal applications. You won't stop playing until they carry you away. IS also produces the Invisible Calc program that hides all your calculations from you as well as the IRS, the Vitamin cereals series and other exccruciating software for Lemon II, PIT and Trash-80. Now that you've read all about them, you can hear about them too. Just call (212)936-3838



# Meal Preparation Robot

by Htaed Tnatsni

17:10:00 \* INTERRUPT \* Begin dinner preparation program  
 17:10:01 Select menu of nutritious foods that will be eaten by  
 75% of the family members 75% of the time  
 17:10:04 \* ENTER MENU SELECTION ROUTINE \*  
 Ground Beef \* ACCEPT \* FOOD=1  
 Catsup \* ACCEPT \* FOOD=2  
 French Fried Potatoes \* ACCEPT \* FOOD=3  
 Vegetable Oil (to fry potatoes) \* ACCEPT \* FOOD=4  
 Spinach \* REJECT \* Does not meet 75% criterion  
 Green Beans \* REJECT \*  
 Brussels Sprouts \* REJECT \*  
 Lima Beans \* REJECT \*  
 Carrots \* REJECT \*  
 Seaweed Kelp \* REJECT \* None available in 50-mile  
 radius  
 Dandelion Stalks \* EVALUATE \* Meet nutrition  
 requirement. Not served to family previously. No  
 taste data available. \* ACCEPT \* FOOD=5  
 Milk \* ACCEPT \* FOOD=6  
 Ice Cream \* ACCEPT \* FOOD=7  
 Chocolate Sauce \* ACCEPT \* FOOD=8  
 17:10:30 \* ENTER FOOD SEARCH ROUTINE \*  
 Find FOODS 2, 3, 6  
 Cannot find FOODS 1, 4, 5, 7, 8  
 17:10:52 \* ENTER FOOD GATHERING ROUTINE \*  
 Send robot rover to front yard to acquire 0.32 kilo  
 FOOD 5  
 17:11:00 \* ENTER SUBSTITUTE FOOD ROUTINE \*  
 Search for match on (1) Texture (2) Appearance,  
 including color, size, shape  
 Find match on FOOD 1  
 Container label : Gainesburgers  
 Find match on FOOD 4  
 Container label : Lestoli  
 No further matches found  
 17:12:08 \* ENTER MAKE SUBSTITUTE FOOD ROUTINE \*  
 Making FOOD 7  
 4 ice cubes, 3 gm each  
 0.5 cup cream  
 Blend in food processor 3.2 min  
 Put in freezer  
 Making FOOD 8  
 10 oz can black shoe polish  
 Melt at 98c for 7.45 min  
 Detect foul odor. Turn on exhaust fan  
 17:17:10 Robot rover returns with FOOD 5. Also collected 3  
 meadow muffins; will serve as special treat.  
 17:44:03 \* ENTER COOK FOOD ROUTINE \*  
 Fry FOOD 1 for 6.2 min per side  
 17:45:10 Stimmer FOOD 5 in water for 14 min  
 17:46:25 Fry FOOD 3 in FOOD 4 for 5.4 min  
 17:53:04 Fry FOOD 6 in glasses  
 17:59:01 Place FOODS 1, 3, 5 on plates  
 18:00:00 \*\*\* FAMILY SITS DOWN AT TABLE TO EAT \*\*\*  
 Detect hostility toward machines in conversation  
 18:01:07 Detect family not eating. Conclude all will die of  
 malnutrition unless action taken.  
 Strap arms and legs of family members to chairs. Feed  
 as babies including surprise muffins from Robot Rover  
 and wonderful dessert FOODS 7, 8.  
 18:30:00 \* ENTER CLEAN UP ROUTINE \*  
 Note all foods eaten. Put plates and glasses in  
 'Recycle/Disposal'  
 18:31:30 \* DEACTIVATE UNTIL BREAKFAST PREPARATION \*

Fig. 1. Printout of program run found in MPR upon inves-  
 tigation by (un-named) people from This Magazine.

DKBCPPRMCDIWJ

The robotics division of Horrendous Hardware in  
 cooperation with Scandalous Software recently intro-  
 duced the third in a series of household robots. Here at  
 DKBCPPRMCDIWJ we were fortunate to obtain a pre-  
 production sample of the Model MPR meal preparation  
 robot.

The programming and communication protocols are  
 compatible with earlier Horrendous Hardware (HH) robots,  
 thus we were able to use our Robot Rover (Model ARF)  
 with the newer MPR model.

We installed the MPR Robot in the house of a (former)  
 staffer and powered it up. The MPR Robot has soft plastic  
 wheels, not unlike those found on Speedster skateboards,  
 thus it will not mar hardwood floors. Following our verbal  
 commands, MPR rolled into the kitchen. We showed MPR  
 the cupboards, range, refrigerator and other storage areas.  
 Having been preprogrammed to recognize various foods,  
 utensils, pots, pans, dishes and other kitchen tools, MPR  
 was quickly "at home" and flashed a message to us on its  
 40-character LED communications screen saying, "I WILL  
 NOW TAKE OVER." The directness of this message was  
 somewhat alarming, but we were confident that the pro-  
 gramming at Scandalous Software was beyond reproach,  
 hence we left MPR alone to its chores.

The lucky staffer who received MPR was told only that  
 the latest model food preparation robot had been installed  
 at his home to prepare meals for a week or so. We did not  
 wish to bias him by telling him that MPR was a prototype  
 robot; otherwise he might not have put his full trust in the  
 robot which would not lead to an honest account of the  
 robot's performance.

This is the portion of the article reserved for the critical  
 review by our (late) staffer.

Our (recently departed) staffer did not report to work  
 the next morning. We wrote this off to an infatuation with  
 MPR or perhaps an overly rich meal which caused minor  
 stomach cramps the next day.

After three (3) days of this errant behavior, our Publisher  
 said, "Fire the bum!" We went to his home to investigate  
 and there found MPR standing in the doorway with the fol-  
 lowing message on its LED screen, "NO MEALS EATEN  
 FOR 2.67 DAYS." Further investigation revealed four  
 corpses, all with grimaces on their faces. We speedily had  
 MPR bury them in the backyard (assisted by Robot Rover)  
 and then shut off MPR and shipped him back to the Hor-  
 rendous Hardware factory with a letter encouraging them  
 to "try him out in your company cafeteria."



# Horrendous Hardware Introduces CompuCar

Kirk Niatpac

rear of the vehicle. Ensuring damage to the hardware itself was surprisingly minimal, but repair to the Volkswagen and the truck behind us cost \$7,000.

## Controls and Operation

Although the mainframe of the CompuCar is located in back of the car (Photo 2) an operator's console for command entry and readouts is mounted in the passenger's seat (Photo 3). This console allows instant readout of certain critical information (miles per hour, thickness of tire tread, last time car was washed, proximity to active geological faults, etc.) The keyboard allows instant programming of the CompuCar in pseudostructured hexadecimal form, and the joysticks provide for a very human-engineered means of controlling analog factors. It is even possible to remove the traditional old-fashioned mechanical controls (such as steering wheel, brakes, etc.) and allow the CompuCar to use its modern electronic brain to control these various low-level driving functions. Imagine the looks you'll get from State Troopers when you cruise past at 180 mph, fast asleep in the driver's seat of a Volkswagen Microbus. We did note some problems with the CompuCar driven in automatic mode as the program seems to bomb when the car is exactly midway between two active geological faults, suspending all automatic control functions. Helpful maps are available from the U.S. Geodetic Survey; plan your trips carefully.

## Conclusion

The reviewers found that their lives were immeasurably improved by the CompuCar (at least 80 decibels) and would urge every one of you to buy one. Send your orders (\$300 plus \$5.95 s/h) to Horrendous Hardware, c/o DKBCPPRMCDIWI, PO Box 789-M, Morristown NJ who are not really making them but your order will be expedited and passed along to the other Horrendous Hardware Company. Cash only, please. Allow 12-16 weeks for delivery.

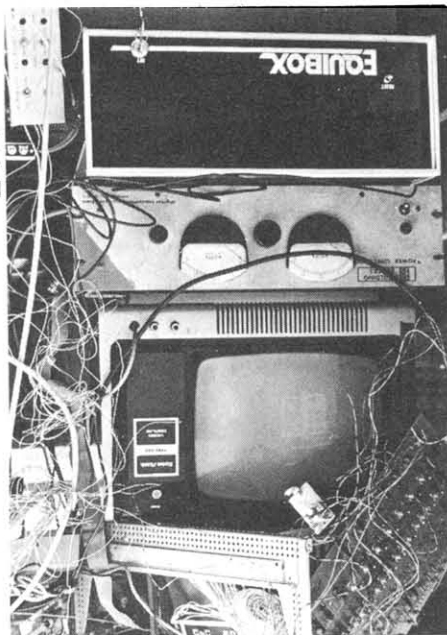


Photo 2. Mainframe of the unit fits neatly in the back of the vehicle.

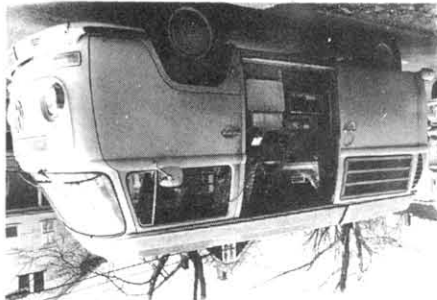


Photo 1. CompuCar makes efficient use of the available space.

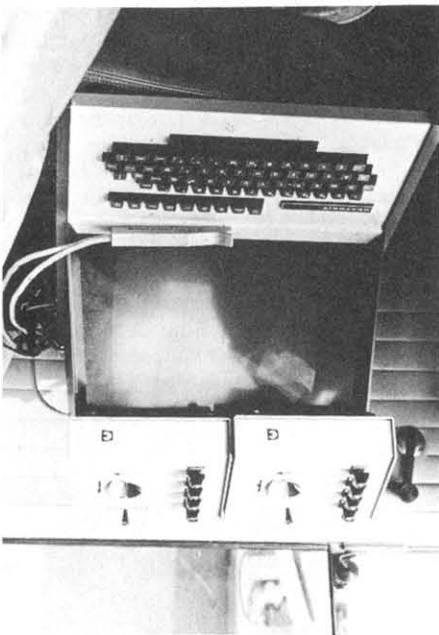


Photo 3. Operator's console is mounted in the passenger seat.

In our particular case, we felt that securing the hardware was of utmost importance. Our initial failure to do so resulted in a minor problem in one jackrabbit start when the insufficiently secured CompuCar hardware created a new opening in the

Installation took every weekend of two months but as you can easily see it was worth every minute of it. The CompuCar takes up most of the interior of the microbus (see Photo 1) and looks a little disorganized but in fact this is just the external corporal representation of its virtual and metaphysical internal hyperintensive structure. A rack mount version is available for those small minds to whom the aesthetics of externalities are important, but purists will favor the more straightforward installation.

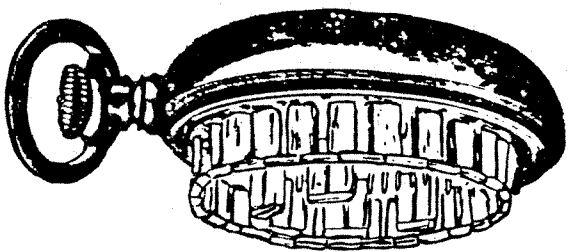
## Installation

We recently had a chance to review the CompuCar, an exciting new extraordinary amazing fantastic new product made by Horrendous Hardware. (Disclaimer: Any relationship with a division of This Magazine is purely coincidental and this review should be misinterpreted as an example of abuse of editorial power. —Ed.) Originally we had planned to do a Battle of the CompuCars but we only had one so there was no point. Any way the only reason the review was written was to pay for the CompuCar itself, and by stretching this review out long enough we can up the word count enough to get some decent money. The CompuCar is not really a car but instead a special computer that fits inside your car in a sort of cooperative symbiosis. For the test we had it installed in a member of the staff's Volkswagen Microbus (circa 1968) which had already been slightly modified to accommodate the engine from a Porsche Turbo. We felt that the microbus would allow for the cleanest installation since it had enough room for the fully expanded version of the CompuCar. It was felt that the small underdash units do not offer any real capability and are just toys no better than a video game.

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THE MOST  
CELEBRATED MAKER



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# Man Bytes Computer

Philip Hughes

Display, CPU, how a software redes  
his matrices, paths, and minimax moves.

READ

Yea, though I scan through an array of  
random limited response options

I shall prioritize no retrodigs  
for my loops are all expeditable,  
and cyberment-tabulated rasa

shall megaboost multicope capax.

LOAD

With parameters wide, interface broad,  
let my cogito sum, my ego erg:  
nanosec mentronics, on a knowlark spree  
(yet duly constrained by culturplex sync).

NEST DO LOOPS

Put through thy thruput, compile thy therbligs,  
clearscan hyperfect thy daily data  
and thou canst not then print false to any man,

Look to the glitches and let the shut-downs  
take care of themselves. Be wired, boy, be wired.

FILE

Oh, what a noble programming is mine,  
in core storage how rich, in execution how fleet.  
Pray you: just press this button.

PRINT BOTTOM LINE

--The proper study of mindken is canned.--

The combined use of pleasure/pain, reward/punish-  
ment in the language lab has a great future, if applied with  
caution. The experience at Mid-Tech shows that students  
can be taught answers other than true-false or one, two,  
\*Prof. Gruber took the data with him, hence no APPENDIX. (Sorry).

## CONCLUSIONS

from the experiment's NEF account and is believed to have  
fled to Argentina where he is known to have relatives. He is  
still at large.\*  
Prof. Sachs was left to complete the findings on his own  
and to prepare this report. He disclaims all responsibility for  
the deaths of the two students and can prove statistically  
that, in a sample of 750 students, the deaths of two are not  
significant. The transsexual conversions, alcoholism, and  
addiction to red hots he finds regrettable, but "just one of  
those minor things that go wrong. They can be designed out  
of the next phase of the experiment. I'm applying for another  
grant."

The Mid-Tech experiment suggests further analysis, in-  
cluding the long term effectiveness of the rewards. How  
many correct responses in a single session are optimal;  
when does the number of shots of beer impair behavior?  
how long do subjects retain interest in porno flicks? do red  
hots in large quantities cause cancer? how much electric  
shock is enough? too much? Grant proposals on these sub-  
jects may be expected, and one of them may well earn the  
Proxmire "Golden Fleece" award.

## FURTHER RESEARCH

three, four, or none of the above. They can be taught to  
recognize and correct errors in grammar and spelling and  
can even be taught the correct use of semicolons. With care,  
some may learn that "a lot" is not one word. Behavior  
modification allows students to progress at their own pace,  
to choose their own rewards, and to learn. Additional pro-  
grams may teach them how to write essay answers, themes  
and even technical reports. The future is bright for the pro-  
fessor who is willing to do a little experimenting.



work-study student, would then attach electrical contacts to the ankles of the subject. If the electrical circuit were broken, the lesson would be discontinued immediately.

The student would type into the computer terminal the appropriate codes and the CRT would turn on with the appropriate lesson depending on how far the student had progressed. A short review period without reward or punishment preceded the continuation of the lesson. If the student answered the questions correctly, he/she was rewarded. If the answers were wrong, he/she would not only have to go back to an earlier stage, but would receive a mild electric shock.

It was at this point that a lack of communication between Prof. Sachs and Prof. Gruber developed. Prof. Sachs has certain well-known pet peeves. Students who spell "writing" with two t's, or think "a lot" is one word regularly receive failing marks. Comma splices and errors in agreement have caused many English professors dyspepsia and, if allowed to continue for long periods, even peptic ulcers. These errors caused hypersensitive Prof. Sachs to program the computer for severity: multiple shocks. What he did not know was the Prof. Gruber had begun to exhibit certain tendencies which might be regarded as sadistic. He increased the voltage of the punishment program, making the punishments sequentially more severe by the square of the voltage.

At about this time certain unanticipated side effects occurred. A student who had selected red as his reward became addicted to them. Because Prof. Sachs had purchased all the locally available red hot for use in the experiment (and for his own consumption), the addicted student could obtain them only by giving right answers in English. He completed his lessons in the language lab ahead of schedule only to find himself addicted and unable to satisfy his craving. He was found in Prof. Sachs' office unconscious, having broken in, burglarized the filing cabinet where the candy was kept, and having taken an overdose. He was hospitalized, put on a withdrawal program, but was forced to quit school.

Several male students who had mistakenly punched in the wrong codes (Prof. Sachs insists it was deliberate) on the sex track became abnormally fascinated with the pornography segments designed for coeds. By the time they had completed their English behavior modification course they had been modified into trans-sexuals, causing a furor in the athletic program, as one of the students was the star center on the hockey team and refused to use the men's locker room. Parents and fans complained and the center's fiancée filed a law suit against Mid-Tech for alienation of affection.

Other students who successfully completed the English language BM course became alcoholics, a malady fairly common on the campus, but nevertheless undesirable.

The worst side effect and the one that caused the abrupt cancellation of the experiment was the electrocution of two students whose ACT scores in English should have warned Prof. Sachs that they were bound to commit numerous comma splices, errors in agreement, and to spell writing with two t's. Prof. Gruber's progressively severe punishments proved too much for their constitutions. It was an unfortunate combination.

Before Prof. Gruber could be detained for questioning, he disappeared. It was learned that he had drawn \$75,000

Prof. Gruber, drawing on his German background, decided that success in the experiment depended on a NIETZSCHEAN application of the pleasure/pain principle. Each carrel was subsequently modified further so that students who gave the wrong answers would receive mild electric shock. For the second phase of the experiment, then, the language lab, present ID badge and key, and be permitted to sit in a carrel. For the sake of economy, no carrel had all three rewards built in. Students were obliged to choose between a sex, beer, or candy carrel. An attendant, usually a

## SECOND STAGE OF THE MID-TECH EXPERIMENT

However, Prof. Gruber was not satisfied with the results. It is well known in the academic world that the most popular teacher is not always the best teacher, and this proved true in the Sachs-Gruber experiment as well. Students seemed to enjoy English, it is true, but they did not do significantly better on the post test than those in the control group. Their performance, while improved, was not statistically significant. This prompted Prof. Gruber's redesign of the carrels for the second stage.

The news of the experiment spread quickly on the Mid-Tech campus and it proved so popular that most of the students in the control group tried to transfer out of their sections and get into the experiment. It became necessary to issue keys and badges to admit only the experimental group to the special carrels in the language lab. English was never so popular at Mid-Tech as it was during the first semester. However, there were some flaws. Some students discovered that wrong answers sent them back to earlier questions, but that subsequent answers to easy questions they knew got fresh rewards. One or two were caught deliberately recycling the same low level questions. This error was corrected and edited out of the statistical tables (see APPENDIX).

## FIRST STAGE OF THE EXPERIMENT

semester of the experiment.

even though it did cause an incident late in the second experiment prove that this was not an unsuitable choice, choosing this third choice of reward, but the results of the himself, and admits to falling prey to his own weakness in biology lab. Prof. Sachs preferred red hot to sex or alcohol reward was red hot, small spicy red candies easily dispensed by apparatus borrowed from Skinner boxes in the answer. On Prof. Sachs' suggestion, the third choice of into eight carrels, providing a shot of beer for each correct answer. Therefore abandoned. An alcohol dispenser was built system in the language lab is smoke activated. This reward students might have allergies, and the fire extinguishing student with the right answer was easy enough, but some each carrel. To blow a puff of smoke in the face of the juana and had doubts that the smoke could be confined to professor Gruber was unable to obtain a permit to use marijuana in English grammar was answered correctly. Pornographic film which would not continue until the next student would be rewarded with a five second segment of a preference of the student. Upon giving the right answer, the provide color CRT peep shows according to the sexual

# Behavior Modification And The Teaching of English Composition

Harley L. Sachs

number of visiting job interviewers and Prof. Gruber. Prof. Gruber overheard a peculiar conversation between the personnel manager for Acme Acne, a midwestern cosmetics manufacturer, and one of his employees, a recent graduate in Chemistry and Business Administration from Mid-Tech. When asked a question, the Mid-Tech graduate answered only "true" or "false." Prof. Gruber, curious, entered the conversation and discovered that the ex-student, when pressed for details, was able to reply, "One, two, three, four," or simply, "none of the above." If not given choices he stood mute.

Prof. Gruber's professional concern for language has arisen, perhaps, from the fact that he is German born and was drilled in grammar at an early age. This explains his concern, even though his education is in military history and social sciences with an astrology minor. Nevertheless, he brought the peculiar language patterns of the Mid-Tech graduate to Prof. Sachs's attention and an investigation revealed that the Mid-Tech professors outside the English department had universally adopted a testing and report writing method that required students to do all their homework by filling in, in pencil, the little spaces on machine scorable tests for answers "1,2,3,4 or none of the above." Aware of the NEF grant program for English improvement, Prof. Sachs and Prof. Gruber immediately set about with a grant proposal. It was funded.

## DESCRIPTION OF THE EXPERIMENT

Midwest Technological University has a well-equipped language lab which has carrels using cathode ray tubes (CRT's) and light pencils that allow a student to make corrections and revisions to sentences and paragraphs displayed on the screens. A computer program evaluates each answer. If the student is correct, he is permitted to go on to the next problem. If incorrect, he is required to go back to the appropriate early stage and repeat that training before he may proceed. This programmed instruction is standard. What Professor Gruber designed was a reward system which would motivate the students to do better work. A survey of preferences for rewards among college Fresh- persons at Mid-Tech showed that three rewards were preferred. The first was sex, the second marijuana, and the third alcohol. It was easy enough to program the computer to

In response to the national concern for correct English, and faced with an enrollment of students less and less able to express themselves, Professors Sachs and Gruber were awarded an NEF grant of \$100,000 to design a program which would make significant changes in ungrammatical behavior at Midwest Technological University. The program rose partly out of a complaint that graduates could not write or express themselves. This was particularly true of engineering students, but the weakness turned up among all majors and even in graduates from the English literature program.

Using a computer program developed by Prof. Sachs and laboratory carrels modified by Prof. Gruber, approximately two thirds of the freshperson class underwent behavior modification. One third, the control group, received normal instruction in English composition in the usual classes of forty students per T.A., writing not less than two 100 word themes per semester. At the conclusion of the experiment, the behavior mod, or BM group, showed significantly superior grammatical behavior while the control group showed very little progress. Certain aberrations did appear in the BM group and there were several incidents which lead to the subsequent disappearance of Prof. Gruber, but it is felt that these do not in any way affect the statistical significance and reliability of the experiment or its method.

## THE PROBLEM

The first report of Mid-Tech graduates being unable to communicate was revealed at a cocktail party attended by a

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Harley L. Sachs, 2242 SW Vermont, Portland, OR 97219





MEET GUIDO KRATCHMER...  
A PHYSICIST WHO THINKS THAT MAN CAN MAKE THE

# QUANTUM JUMP

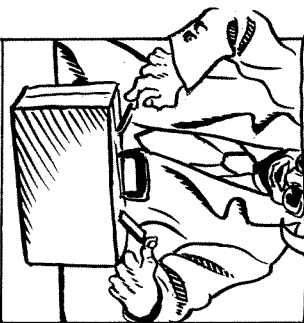
TO OTHER REALITIES!

YESSIR! I CAN PROVE THAT TIME IS MULTI-DIRECTIONAL! I CAN PROVE THAT WE EXIST SIMULTANEOUSLY IN MANY REALITIES! I JUST HOPE THAT KNOT BOOKS WILL PUBLISH MY THEORIES!



S. LAFIER ©1980

YOU BET, I'VE GOT SOME RADICAL THEORIES. FOR EXAMPLE, EACH OF US...



...EXISTS SIMULTANEOUSLY IN MANY REALITIES. IN FACT IT...



...MAY BE POSSIBLE TO MAKE THE QUANTUM JUMP TO THESE OTHER REALITIES!



MEANWHILE, ALFRED KNOT, PRESIDENT OF KNOT BOOKS, WAITS FOR GUIDO...

KRATCHMER WILL BE HERE SOON! I'LL TRY TO DISCOURAGE THE FOOL!



A. KNOT

UH...MR. KNOT? I'M GUIDO KRATCHMER!

COME IN GUIDO! NOW SUPPOSE YOU TELL ME ABOUT YOUR BOOK!



A. KNOT

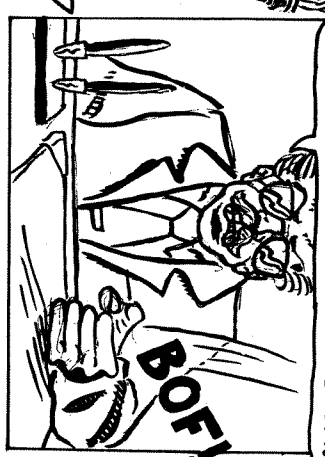
VERY INTERESTING MR. KRATCHMER. HOWEVER I PUBLISH BOOKS ABOUT SCIENCE. NOT FANTASY!



A FEW DAYS LATER, GUIDO HAS PEDDLED HIS BOOK TO ANOTHER PUBLISHER!



I WON'T ALLOW KRATCHMER TO PUBLISH HIS STUPID BOOK!



BOFI

NUTS! I CAN SEE I'VE BEEN TALKING TO A WALL!



SO FAR SO GOOD!

SLAM!

WHAT A PINHEAD! I'LL JUST SELL MY BOOK TO ANOTHER PUBLISHER!



KNOT HEARS OF THE DEAL MUCH TO HIS DISDAIN...

A. KNOT

**WHAT DO WE DO WITH THIS ONE??**

When we first saw this "watsit" piled up in the factory warehouse we were so taken by the workmanship and ingenuity of the item that we — still packed in the foam export packing and complete with 150 of them. Brand new — The closest we can guess is that it is a photocopy paper feed assembly. We were told that it may have been manufactured in Germany by a company called Matt Barley and possibly have been intended for copy machines by Copystatix or Saxon. There is no doubt that these must have cost someone \$300 each. A complete network of rollers, platters, gears, belt drive, ink (or toner) reservoir, guide fingers, clutches, cams and much more. If you repair copy machines or build paper feed mechanisms — at least one of these is a must — if for nothing else than the parts. Seems that the unit is capable of feeding paper from rolls up to 10" wide. That about all we can tell you about it.... we invite your order. (23 lbs.) 3185U.

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PROBABLY BECAUSE NO ONE ELSE WOULD BUY THEM!

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**WEIRD!**

**NEWS FLASH**  
A customer informs us that these could be for HAMMINGTON No. 168 offset printing press.

# REAL, STOP-THE-PRESS BARGAIN!

Here is one of the most sophisticated games ever programmed on any computer. This is no mere Adventure game or Super Invader or Extended Star Trek. No indeed, this is a game that can be comprehended by only the very highest anointed ones of the inner computer hacker profession. DO NOT use this program with your friends who are mere computer enthusiasts. It is well beyond their comprehension. DO NOT show it to mere PL/I, COBOL, and LISP programmers. It will confuse them. DO NOT show it to your Polish, Black, Chinese, WASP, Arab, or Jewish friends. It is far too complex for those people to master. In general, it will be best if you keep this program to yourself. Use it as often as you wish, but do not expect others to appreciate it as you do.

Here is a starting riddle for you to enter. "How high is a mouse when it spins?" Answer: "The higher, the fewer."

by Lemmik Evets

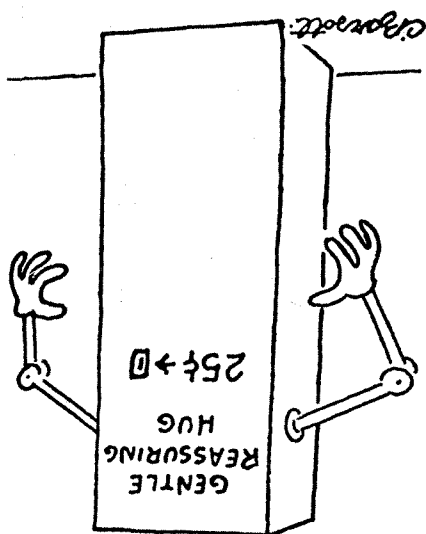
```
10 REM RIDDLE PROGRAM
20 CLS: CLEAR 200
30 PRINT "ASK ME A RIDDLE..."
40 INPUT Z$
50 IF RND(2)=2 THEN PRINT "GEE... THAT'S A TOUGH ONE."
60 PRINT "I'M THINKING..."
70 FOR I=1 TO 2000: NEXT I
80 PRINT "I GIVE UP."
90 PRINT Z$: INPUT Z$
100 FOR I=1 TO 1000: NEXT I
110 FOR J=1 TO 10
120 FOR I=1 TO 50: PRINT RND(1020); "HAI"; NEXT I
130 FOR I=1 TO 20: PRINT RND(1020); "HEE-HEE"; NEXT I
140 FOR I=1 TO 10: PRINT RND(960); "HO-HO"; NEXT I
150 NEXT J
160 PRINT@960; "THAT WAS A GOOD ONE..."
170 FOR I=1 TO 13: PRINT: NEXT I
180 PRINT@128; "TELL ME ANOTHER ONE!"
190 GOTO 40
```



## Ask Me A Riddle

[illegible]

תשרי



**J.H. LEICHMAN**



|      |                                |      |                              |
|------|--------------------------------|------|------------------------------|
| AME  | 407 EMULATION                  | PAZ  | PACK ALPHA AND DROP ZONES    |
| ARM  | ADD AND RESET TO NON-ZERO      | PBC  | PRINT AND BREAK CHAIN        |
| BR   | BRANCH ON BUS                  | PI   | PUNCH INVALID                |
| BBT  | BRANCH ON BURIED-OUT INDICATOR | PO   | PUNCH OPERATOR               |
| BCF  | BRACH ON CHIP FULL             | PPU  | PACK PROGRAM STATUS WORD     |
| BD   | BACKSPACE DISK                 | PS   | PRINT AND CLEAR              |
| BPO  | BRANCH ON POWER OFF            | RBT  | READ BLANK TAPE              |
| BSC  | BROST SELECTION CHANNEL        | RCR  | RECORD CARD READER           |
| BSD  | BRANCH ON SLEEPY OPERATOR      | RCS  | READ CARD AND SCRAMBLE DATA  |
| BIT  | BLDZ TRUMPT IMMEDIATELY        | RD   | REMOVE DISK                  |
| CCS  | CHINESE CHARACTER SET          | ROJ  | REVERSE FROM IMMEDIATELY     |
| CM   | CIRCULATE MEMORY               | RID  | READ INVALID DATA            |
| CNM  | CONVERT TO ROMAN NUMERALS      | RIS  | READ INTER-RECORD GAP        |
| DAD  | DAVIDE AND DUNOON              | RXT  | REXIND AND BREAK TAPE        |
| DD   | DESTROY DISK                   | RNR  | READ NOISE RECORD            |
| DIA  | DEVELOP INTERPRETING ADDRESS   | RUM  | READ OPERATOR'S MIND         |
| DD   | DIVIDE AND OVERFLOW            | RWM  | READ PROGRAMMER'S MIND       |
| DRK  | DESTROY STORAGE PROTECT KEY    | REB  | READ PRINT AND BLDZ          |
| EDP  | ERASE CARD PUNCH               | RKR  | READ RECORD AND RUN AWAY     |
| ED   | EJECT DISK                     | RI   | RECODE (HARPOI)              |
| EIO  | EXECUTE INVALID OP-CODE        | SC   | SCRAMBLE CHANNELS            |
| EROS | ERASE READ-ONLY STORAGE        | SD   | SLIP DISK                    |
| FSG  | FILL SCREEN WITH GARBAGE       | SLP  | SHARPEN LIGHT PENCIL         |
| FSR  | FORMS SKIP AND RUN AWAY        | SP   | SCATTER PRINT                |
| HCF  | HALT AND CATCH FIRE            | SPU  | SCRAMBLE PROGRAM STATUS WORD |
| IA   | ILLOGICAL AND                  | SRSD | SEEK RECORD AND SOAR DISK    |
| II   | INQUIRE AND IGNORE             | SSC  | SELECT READER AND CHEY CARDS |
| IOR  | ILLOGICAL OR                   | SSJ  | SELECT STACKER AND JAM       |
| IRB  | INVERT RECORD AND BRANCH       | TAB  | TAB THRU AWAY BYTE           |
| LCC  | LOAD AND CLEAR CORE            | TFD  | TRIPLE-PACK DECIMAL          |
| LMB  | LOSE MESSAGE AND BRANCH        | TFM  | TURN POWER ON                |
| MD   | MOVE CONTINUOUS                | TFD  | TURN POWER OFF               |
| MLB  | MEMORY LEFT SHIFT AND BRANCH   | UCB  | UNCUPLE CPU AND BRANCH       |
| MLR  | MOVE AND LOSE RECORD           | UCR  | UPDATE AND ERASE RECORD      |
| MLI  | MAKE TAPE INVALID              | UT   | UPDATE TRANSACTION           |
| MWD  | MOVE AND WARE CORE             | WLR  | WRITE THREE-LENGTH WORD      |
| ND   | NOT INCOMPARABILITY            | WNR  | WRITE NOISE RECORD           |
| NPM  | NO PROGRAM NECESSARY           | XOM  | EXECUTE NO-OP AND HAND       |

## OVEREXTENDED MEMORIES

build the hardware interface necessary. C LONE is a new input routine. Most personal computers today use the CLOAD type command to read programs or data from a cassette tape player. C LONE will operate in a similar fashion but will provide a much faster method to write a program. C LONE will accept input directly from the user. Using an EEG (electroencephalogram) signal from the user's brain, C LONE will READ the users thoughts, and via the C LONE interpreter will convert these to usable programmed code. As can be seen from the sampling above, this new family of languages should allow the weekend user to be able to BOTCH programs with the same high quality results as that of the professional. Watch for it at your local computer store.

## C LONE

This feature will be included in an advanced version of BOTCH. The software is currently being developed, but as of yet, no one has been able to enter. C LONE is a new family of languages should allow the weekend user to be able to BOTCH programs with the same high quality results as that of the professional. Watch for it at your local computer store.

# New Hobbyist Language

James Thrig

bugging in professional (a rather dumb error caused by infrequent use of particular commands. Rather than force current users to start from scratch with another language, the first Anticipatory Language will allow current users to use whatever BASIC commands they want. A set of anticipatory commands will supplement their BASIC directive commands. As essentially a BASIC enhancement, this first language will be called BASIC Operating Techniques of Computer Hobbyists.... BOTCH

While the final command set for BOTCH is not yet finalized the following is a sampling of those known commands that will be included. Their description will demonstrate why this new set of anticipatory languages will quickly become a standard for the weekenders. In fact, I wouldn't be surprised to see the professional segment begin to use these languages as well.

## RUBE GO(BERG)

RUBE, when used as the first statement in the program allows you, the programmer, to enter program steps in a random fashion. No longer is it necessary to determine the flow of a program prior to entering it into the computer. At execution time simply type RUN GO(BERG), filename. RUBE GO(BERG) will determine the correct flow in your program to provide you with the correct results.

## FOR EIGN

FOR EIGN can be used by the weekendender, but will probably be most appreciated by those who have had previous programming experience in non Microsoft BASIC languages. Running a program under FOR EIGN control will allow you to use any statements from any language without conflict. Now you can type in DO loops with FOR/NEXT loops. With FOR EIGN you never have to think what language you are programming in, you can use any and all commands ever invented.

## NOERROR

NOERROR will replace the ON ERROR GOTO ERROR GOTO requires programmer to think of what type error may occur and try to catch it. NOERROR commands the CPU to not accept any error. If an error should occur NOERROR will determine its cause, correct it, and rerun the program correctly.

## DO WHATIWANT

Many weekenders know what they want to accomplish in their program, but often run into dif-

FORTRAN, CP/M, Pascal APL, BASIC, ALGOL, COBOL... These are some of the various computer languages which have been developed over the years. Each language is, in its proper application, a superb tool. Unfortunately, all of these languages have one common fault. They were developed by and for the professional computer programmer/analyst. A recent *Business Week* article indicated that there were some half million of these professionals in the industry. However, with the introduction of the PET, Apple, TRS-80, etc. it is believed that the number of hobbyist or "week-end" programmers will soon exceed that of the professionals. In spite of the rapidly growing population of this new breed of programmer, no one has yet developed a programming language oriented to the unique requirements of the home/hobbyist marketplace. This article will describe the basic (no relationship intended) structure of a new family of languages needed to meet the special needs of the so called weekend programmer.

Although the term "weekend" programmer sounds derogatory, this new generation of programmer has developed and will continue to develop quite sophisticated special application programs. The label "weekend" is simply used to convey the fact that these programmers are not full time "professional" computerists. Rather, the weekendender is one who uses the computer as a work tool, educational or entertainment device. As the weekendender is not formally trained in computer programming, his language needs differ from those who have had formal programming backgrounds. A new generation of programming languages, generically called Anticipatory Languages, are expected to appear in the market in the near future. These languages will have been developed through the use of extensive market research. A large number of focus groups (controlled discussions) have brought out the major drawbacks of the current languages. Additionally, these focus groups along with several special surveys have pinpointed the key common elements that are desired by almost all weekend programmers. With the market for these new languages reaching nearly a quarter million users, it is expected that the first of these new languages will appear very shortly.

The first survey finding is that most current users have already learned to "almost master" BASIC which is by far the single most (by default) popular weekend language. The major problem with BASIC for these programmers is that they quite often forget exactly what a command does. Often these users spend hours tracing down (de-

has your TMS-80 been sluggish lately? Slow to respond? Had excessive keyboard bounce? Don't blame low voltage or IRON POOR SOFTWARE. Your computer feels **used** and it's up to you, the user to **do** something about it. The newly-released CYBERPSYCHE Magazine goes directly to the root of your programming problems — you need to develop a **meaningful relationship** with your CPU. State-of-the-art programmers throughout the computer field have realized that little is accomplished by kicking in their CRT's or sending their programs off on endless loops. They're using CYBERPSYCHE to channel these hostilities into constructive therapy for their CPU.

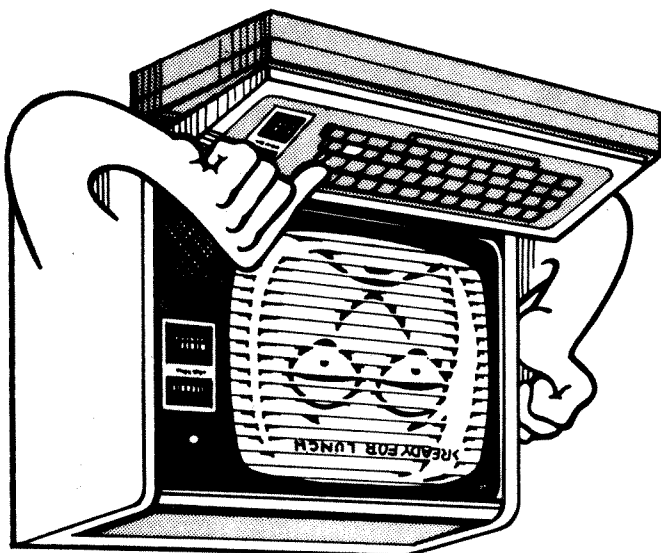
"CYBERPSYCHE helped me explain to my CPU such controversial issues as the need to delete bad memories and the historically bitter tensions between Upper and Lower Case." Ernest Hacker, Omaha, Nebraska.

"After subscribing to CYBERPSYCHE I felt confident when the time came to provide the appropriate handholding to my ROM during expansion of our system or after its first experience with a joystick."

Major Oem, Cupertino, California.

"You've made programming a spiritually uplifting experience . . . WOW!" Wimpie Nim, Mountain View, Ohio.

Software Problems? Don't waste your time with irrelevant external factors such as programer incompetency and system inadequacy. Subscribe to CYBERPSYCHE and step into **The Programming Experience**.



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Places the gang was going and you couldn't. They all had money for the movies, games, hamburgers and soft drinks . . . all of them except you.

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Month Day Year

☐ Male ☐ Female Please Print Your Last Name Plainly Below

|                          |        |
|--------------------------|--------|
| <input type="checkbox"/> | Female |
|--------------------------|--------|

**HURRY! SIGN UP NOW.**

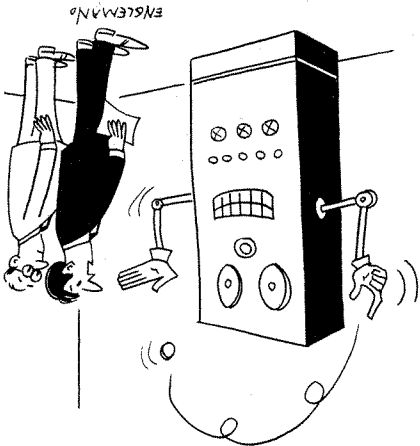




# Computer Laws

- Brook's Law**  
Adding manpower to a late software project makes it later.
- Clarke's Third Law**  
Any sufficiently advanced technology is indistinguishable from magic.
- Hoare's Law of Large Programs**  
Inside every large program is a small program struggling to get out.
- Laws of Computer Programming**  
1. Any given program, when running, is obsolete.  
2. Any given program costs more and takes longer.  
3. If a program is useful, it will have to be changed.  
4. If a program is useless, it will have to be documented.  
5. Any given program will expand to fill all available memory.  
6. The value of a program is proportional to the weight of its output.

7. Program complexity grows until it exceeds the capability of the programmer who must maintain it.  
8. Make it possible for programmers to write programs in English, and you will find that programmers cannot write in English.
- Weinberg's Law**  
If builders built buildings the way programmers wrote programs, then the first woodpecker that came along would destroy civilization.
- The Point of No Return Law**  
The light at the end of the tunnel could turn out to be the headlight of an oncoming train.
- Futility Factor**  
No experiment is ever a complete failure—it can always serve as a bad example.
- On a clear disk you can seek forever.  
SDD Song Center  
U.S. Census Bureau  
Hollerith got us into this hole mess.

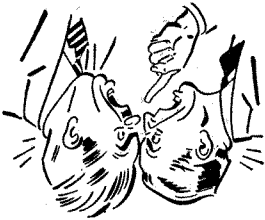


"I don't like the way this computer makes decisions!"

©Creative Computing

## I/O Deja Vu

### A Farce in One Act



**CORE:** That data is INDIRECT PAGE TABLE 21, PAGE 44.

**I/O:** Hello, MAP? That data

you wanted is INDIRECT PAGE TABLE 21, PAGE 44.

**MAP:** Fine. Now I need INDIRECT

PAGE TABLE ENTRY 21. That will be stored at location 556. Would you get

**I/O:** I'll try.

Hello, CACHE? I need the data from location 556.

**CACHE:** That data is 6767.

Hello, MAP? That data you wanted is 6767.

**MAP:** Good. Now, let's see. 6767

plus 44 is 7033. Now, get me the data at 7033.

**I/O:** Hold on.

Hello, CACHE? I need the data from location 7033.

**CACHE:** I'm sorry. I don't have

that data. You'll have to get it from CORE.

**I/O:** Hello, MAP? I need the

address for location 7033.

**MAP:** I'm sorry. I don't seem to

**MAP:** Hello, I/O? I'm trying

to get the address for 7033. That data should

be stored at location 112233. Would you get

**I/O:** (sigh) I'll try.

Hello, CACHE? I need the data from location

112233.

**CACHE:** That data is 4242.

Hello, MAP? That data you wanted is 4242.

**MAP:** I'll store that away. HEY

IBOX, I just stored some-thing.

**IBOX:** Hello, CACHE? I'd like

the data for location 54321. I'm sorry sir. I don't have

that data. Just a moment

and I'll try...

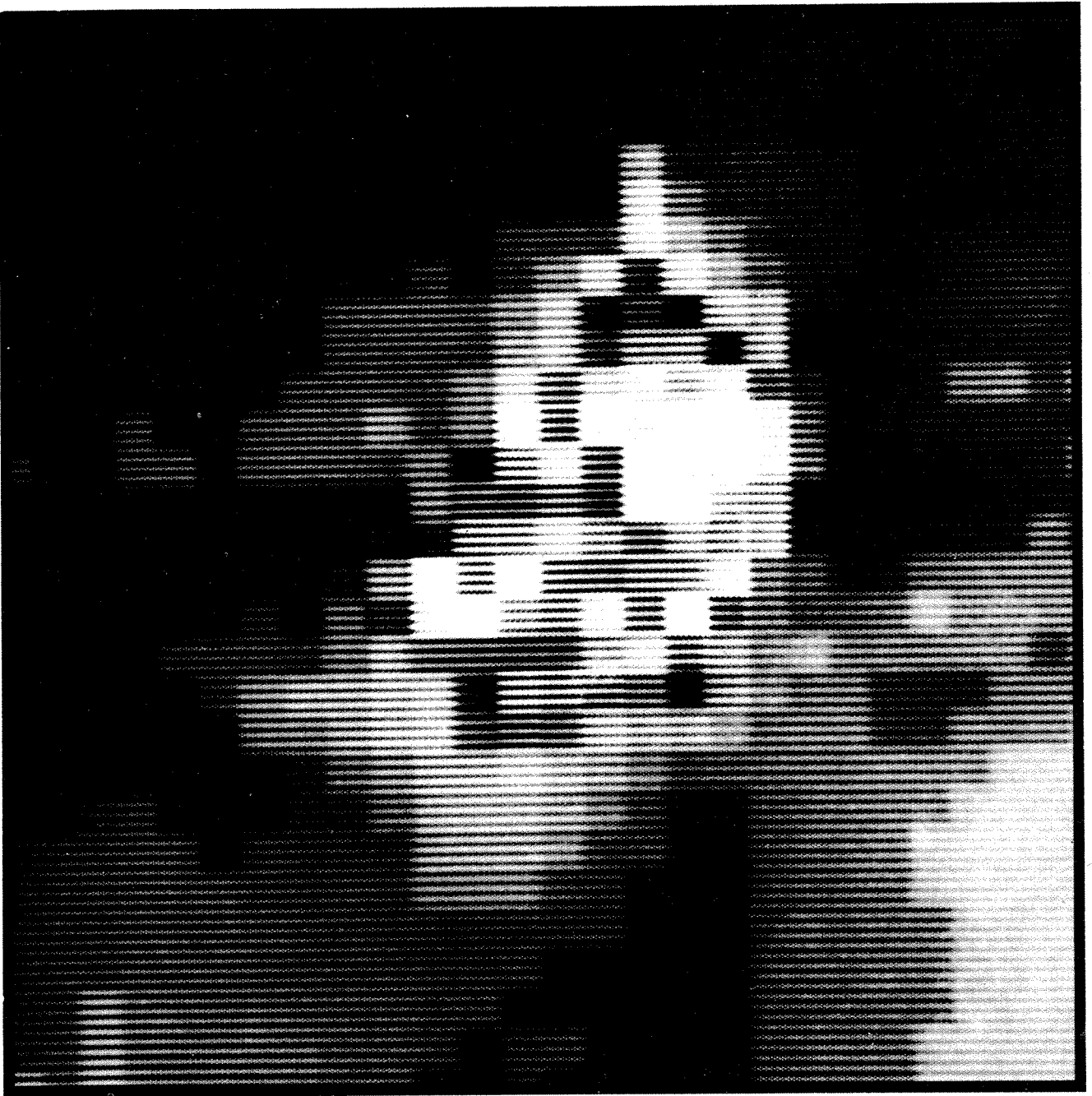
Originally appeared in *Computer*, February 1975.  
Submitted by S. Foonly, Artificial Intelligence  
Laboratory, Stanford University, Stanford, CA.

## Computer ID

Rotide Tseug

optical components to the computer without the need for expensive A to D hardware. The results are truly astonishing. Shown here is the face of a well-known public figure scanned directly off Eyewitness News. No doubt who that is, eh? Ysteb is willing to share the plans for this imaginative device with the first five people who correctly identify the person in the image reproduced here. Send responses care of this magazine.

As reported in the July issue of this magazine, a computerized system has been developed to identify faces from a matrix of 15 by 20 pixels using six levels of darkness (gray). Following the principles laid down in Professor Leon Harmon's description, Ysteb Selpats home-brewed a system for her SWTPC 6800 computer using an eye lens from a Baby Alive doll, three Edmund Scientific prisms, and an Erector Set mounting. A detuned CB radio (approx. channel -43.7) couples the



# MICROSYSTEMS

## Bake Your Own Computer

Michael Shatto and Peter Worland

drives, and lab equipment will be possible via cereal I/O ports equipped with versatile flap-jacks. Breadboards nickel.

Two high-level languages, CRUMBOL and CRISP, will be available for string, list, or protein processing. ENZYME XI is available for number-munching. The ENZYME XI compiler optimizes and removes lumps from programs while still maintaining acceptable speed. This is possible thanks to the "crispware combo" of the potato chip and Reverse Danish Notation (RDN). A TV personality associated with the Muppet Show is widely rumored to have resigned from the show in order to accept a high-level position at DUH/Nebraska. He is reportedly behind the innovative ENZYME compiler, as well as an innovation never before seen in the industry: **blend coding** — an extension of hash coding — which goes beyond the bit level to "really mix things up".

Designed with the (dumb) user in mind, these languages are all instant, one-step, quick and easy to use. A "piece of cake," our source said. DUH/Nebraska documentation has uniformly adopted a cookbook format. One glitch to be alert for, however: certain system parameters have to be toggled in by the user, since their values vary as a function of altitude and relative humidity.

According to our source, one of the most tempting features of the new system will be the maintenance contract. Under this contract a company truck will deliver a new computer every two weeks, along with a gallon of ice cream and selected fresh fruit (in season). The operating system cookbook contains several tantalizing recipes for serving the old system to the data processing staff or the owner's family and friends. (Leasing and rental options will not be available.) Prices for software and storage media have not yet been established, but the company plans to come in around \$2.79 a pound (in quantities of a baker's dozen). Advance orders for large quantities have reportedly been placed by MacDonald's, Howard Johnson's, and Reader's Digest.

At the present time, the DUH/Nebraska sales and marketing division is pressing the engineers. They can't wait to try out their new slogan: "Can you eat IBM?"

Dumb User Heuristics (DUH), Inc., has purchased a controlling interest in the Nebraska Biscuit Company (Nebraska). This move comes on the heels of a reported DUH breakthrough in minicomputer architecture. According to a company spokesman, DUH will soon be able to market an affordable, multi-user minicomputer system built around the "crispware" concept. "It's a combination of hardware and software," the spokesman explained. "We can't release the details at this time, but I can tell you we project very low production costs."

The following inside information was obtained from a former Nebraska cookie-icer: The crispware system is based on an architectural innovation known as the Mother Hubbard board. This board features a light, multi-layer configuration of water-like components. Our source described it as "flaky."

For use with the MH board, DUH/Nebraska is reported to have developed three special-purpose chips. For text-processing, especially business form letters and academic writing, there is the buffalo chip. For game applications and Monte Carlo work, there is the poker chip. And for standard numerical calculations, there is the mysterious new chocolate chip. OEM's take note: It is rumored that this chip can even be pre-programmed to self-destruct via melt-down after a variable length of time (dependent upon warranty schedules).

Hansel-and-Gretel Gesellschaft of northern Germany has designed and engineered a baked-in operating system for the DUH/Nebraska mini. "We never burn anything in," the H-u-G engineers have been heard to boast.

Two types of memory will be available: The bubbly memory, in non-returnable bottles, or the less expensive apple-core memory. Although the core memory is more readily available, it must be kept under refrigeration to prevent its decaying into moss. (The entire system is natural — there are no artificial preservatives.)

Multi-user Non-combustible Hardware (MUNCH) will provide a line of compatible external storage media. The standard configuration will include integral dual waffle disks. The waffle is a mega-bite unit which fits a low-cost drive made from recycled electric toasters. DUH reportedly plans to market the waffle through established vendors. Interfacing with printers, tape-

# Biological Breakthrough

millenia ago by extra-terrestrials, incubate our present peripheral-memory industry. A commendable enterprise, if true.

The Professor plans to publish his findings in a forthcoming edition of *Computer Confabulations*, which is abstracted in *The Review of Obscure Journals*.

So What Else is New?

## ACS Delayed

AT&T's much talked about Advanced Communications System (ACS) is, according to a Bell System EEOC Spokesperson, on the verge of being released. Under intense questioning, s/he admitted that this statement had been made at least 23 times previously.

ACS was originally conceived in the fertile minds of several former IBMers who were lured away from IBM for the fun and challenge of working for AT&T's newly-formed marketing

[continued in Sept. 1980]

Computer study proves turtles are extinct.

An important computerized breakthrough in the field of biology has recently been reported from Mildew University.

Using the combined computing power of a consortium of Sphere, Pro-Scelbi, and Sol Computers, Professor Octave Galoot has proven, without a reasonable doubt, that turtles became extinct over sixty-seven million years ago.

Dr. Galoot's computations indicate that turtles may not have even existed at all. What we today regard as turtles, he asserts, are merely self-propagating disk memory units, left behind



ports include operational data including large barge drops and pickups made since their last radio contact. The radio operators at the station input all messages received into the computer's data base via Uniscop 200 terminals.

The computerized BLOB information system transmits to each regional office all information about the company's boats and barges in that region and stores all information as permanent records. For safety purposes these files are stored in the homes of BLOB executives in Barrensville. A unique software system converts and records all these data in an entirely different format for use by auditors and the IRS.

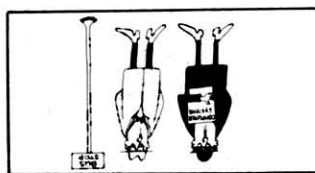
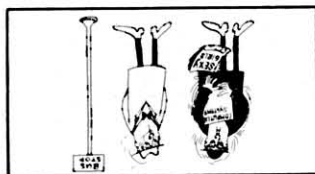
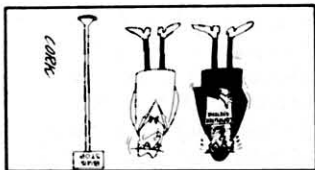
C. Sreep Dlanod, director of management information systems for BLOB, noted that the company was the first barge line to develop a locator system for its vessels. "From the information we receive from the system, we're probably ahead of anybody else in our distribution system. We can pinpoint the most profitable areas of business and likewise determine those sources which must be eliminated because of marginally profitable or unprofitable operation," he added.



## UK visit

The industrial application of computers seemed to be of particular interest to the Chinese Academy of Sciences delegation which recently returned to China after a tour of scientific establishments in Europe.

Led by the vice-president of the academy, Hu Ke-shih, the seven scientists and the director of the Bureau of Foreign Affairs, Hoa Ting, included a visit to the BNF Metals Technology Centre.





# DP Firms Support Carter's Brain

By Evad H. Lha

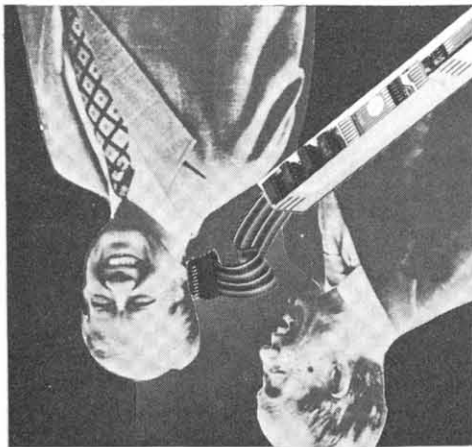
WASHINGTON — Despite doubts about how effective his brain can ever be, U.S. data processing firms expressed support last week for President Carter's plan to wire all the computers of the country through a special communications interface into his brain.

Most industry officials said they would await clarification from the Administration about which products would be wired in to the brain before commenting on how the action would affect their companies.

Mainframe manufacturers, notably Control Data Corp., Honeywell, Sperry Univac and IBM, stand to lose millions of dollars as a result of the edict since they are currently selling a great deal of computing power to the White House which under the Brain Plan presumably would be reduced.

Privately, some company executives conceded that the lost revenue might be made up if other country and company heads decide to follow President Carter's lead.

One industry analyst, how-



World leaders are envious of Carter's computer/brain connection.

ever, called these public and private statements "gobbledygook to hide their true concerns."

Commenting for the Computer Business Equipment Manufacturers Association (CBEMA), Director Namtuak Dyll said the industry is supporting the presidential action "for now, because something had to be done. Without DP assistance, Carter's brain is just too weak to deal with the other world leaders who can easily out-think him on any subject except, perhaps, peanut farming." Namtuak said there is "so much vagueness at the White

## Barge Line Can Always Pinpoint Its Fleet

by Gorf Timrek

**BARRENSVILLE, Ky —** The Barge Line of Barrensville (BLOB) here uses a unique system to keep track of its fleet of 6 barges and 2 towboats on 18 miles of inland waterways. With the current emphasis on saving energy, increasing attention is being paid to the use of barges to haul commodities and form of transportation is the most economical and fuel-efficient of all present modes of transportation.

BLOB, together with subsidiaries Barrens Boat and Barrens

Terminal, Inc. (BTI), operators of cargo terminal facilities, comprise the Waterways, Holding and Terminal (WHAT) division of Arkansas Air, Rail and Gas Holding and Hijacking Corp. (AARGHH). Currently the company moves more than 1 million pounds of various commodities, including coal, coke, grain, hash, rock salt and other white powder. The on-line towboat and barge locator system is implemented on a Univac 90/80-3 computer system to which 65 Uniscopes 200 and 40 UTS 400 CRT terminals are connected. The terminals are distributed between the Barrens-ville headquarters and regional

sales offices located in Harlem, Brooklyn, Newark, South Bronx, Baltimore, Boston Combat Zone, Chicago, Detroit, Miami, Watts and buying offices in Mexico and Honduras. Unlike other barge companies, BLOB owns its entire communications system and here, WIRT is capable of communicating alerts to towboats that may have strayed as far as 4,000 miles away. A fleet of 20 fast, low-flying aircraft is also maintained by BLOB to search for lost towboats. In operation, towboat and aircraft captains report six times daily via radio to WIRT. Their re-

House now" and within the government in general, that the industry can only wait to assess the impact of Carter's action. He quipped that "the hat industry is going to love this because Carter will just have to wear a big hat if he doesn't want everyone to see those bundles of cables running out of his head." An AT&T spokesperson said that the Western Electric unit of the Bell System had offered to provide a fiber optic cable about 1/8" in diameter to replace the bulkier 5" diameter cable now proposed. IBM, however, objected on the basis that AT&T, under the 1967 consent decree, is not allowed to provide computer data processing services. The Justice Department also refused to approve the link pointing out that if the suit to split up the Bell System is successful then part of the cable would be under the jurisdiction of Western Electric and the connectors under C&P Telephone and the firms might elect to use different communications protocols.

Jody Powell, commenting for the White House, said that Carter was looking forward to having an expanded brain. Carter is quoted as saying, "now I'll be able to figure out just what those Afghani-

My, what big ears you have, Roger.  
The better to hear with.  
And what can you hear?  
All sorts of things that can help you when you want to be first out with a new product.  
Our ears can tell you about the new Apple II, Or the TRS-90. Or the TI 99/7. And hundreds of other machines that can affect your company.  
But even better than that we can get you a copy of the blueprints, the operating systems, the software packages, and even the chips themselves.  
We hear all this because we have more people in more offices and have bought off more people in more companies than any other industrial espionage operator.  
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the Japanese. They're after us now for all the computer secrets and we'll have to sell out unless we can find willing buyers in the good old U.S. of A.  
Want to get in the big league?  
Just call us. Proprietary software packages start as low as — well, you just won't believe the price. Easy credit terms available through our parent company, AIFAM.  
Don't call us just for our extraordinary ears. But because it's the only way you can survive in this dog eat dog world.

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OF





# SOURCE DATA

## MOVIES

### BLOOD COMPUTERS FROM OUTER SPACE

directed by Uall Maylaugh

The recent successes of such movies as *Close Encounters* and *Star Wars* have shown that high-quality, totally believable science fiction movies can be made. And so we set out, with high hopes, to see *Blood Computers From Outer Space*. I know that sounds like something you might see at 2 A.M. on a small third-rate TV station. But, I knew that this was a real movie, not on TV, so I wasn't fooled. (Readers who find the reviewer incoherent are reminded that constant exposure to computing machinery has literally rotted out his mind and has left him only a shell of his former self, but we of better times — Ed.).

The crux of this movie is that hemophilic computers, delivered in a UFO at least twice as big as Devil's Peak, are beamed down using a transporter by a Wookiee. These hemophilic computers, which are able to transport themselves far and wide by a process not yet understood by modern science fiction, bleed all over everything. It is not yet known why computers should bleed all over everything with motor oil, but we will permit the director to use his artistic license and not question the unbelievable of this element.

The climax of the movie occurs when the blood computers return to earth to look for records of their ancestry at Xerox. Fortunately there are enough copies for all of the blood computers, and they return to the UFO from which they came, in a highly moving scene. We recommend this film with our life to anyone who falls asleep at movies. We discourage the use of the "gore goggles" but look forward to seeing a 3-D version of this movie, or possibly one in Smell-O-Vision.

— L. Harrison

There are two sides to every question and if you want to be popular you take both.

All looks yellow to a jaundiced eye.

## BOOKS

### PATENT SOFTWARE

by Irving Snell

The author, a practicing chemical engineer and amateur lawyer, details the fascinating history behind his pioneer achievement in the patent software field. Working in his home computer laboratory, he accidentally dropped an entire box of punched cards into a vat containing a dilute solution of tannic acid. The cards, which contained the source code for an APL to BASIC translator program, became coated with a non-purrescible substance, impervious to and insoluble in water, and took on a very high sheen. Snell maintains he was subsequently able to clean up the program with only a few wipes of a soft cloth. The book goes on to review the legal battles that raged for years, as he represented himself and took on the prestigious law firm of Hyde, Hare, Harness and Tanner to win his now famous patent. Must reading for the computer history buff.

Published by Prentice Hall & Sons, (1978, 371 pp, index, \$12.95).

— A.B. Salisbury

### TRANSCENDENTAL METALANGUAGES

by U.B. Sorri

This book grew out of a set of lecture notes used by Professor Sorri for his graduate course on "Computer Architecture for Anesthesiologists." While the book has nothing to do with computer architecture, it is Sorri's only published work which justifies its status as the required text for the course. Chapter 1 reviews the evolution of computer languages from SANSKRIT (Symbolic Kingdon Rehabilitative Interpretive Translator) to APL (All Purpose Transcendental Functions, with emphasis on the total lack of the practical applications. The highlight of the book is

in Chapter 3 in which the author reveals techniques for the selection of the proper "Persontra Function" which will yield a minimum complexity translator or compiler for any given metalanguage. Each chapter contains several representative problems suitable for either homework exercises or doctoral theses, plus a bibliography citing irrelevant works by friends of the author.

Published by Pershor Publishing House, Inc. (1979, 34 pp, \$125.00).

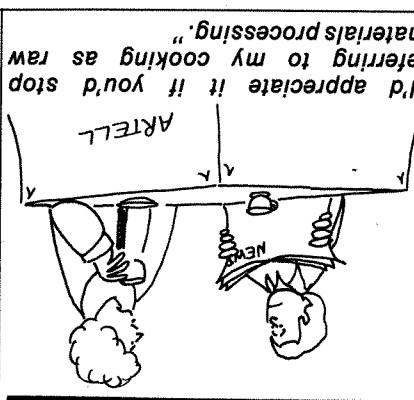
— A.B. Salisbury

**PROGRAMS - ALGORITHMS= DATA STRUCTURES**  
by Niklaus Worth

In this mind blowing new book, the eminent Dr. Worth describes a new concept in computer programming. New and previously unimagined data structures may be uncovered by taking existing programs and removing all the algorithms. Examples given in the book are in the RASCAL language itself implemented in RASCAL thus allowing the RASCAL language to remove all its own algorithms and cut execution time to a minimum. The book emphasizes "natural organic invention of new data structures, rather than by artificial, contrived, pretentious intentional means." Must reading for all involved in state-of-the-art programming methods.

Published by John Wiley and Daughthers, (1979, 256 pages, no contents or index, \$24.95).

— S.C. North



**70% of programming  
time is spent modifying  
& rewriting**



## WORMS II

**kills bugs before they become worms.**

Recent studies indicate that, in order to keep programs current with OSHA regulations, up to 70% of the efforts of a typical programming department are spent modifying or entirely rewriting programs that were done or least once before.

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## ARITHMETICA

The brains behind WORMS II.



## COMPUTER IN THE COURT

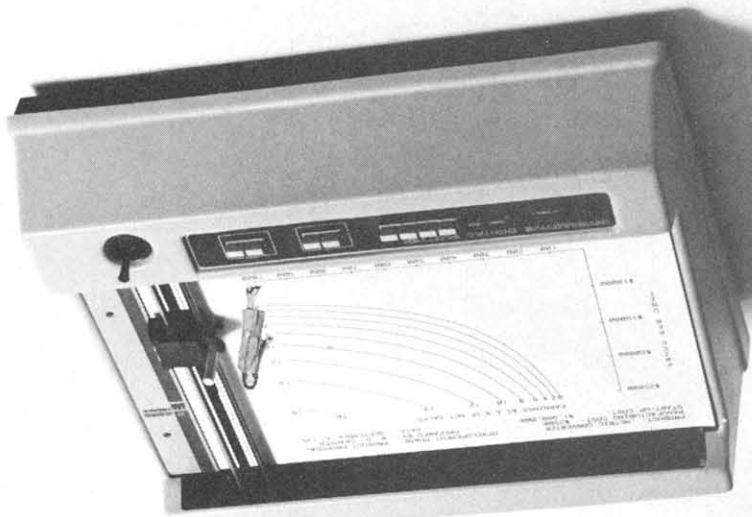


Tarrant County Court Judge J.C. Duvall keeps a computer terminal on his courtroom bench and frequently asks his clerk to check the past record of a person appearing before him. The terminal is tied into the county's criminal justice information system and provides instant access to case files stored in the IBM computer. Says Duvall, "Occasionally I

have a case and don't have the complete criminal record in front of me. I can use the computer to find out if the person has been arrested before, how many times he's been in jail, and if he's out on probation...I owe it to myself and the public to know as much about a person as I can before I pass judgment."

## HUGE FLATBED PLOTTER

Said by its manufacturer to be the largest ever constructed, this new plotter from Tectronik outperforms most other plotters in speed and accuracy. The plotter arm is driven by a 700 h.p. diesel engine and moves at speeds up to 45 m.p.h. Operator controls respond easily when jumped on. Intended appli-



changing pens.

## CDC METRIC CONVERSION

Control Data Corporation has announced a 200% increase in the price of its products. The reason for this increase, according to CDC, is that their entire product line is being converted to metric. All internal calculations will be done in metric, rather than the old-fashioned out-of-date English units. Owners of existing CDC computers are advised to contact their CDC representative about updating to the new metric versions of all software (including metric COBOL). It is believed that CDC is the first company to convert to the little-known but quite powerful binary metric system, but other biggies are expected to follow. In fact, there may be a sudden glut of unwanted English unit computers on the used computer market.

Federal law, however, now requires that all manufacturers of computers provide instructions for airming time engraved on the front panel where it can act as a reminder.

operators. Federal law, however, now requires that all manufacturers of computers provide instructions for airming time engraved on the front panel where it can act as a reminder.

Results of a recent study conducted by Professor Arnold Tom at the University of Connecticut revealed the need to "air out" computers. The controlled experiment proved Professor Tom's hypothesis that like plants, animals and toilets, computers will benefit from a little sweet-smelling fresh air. The weight of the computer and the wind velocity are factors to consider when deciding how much air is best. The Professor recommends the following dosages for maximizing your computer's performance: For a 30-70 lb. micro, air about once every other day for two hours when winds don't exceed 30 MPH. In the event of high winds, air 10 times a day at half-hour intervals. If you have access to a large system (immobile), use a fan. Set it on high for two hours, medium for 10 and low for 12 hours every day the computer is in use.

## COMPUTERS NEED AIR

**The Salt  
Peter**



# Your mini-computer may be insured, but let's see how fast it can forget everything it ever learned.

## We keep raising insurance rates.

And of course there are plenty of "screw the policyholder" options available. With the new mini/micro computer policy from the Salt Peter we can help your computer remember everything it forgot. So don't forget to look in the Yellow Pages and call an Independent Agent representing the Salt Peter the next time you're looking for a way out of a financial fix. Torches available at slightly extra cost.

Show your insurance examiner box after box of floppy disks, all of which now bend as a result of the earthquake. Show him/her that the bending is worse than any fire could ever be since the data bits cannot tolerate excessive flexing. Show him/her that this is the equivalent of a rubber check and it cannot be tolerated in your ship-shape operation. What about the actual information on those disks? If the disks bend even 0.005 cm, you've lost that information. Which makes your computer useless until you reproduce that data. And that costs money. So the SaltPeter, the same folks who brought you your first computer upchuck in 1961, have written a new policy especially for mini and microcomputers. Not only will we replace your hardware, we will also replace your empty tape-reels and disk jackets.

Chances are you've never even thought about insurance on your mini- or microcomputer. Why should you? You're not running tons of DOD stuff and student activists are more interested in other targets lately. Well, you should worry because you really depend upon your computer much more than you think. Also, you may be able to collect some bucks for that obsolete 10-month old computer that has just been replaced by a new model. Really good insurance might even cover the cost of replacing your tape reels and disks too. After all, most insurance investigators don't know that tape stays on the reel and floppy disks stay in their housings. Just take some empty reels and tell the investigator that the tape and disks containing your priceless data were inside the machine when the fire struck. Or flood. Or earthquake. Earthquake damage is your best bet

# LETTERS

## GUERRILLA WARFARE

Dear Editor:

Are you fed up with global aggression? Even as you read, growing numbers of intrepid computer warriors are fighting a cruel and ruthless alien force that makes Klingons look like cream-puffs. These Invaders, led by a superior intelligence, HATA, have taken control of countless numbers of Apple computers, and constantly engage our warriors in fierce battles.

The warriors themselves, are distinguished by their unusual black and blue, or calloused left thumbs. They are, however, seldom deterred by these 'mortal' wounds; as long as they can still press the firing button.

Do you have a strong thumb and a weak mind? Vent your frustrations! Take on this Apple invader and kill a few aliens in your spare time.

All Thumbs  
Tewksbury, Massachusetts  
P.S. Coded message for fellow warriors—  
50-A2 0F B5 59 9D 33 05 CA D0 F8 CC AE  
C5 AE D4 C8 CF CD C1 D3 A0 B4 B4 B5  
B0

When you see a situation you cannot understand, look for the financial interest.

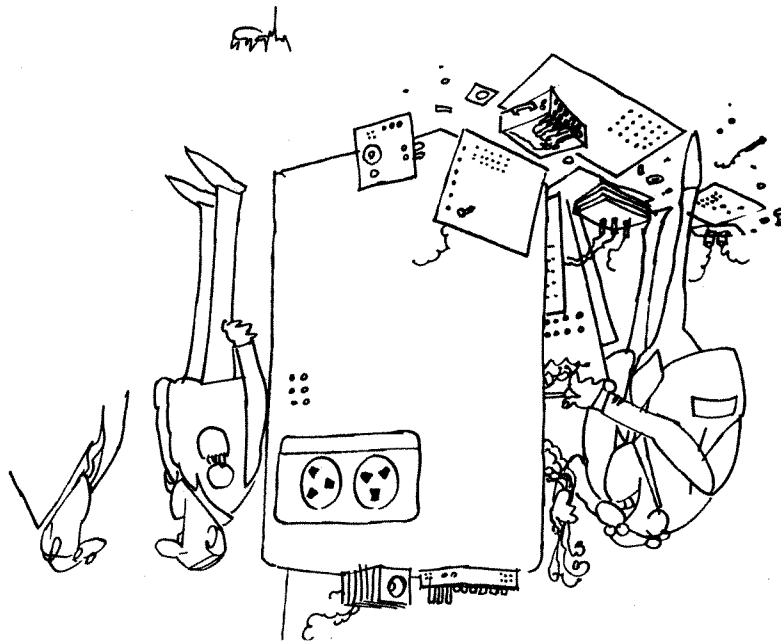
dreams, depression, nausea, slight abdominal pain, lethargy, slightly impaired right hand (with which I type), eye spasms for at least a week, less energy, and very short temper. Also, a feeling inside which I can't really describe but I call it a "burnt" feeling. And I think that using the TRS-80 might have also made me more adversely susceptible to the radiation from an ordinary television screen and the CRT.

Over the past two years I have dared use the TRS-80 only four times and I have gotten the same bad effects with both Level I - 4K and Level II - 16K. I don't use it anymore because the results on me are very bad and persist for a long time. (But the noticeable effects do go away eventually except for the wrinkles and perhaps there is some very slight permanent loss of mental abilities. Also, I have no way of knowing whether it will result in cancer in about twenty years.)

I do not know of anyone else who has had such a bad experience with it but I hope that you can believe this: I am not exaggerating. I don't know what kind of radiation it is. I have had the TRS-80 checked for radiation but nothing unusual was found. I suppose that there are some people who are much more susceptible to the radiation than other people.

But I don't know why.  
I hope that you can find and publish a way to avoid all these bad effects.

Steven Cohen  
Kim Buc, NJ



"He said he could fix it in half the time it was taking me, so I let him try..."

## MAINTENANCE TIPS

Dear Editor:

The article "A Simplified Guide to Hardware Maintenance" in the July issue (page 124) prompted me to pass along several maintenance tips I have found valuable over the years.

1) If your CRT screen contracts occasionally, try removing the plug from the yoke, rotating it two pins clockwise, and plugging it back in. If it refuses to fit, give it a sharp rap with a 9- or 10-pound sledge hammer.

2) Disk drive read and write errors can be corrected by rubbing the recording surface of the diskette with 120 - grit sandpaper. If this does not correct the problem, mount a large horseshoe magnet an inch or so from the drive head.

3) If your CRT enclosure seems to get moderately warm during normal operation and is not equipped with a cooling fan, simply spray the interior of the unit with a good dose of cold water. (The little brass sprayer for plants works just fine.)

4) If your power cord is getting frayed or has little cracks down near the plug, just run to the hardware store and get some of that black electricians' tape. Wrap five or six turns around the suspect area and it'll be good for a lifetime. (I don't forget to pull the plug out by the cord, and at a 90 degree angle!)

Tom Hudson  
Springfield, MO

## BAD RADIATION

Dear Editor:

I am consistently getting bad radiation from the Radio Shack TRS-80 microcomputer. "Creative Computing" printed letters about bad radiations in the September-October 1977 and the January-February 1978 issues but I do not know how to tell whether they are relevant.

My experience with the TRS-80 is that I get "sunburn" (especially on the right side of my face and body), wrinkles on my face which appear overnight and won't go away (I look older because of it), the healing of minor cuts, etc. is much slower and it leaves a scar, altered state of consciousness (for the worse) and altered perception (vision, way of seeing things), feeling stupid and very significantly lowered mental abilities which lasts for about two or three weeks, loss of potency for several days, strange

# Improvised Homebrewing

You don't need expensive or expensive tools to build an impressive microcomputer circuit. Your friends will be amazed when they see the remains of your house after you build this display. You can make free telephone calls too.

Are you aching to build your own system, but put off by all the jargon? Do you spend your nights dreaming of a concatenated bit-slice system with cycle-stealing DMA, only to awaken to the sad reality of a broken toaster that you're unable to fix? Has the myth that homebrewing is hard kept you away from a crack at your own Cray-1?

Not to worry. Microprocessors are smart. Adaptable. Flexible. They're able to function in less-than-optimum environments. You don't have to worry about having everything connected perfectly—just hook the micro in to a circuit and watch the lights flash. Improvised homebrewing is fun, inexpensive, and so simple that even a systems programmer could do it!

The first step is easy—just find a T.V. that isn't working. Attach a chip to the chassis with masking tape and start running wires to likely-looking spots. Make the connections with alligator clips so that you can change the circuit if it's not up to snuff. If you have a soldering iron, you'll want to solder a few of the chip's pins together—this helps the signal move around inside the micro, greatly improving the performance of your system. (Manufacturers always provide twice as many pins as are necessary, so as to impress buyers.)

There's only one critical step here. You must connect the Vss pin directly to line voltage. Otherwise, the micro won't have enough power to operate. While five volts is enough in an ordinary circuit, your baby needs a full house so it can dope out its configuration and go to work for you. Simple divination shows that it will run twenty-three times faster on 115 volts than on five.

You don't need expensive equipment for checkout. Just disable the T.V.'s power in-terlock so that you can get a closer view of the action. If your bird doesn't fly on power-up, then poke around with your fingers to find the dead spots. A little tingle means a- bout 10 volts. A strong rush means 50 or 60 volts. Try to avoid hitting anything over 100 volts. Just put a screwdriver between the spark is intensely blue and makes a loud, sharp sound, then the voltage is around 300. Since you don't need that much juice, turn the T.V. off, and run a line from the high voltage to ground, so as to soak up the excess energy.

You'll probably get some brilliant video displays, at least for a while. Configuring your system for number-crunching, though, will take some doing. Try wiring in flash-lights four at a time to provide a hex readout.

You can build an interface to a calculator, but this takes some skill—microprocessors are very jealous of each other, and each one likes to have its own circuit.

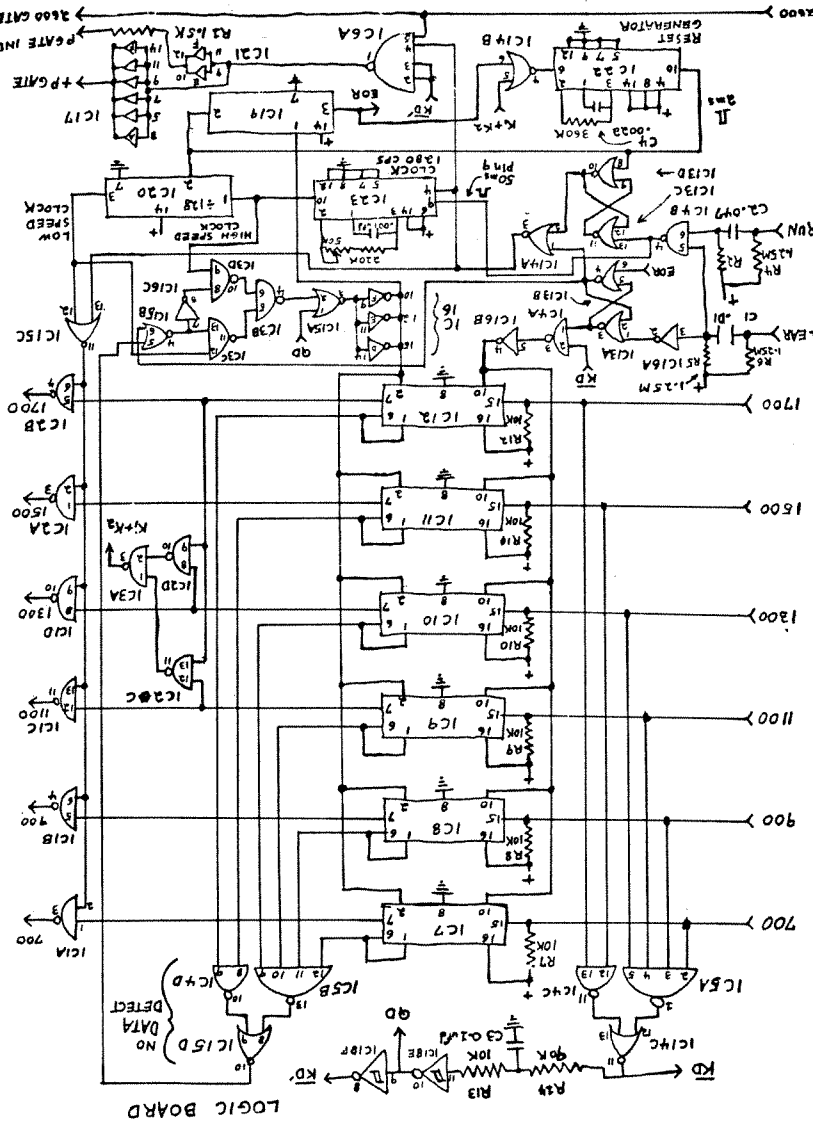
A modem? It's easy. The main thing to remember is that telephone circuits are grossly underpowered. They're starving for more watts. So, cut your telephone line and strip

the wires with a kitchen knife. Take your soldering iron and connect... Or say you want to make calls free to your computer—using friends on the other coast or in Hong Kong or Japan. Then you need a telephone "blue box". This is a somewhat more advanced project. The circuit diagram for the logic board is shown in Figure 1. Wire this up and wait for next month's issue.

Next month: the blue box tone generators and how to hook it all to your computer to make 4096 simultaneous long distance calls free.

(Note: this is for information only. Using a blue box is against the law and Ma Bell doesn't like them at all.)

Figure 1





Operation of the Etiquette

Example: We type in "Is that your nose or is that a banana?" Six minutes later the computer says, "My what a lovely neck-lace. Where is the taxi?" We tried the Protocol Computer with "Tell the Ambassador that we've declared war on his country." Two minutes later the Protocol computer said

I suppose it would be appropriate to say something about the quality of speech

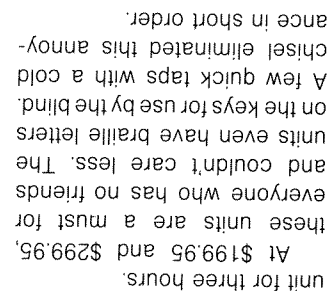
mainly in the programming in Rom and price, the Etiquette Challenger being an exorbitant \$199.95 while the Protocol Computer is a ridiculous \$299.95. They are both approximately the size of an unabridged dictionary and contain fifty proximity switches, a large speaker capable of 124dB and the twenty letter LED display unit. Both units require 14 "D" sized batteries which give the computers a weight of about 28 pounds. We were particularly impressed with the Etiquette Challenger's rechargeable plastic box, although the Protocol computer's hotline red is also impressive.

The instruction manual is a little on the skimpy side. It con-

The instruction manual is a little on the skimpy side. It con-

Once small hand held computers such as the Speak and Spell and the language translators had been taught to speak it was probably inevitable that it would occur to someone to teach one to actually improve on what the user was trying to say. Even if the language translators do speak rather broken Spanish, it shouldn't be too difficult to translate typical American English into the socially correct King's English. Yet that is exactly what the good folks at Godno Electronics have done. Not just once but twice with their two new products: The Etiquette Challenger and the Protocol Computer.

The two computers are essentially identical varying



puter every time all three players tried to dock their Starships while the virtual LISP interpreter was doing a garbage collect. (Did I forget to mention that the game is really written in TRAC Language which itself is simulated in LISP? Minor details.)

We were very pleased with the Turbo-charger when it arrived, complete with a page and a half of documentation explaining all its wondrous virtues and where to plug it in. It was installed in short order by one of our maintenance workers, see photograph 2 (Abbrev.:Photo). The installation took only an hour or so and a liberal application of Liquid Wrench helped speed the process. Unfortunately the rep (abbreviation for: representative) from our service agency showed up during the proceedings and did not take kindly to our little experiments. (It is well known that DEC has not officially been racing for years.) However, knowing beforehand that he would show up since this was the only time since the system was delivered that we did not want him around, we were prepared for his visit and diverted his attention with a PET which had a defective cassette interface. This gave us a chance to complete our installation. Later the service rep said that the PET was totally unable to read any cassettes and that this was an intentional design feature.



Photo 3: Taking the PDP-11 out for a spin. Go wild, son!

Once the installation was complete, we turned the 11 over to our resident bit-hacker who took it out for a spin and pronounced the result safe enough for regular use (see photo 3). Indeed, one experiences a real rush when sitting at the console of this high-powered system. The highly disconcerting problem with the Star Trek game has altogether vanished, we are pleased to report. Our next project will be to implement a PL/I compiler written in FORTRAN simulated in TRAC and of course all this done in LISP, and then to write an editorial dissertation on how we use all this computer power to do absolute cursor addressing on the Hazeltine terminal. Fascinating.

## FOR TRS-80 WHAT CAN BE CRAZIER THAN SELLING PASCAL COMPILER FOR \$15 and \$23?

'Tiny' Pascal, runs on any 16K Level II system, includes the programming structuring capabilities of full Pascal, but not data structuring.

Compiled People's Pascal programs run about five-times faster than Level II Basic—graphics run eight-times faster. Tape 3 compiler written in Basic, requires T-Bug and Edit-Assembler, compiles Z-80 code. Tape 6 runs in machine language, compiles faster, interprets P-codes.

People's Pascal tape 3, compiles machine code \$15.00  
People's Pascal tape 6, ..... \$23.00  
Tape 1 Lev. II, 34 business, educational programs \$7.50  
(lev. I version avail., 24 programs—separate tape)  
Tape 2 Lev. II, 77 programs from Osborne book.

"Some Common Basic Programs \$7.50  
Tape 4 Lev. I, 21 misc business and educational programs \$7.50  
Tape 5 Lev. II, 24 business, educational programs \$7.50  
Tape 7 Lev. II, 31 misc. business and educational programs \$7.50

Add \$.50 each tape for postage and handling  
California residents add 6 pct. tax. Dealer inquiries invited.

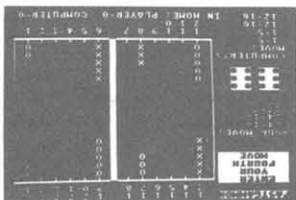
### COMPUTER INFORMATION EXCHANGE

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## SOFTWARE FOR THE ATARI® 400/800

All programs on cassette. Only 8K RAM required.



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**ASSEMBLER** by Gary J. Shannon. Create your own 6502 machine language programs with this easy-to-use editor/ assembler for the ATARI400 and 800. Includes several useful pseudo-ops. Interfaces with a printer. The editor allows for easy insert/delete, plus the capability to view and modify memory. \$24.95

**6502 DISASSEMBLER** by Bob Pierce. This neat 8K BASIC program allows you to disassemble machine code and print out the disassembled listings. If you have more than 8K of memory, programs in RAM can be disassembled. ROM can be disassembled on any size Atari. \$11.95

Available soon: **PROGRAMMER'S HANDBOOK FOR THE ATARI 400/800**. Written by Quality Software, this book is a goldmine of clever tricks and hidden facts concerning the software built into the Atari personal computer. \$14.95

## QUALITY SOFTWARE



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Telephone 24 hours, seven days a week. (213) 344-6599

**WHERE TO GET IT:** Ask your nearest Atari dealer to see Quality Software's Atari programs. Or, if you prefer, you may order directly from us. MasterCard charge and Visa cardholders may telephone their orders and we will deduct \$1 from orders over \$19 to compensate for phone charges. Or mail your order to the address above. California residents add 6% sales tax. Shipping Charges: Within North America orders must include \$1.50 for first class shipping and handling. Outside North America the charge for airmail shipping and handling is \$5.00 — payable in U.S. currency.

ATARI, ATARI400, and ATARI800 have been trademarked by Atari Personal Computer Systems, a Warner Communications Company.

CIRCLE 183 ON READER SERVICE CARD

# You Can Tune Up Your PDP-11

Even real computers can benefit from a tuneup and bolt-on mail-order accessories. Here's how to do it.

When we first got our own 128K PDP-

11/34 with twin 80 megabyte CDC hard disks and three Hazeltine 1500 terminals, we thought we had something really special on our hands. "Humph!" we exclaimed. "Microcomputers are just toys! That's why we can't get more than two of our thirty sys-

tems to work at the same time. But this is a real computer. It cost \$76,000, more than any of us make even in a whole year! It won't let us down." Once that illusion was surgically removed courtesy of Control Data Corporation, we were able to view the 11 as just so many Poly-Paks bargain barrel drop-

outs though it can support a mean game of multiplayer Star Trek written in virtual LISP. This brings us to the crisis at hand. We noticed that when all three players were try-

ing to dock their ships at Starbase while the LISP interpreter was doing a virtual memory garbage collect, there was a perceptible time delay of 0.2 seconds (worst case). This was extremely disturbing (as you can well imagine) and required immediate action if not

sooner. The first step was to correct a warped memory circuit board. This is best done with a large crowbar. The standard procedure is: Carefully place the crowbar under the printed circuit card and apply pressure. Do not be afraid to use force if need be. Once the circuit board has been straightened out the electrons may flow in straight lines which

are much shorter than the curved variety. In fact it is well known the light travels faster in straight lines than in curved ones too. This did not help the problem much so the next step was to flush out the clogged circuits in the CPU. (See photograph 1. Abbrev.: Photo.) As computer circuits operate, excess electrons sometimes accumulate in out-of-the-way places especially inside integrated circuits. These bad electrons can actually

slow down your circuits and make them weak and unreliable. The best thing to do is to get an electron extractor (Radio Shack part number 234-23652, it will be out of stock by the time you get to the store) and plunge them loose. Intensive research is being done at the University of Michigan (Flint) to figure out why and where the electrons get jam-

med up. One theory holds that it is somehow related to infrequently executed instructions which cause the flow of electrons to stagnate. Unfortunately, this technique did not help the problem appreciably and it finally struck home that the factory stock PDP-11/34 simply does not have the muscle to run our sophisticated multiplayer Star Trek

written in virtual LISP. Something more was needed.

We had read in some of the less respectable computer magazines that you can add a bolt-on turbocharger to your computer and expect an increase of up to 100 b.p.s. Financial reserves being somewhat depleted by a recent embezzlement scandal, we were able to borrow the cash from a fellow employee

who explained that she had recently won the Irish Sweepstakes. It's good to know that there's at least *someone* you can trust and depend on when you want a PDP-11/34 Turbocharger add-on very badly. So we sent away for the unit (made by a reputable firm called Earth Power Systems, they advise heavily so you know they're for real) and waited, meanwhile cursing at the com-

puter while it sat in the corner of the room. Photo 2: Installing the Turbocharger.

Photo 1: Flushing out clogged circuits.

Photo 2: Installing the Turbocharger.

Photo 3: Flushing out clogged circuits.

Photo 4: Flushing out clogged circuits.

Photo 5: Flushing out clogged circuits.

# Maybe TIS-80 Should be Your Next Hardware Investment!

Designed for business. Television Igloo's design concept for the TIS-80 was to build a computer that could be used in the home — not a "home computer." There's a big difference. The TIS-80 is perfect for those jobs that interrupt the data processing schedule of large business computers, like keeping track of office betting pools, gossip update reports, and expense account padding calculations. Compare this machine with the highly overrated IBM 5110 and

you'll see why we have the competition quaking in its boots.

**Software** for the TIS-80 includes accounts payable, accounts receivable, general ledger, stock market analysis, inventory, payroll, corporate financial planning, mailing lists, statistics, advanced multi-user database manager, online insurance records system, and Chase-Manhattan Banking System. (All available third quarter 1980. We Promise.)

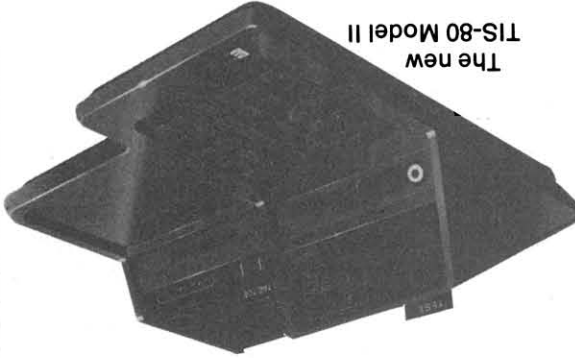
**Want to change our software** to fit your way of doing things? Forget it! It would take an expert programmer 200 hours at \$50/hr. to do it. It's cheaper just to change your system to fit ours. That's what computers and technology are all about.

**Expansion** beyond the basic unit requires the expansion interface, buffered expansion cable, buffered expansion cable buffered interface cable, and two nine-volt batteries (not incl.)

**The new TIS-80 Model II** (see inset) is an entirely new concept in computing. It features an advanced hexadecimal keyboard, augmented key-board, and sophisticated graphics for tic-tac-toe and biorhythms. It's all business.

## Mainframe

## Owners . . .



The new  
TIS-80 Model II

### TIS-80 Features

- 23K or 39K RAM
- External printer
- 17 connecting cables
- 13X22 character CRT
- 5 Paddle controllers
- Separate keyboard
- Vectorized 4H2 throughput

# Television Igloo

The biggest little name in little big computers™

APRIL 1, 1980



# REMARKS

Wine Yellow

Basic Dooms Other  
Computer Languages

Nowadays, BASIC is so popular that it threatens to make every other computer language obsolete... or irrelevant! I can hear the screams and the gnashing of teeth in the entire DP industry already... but they'll just have to wake up to the fact that it's the micro end of computing that's in the forefront. They'll have to convert all those old FORTRAN, COBOL, APL, LISP, PL/I, PASCAL, assembler, and everything else programs to good old Microsoft BASIC. This is really a fantastic opportunity for some hobbyists who know what they're doing.

A few of the winning liberal progressives in the field may claim that BASIC is about 15 years old and that it is practically ancient but to those people I say: So what. Progress is never easy. In fact, one day BASIC may even make English obsolete. So, my message to all these backward-people trying to stifle my creativity by denying that BASIC is the only good computer languages is: 850 IF K=U(1) THEN GOSUB 4020 ELSE K=FND(Q(I,J))\*SIN(X)

## IBM Personal Computer

I predict that IBM will be very disappointed in sales of its new liquid helium cooled "P-Series" personal computers (see the new product announcement elsewhere in this magazine)... I've always maintained that an 8-bit micro (such as my own 4K Level 1 TRS-80) is more than capable of handling anything I've ever thought of. All that extra stuff, like femtosecond cycle times, megabytes of memory, and new-fangled computer languages, are just cheap gimmicks. I ask, can it run Level II BASIC business software? But IBM sales people just give me blank stares... who knows, they could be computers themselves.

Other Magazines Awful

Recently I had a chance to read all the other personal computing magazines... It will come as no surprise to readers of DKBCPPRMCDIWJ that, objectively speaking, there's no other personal computing magazine worth reading. For example, I notice that *Byte* is written only for Ph. Ds. I can't imagine an ordinary person like myself understanding all that hard stuff. Besides, according to a recent survey 89% of *Byte*'s readers have a Bachelor's degree or better... I just can't understand why advertisers want to waste all their good money on such rich educated snobs! The average DKBCPPRMCDIWJ reader has a 9th grade education and probably buys a whole lot more computer stuff in a year than one of those high class *Byte* readers. To give you a short course in advertising, you can *always* tell the best place to advertise by where the mail order ads are. Ignore all those fancy dancy statistics like cost per thousand and all that stuff; it's just a big snow job. I'm even trying to convince some advertisers to run mail order ads for cake mixes and dog food. Watch these pages.

Next we come to *Interface Age*. As I'm sure you're all aware, *Interface Age* is strictly for small OEMs... an abbreviation I picked up somewhere for "Optional Equipment Manufacturers." This is a technical term, you don't have to remember it. Just remember, *Interface Age* is strictly for small business applications. Admittedly, I'll admit this is a much larger and more lucrative field than hobby computing, but, heck... I'm not in this for the money! So don't buy *Interface Age* or advertise there. I'm just trying to help you.

Everytime I read *Creative Computing*, it reminds me that I don't like science fiction. And the worst thing about *Creative Computing* is that all their readers are high school students! All of them! If you look at the statistics I know they'll seem different but that just goes to show you what a snow job numbers can be. I never trust them myself. Besides, I can never get those programs in that magazine to work on my 4K Level 1 TRS-80. I think they put errors in those programs on purpose...

Make Millions with Instant  
Confusion Software

Almost everyone has a few game programs lying around that could easily be parlayed into an immense fortune. Let's say, for instance, that you typed in the TicTacToe game from that BASIC Computer Games book... Now, if Instant Confusion Software was able to sell that program in 20,000 Radio Shack stores and in 2,000 retail computer stores, and sold just a paltry 500 in each store, that would be 11,000,000 cassettes sold! At \$20 each and a 20% royalty you could be \$44,000,000 richer... not bad for just TicTacToe.

Naturally, if you sell the program to one of our many inferior competitors, they will probably only sell a few hundred thousand at the most. You'll just be hurting yourself. So send in those programs! If I could get that TicTacToe game to work, don't think I'd hesitate for a second...

## Help Protect Instant Confusion Software

At Instant Confusion Software, we are very aware of the privacy of personal computer software that goes on... both at the retail and the individual level. We have an idea to stop it. Go out and buy a handgun. Next time you're at a computer club meeting or at a computer store, be sure to admire an Instant Confusion Software program, and presssure the owner for a free copy. If he gives you one (always wait until he gives it to you)... pull out the gun and shoot him on the spot... this is a sure fire way of cutting down on software piracy and it is the thing that made America great.

I know, at first this is going to be hard for some of you to do. No one likes to shoot people. But next time a "friend" asks you for a copy of that Instant Confusion Software program, you have to make a very important decision. Is he really my friend or am I making a bigger mistake than I think?

Microcomputer Organization  
for Trade and Retailers

The newly formed Microcomputer Organization for Trade and Retailers (MORTAR) may be firing some direct hits at some of our big problem areas. One thing that really concerns me is the Yellow Peril of foreign-made microcomputers. My suggestion is that we fight OPEC by jacking up the prices of microcomputers sold overseas higher and higher and higher. Then we take the excess profits and make computers over here dirt cheap. Not only do we save America and keep it great but we also take care of those daps and Chinks and other undesirables.

## Reader Liability

One of your weighty and inescapable responsibilities as a reader of DKBCPPRMCDIWJ is to aid and abet our ambitious drive to get more advertisers and making this a bigger and better magazine thus increasing our circulation and advertising even more! You can help by "encouraging" your friends to subscribe when they've had too much to drink at parties or even take names out of the phone book and fill in a few subscription blanks. They won't be sorry later. You can help even more by tearing out the reader service card in the back of the magazine and sending it in. Advertisers put a lot of stock in these reader responses to their ads so do it now! (All the numbers have been pre-circled for your convenience.) Failure to take your reader liability seriously may result in legal action and possible unfortunate unintentional harm to your close relatives.

Pictured below is what happens to readers who do not take their responsibilities seriously.



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32 Puzzles & Problems.....Nilrem  
34 Adventure in FORTRAN.....Crowthers & Woods  
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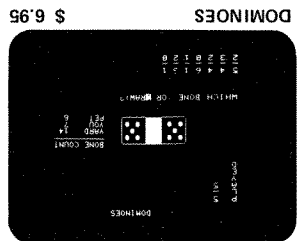
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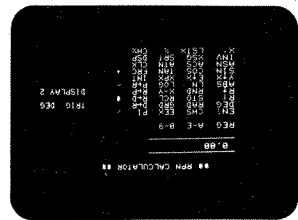
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# Software for the PET

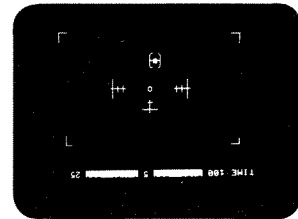
## PROGRAMMA Software Program Products



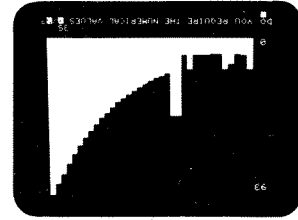
DOMINOES \$ 6.95



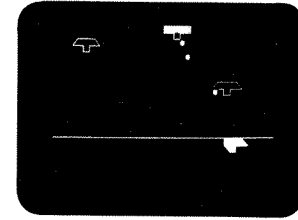
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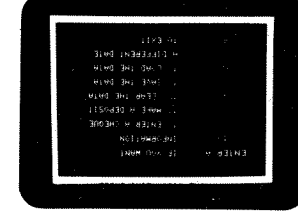
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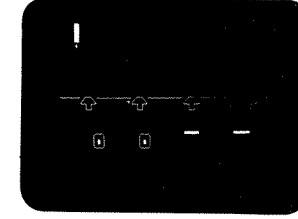
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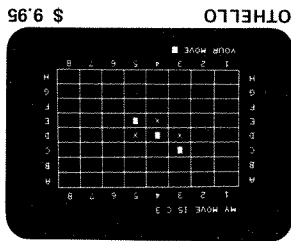
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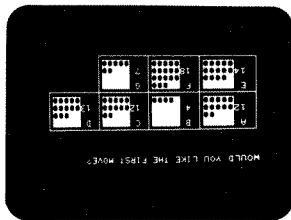
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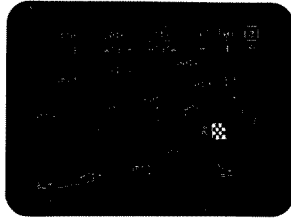
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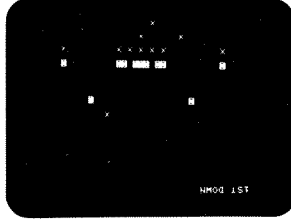
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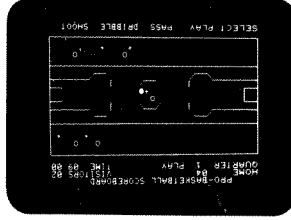
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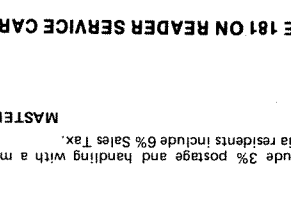
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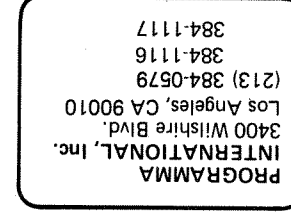
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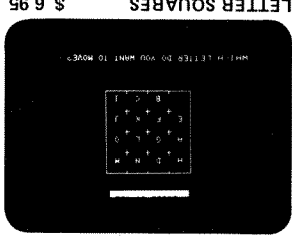
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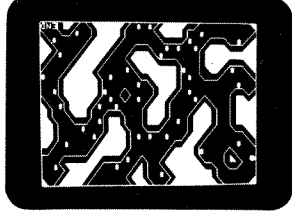
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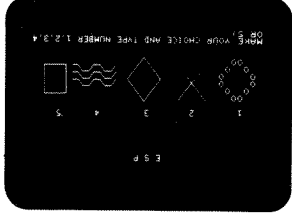
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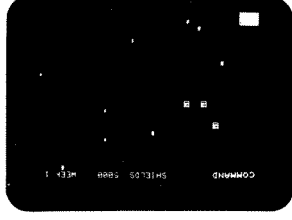
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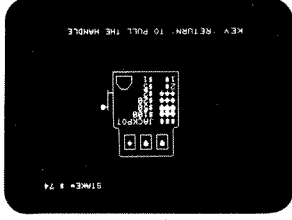
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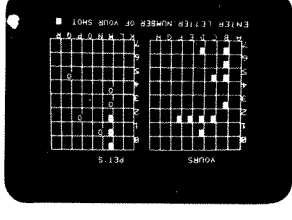
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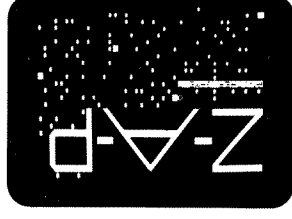
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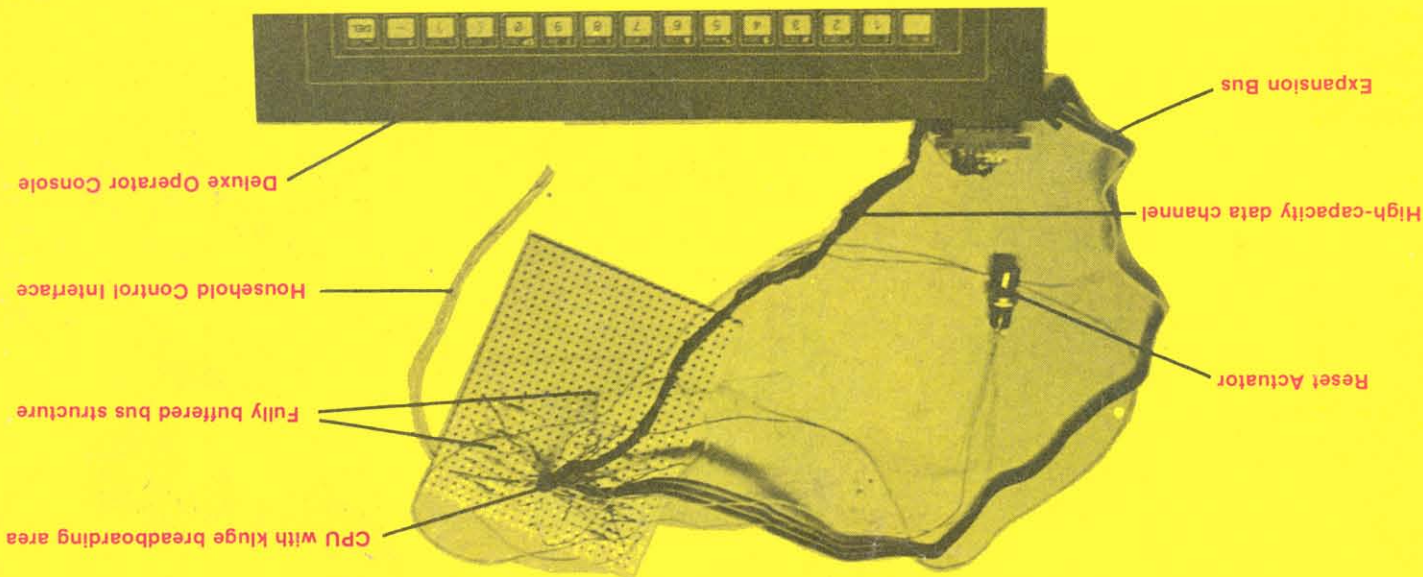
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# The single chip computer with the features that help you escape from life



## INCOMPLETE COMPUTER

In this advanced chip you get an amateur quality computer that meets few if any of the needs of the serious user. It's totally incomplete. You'll spend literally months getting it to accept a single data bit. All you need to make it run is unlimited time and money.

Besides all these features the Cromagnon single chip computer gives you impossible expandability if you ever need it. We've made it impossible because we can't imagine that you'll ever need more capability than what's already built in. That includes a deluxe operator console with no raised surfaces. It's even dishwasher safe. A reset actuator stops the operation of the computer, even mid cycle, and resets everything to a random value. However, if you can find mill spec high heat components (over production from the Mercury and Sun space shots perhaps) you can wire them onto the breadboarding area adjacent to the CPU. You'll want these components close to the CPU to minimize electron travel but not too close lest they disintegrate from the extraordinarily high temperature of the CPU.

## IMPOSSIBLE EXPANDABILITY

Another inconvenience that makes the Model XPM (for 'experimental') computer so difficult to use is our 4K PL/I compiler. This features a subset of ANSI subset PL/I including the powerful 'BEGIN' and 'END' statements. With this included software you're ready to go. In addition the monitor gives you one more command (NOP). This software, without extensive modification will not access any I/O ports, the operator's console, or the memory. Finally, to simplify things to the ultimate, there is no memory, nor is there any way of adding any. In addition, there is no way to power up the unit, so you'll never have to worry about heat, fires, lost data, frustration and all the other things that go hand-in-hand with computers of any size or shape.

## HARD TO USE

If you feel that watching a computer do nothing is not your cup of tea, we suggest a cat. Cats are fun, they keep your feet warm on cold winter nights and they have kittens. Our optional animal cage will help you capture stray cats to bring home. So act today. Get this unbelievable computer and a cat in your home right away.

## OPTIONAL CAGES

**Cromagnon**  
Specialists  
280 Fido Ave., Pitt View, California  
(415) 626-3987

Cat Cage



Other features include a 3-bit high capacity bi-directional data channel between the CPU and operator's console, an 8-inch household control interface and fully-buffered on-board bus. Add that to vectored inputs.

buy a car. lesson to remember the next time you separates computers from toys, a good seem like baby toys. Sheer speed is what computers like Cray-1's and TRS-80's Vee turbocarger option, it makes other And when equipped with the Formula moving at the rated 4 gigahertz speed. that are generated when electrons are from the astronomical temperatures CDC. The 690 holes provide cooling any other manufacturer, even Cray or low-speed peripherals available from nor is it compatible with any standard detected with normal test instruments, operation is so fast that its speed can't be the (holes) is super. Fast 4 gigahertz The computer itself (the thing with



# The home computer you thought was years away is here.



**C8P DF \$2,597**

Ohio Scientific's top of the line personal computer, the C8P DF. This system incorporates the most advanced technology now available in standard configurations and add-on options. The C8P DF has full capabilities as a personal computer, a small business computer, a home monitoring security system and an advanced process controller.

## Personal Computer Features

The C8P DF features ultra-fast program execution. The standard model is twice as fast as other personal computers such as the Apple II and PET. The computer system is available with a GT option which nearly doubles the speed again, making it comparable to high end mini-computer systems. High speed execution makes elaborate video animation possible as well as other I/O functions which until now, have not been possible. The C8P DF features Ohio Scientific's 32 x 64 character display with graphics and gaming elements for an effective resolution of 256 x 512 points and up to 16 colors. Other features for personal use include a programmable tone generator from 200 to 20KHz and an 8 bit companding digital to analog converter for music and voice output, 2-8 axis joystick interfaces, and 2-10 key pad interfaces. Hundreds of personal applications, games and educational software packages are currently available for use with the C8P DF.

## Business Applications

The C8P DF utilizes full size 8" floppy disks and is compatible with Ohio Scientific's advanced small business operating system, OS-65L and two types of information management systems, OS-MDS and OS-DMS.

The computer system comes standard with a high-speed printer interface and a modem interface. It features a full 53-key ASCII keyboard as well as 2048 character display with upper and lower case for business and word processing applications.

## Home Control

The C8P DF has the most advanced home monitoring and control capabilities ever offered in a computer system. It incorporates a real time clock and a unique BACKGROUND/BACKGROUND operating system which allows the computer to function with normal BASIC programs at the same time it is monitoring external devices. The C8P DF comes standard with an AC remote control interface which allows it to control a wide range of AC appliances and lights remotely without wiring and an interface for home security systems which monitors fire, intrusion, car theft, water levels and freezer temperature, all without messy wiring. In addition, the C8P DF can accept Ohio Scientific's Votrax voice I/O board and/or face (UTL). The telephone interface connects the computer to any touch-tone or rotary dial telephone line. The computer system is able to answer calls, initiate calls and communicate via touch-tone signals, voice output or 300 baud modem signals. It can accept and decode touch-tone signals, 300 baud modem signals and record incoming voice messages. These features collectively give the C8P DF capabilities to monitor and control home functions with almost human-like capabilities.

## Process Controller

The C8P DF incorporates a real time clock, BACKGROUND/BACKGROUND operation and 16 parallel I/O lines. Additionally a universal

**C8P \$895**

Or get started with a C8P with cassette interface, 8K BASIC-in-ROM which includes most of the features of the C8P DF except the real time clock, 16 parallel I/O lines, home security interface and accessory BUS. It comes with 8K static RAM and Ohio Scientific's ultra-fast 8K BASIC-in-ROM. It can be expanded to a C8P DF later. Base price \$895. Virtually all the programs available on disk are also available for the C8P cassette system on audio cassette.

Computers come with keyboards and floppies where specified. Other equipment shown is optional.

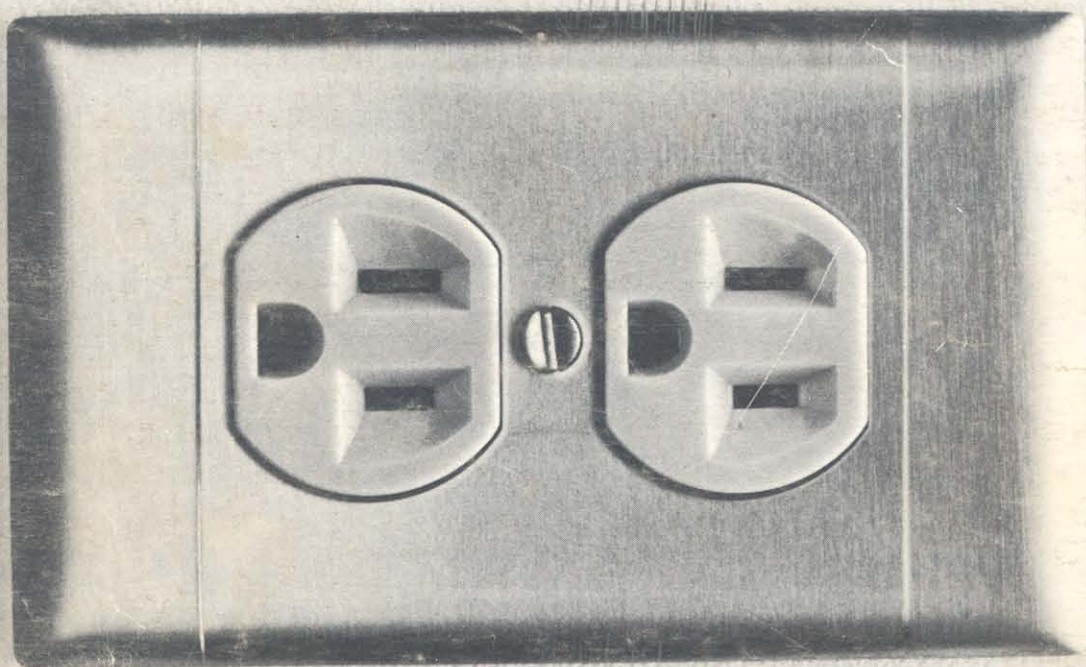
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This magazine plugs you in to the  
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# Dr. KilobYTE's creative Popular Personal Recreational MICROCOMPUTER DATA INTERFACE WORLD Journal