

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

Reading, Language
and Computers:
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•Readability
•Comprehension
•Sentence Construction
•Adventure in French
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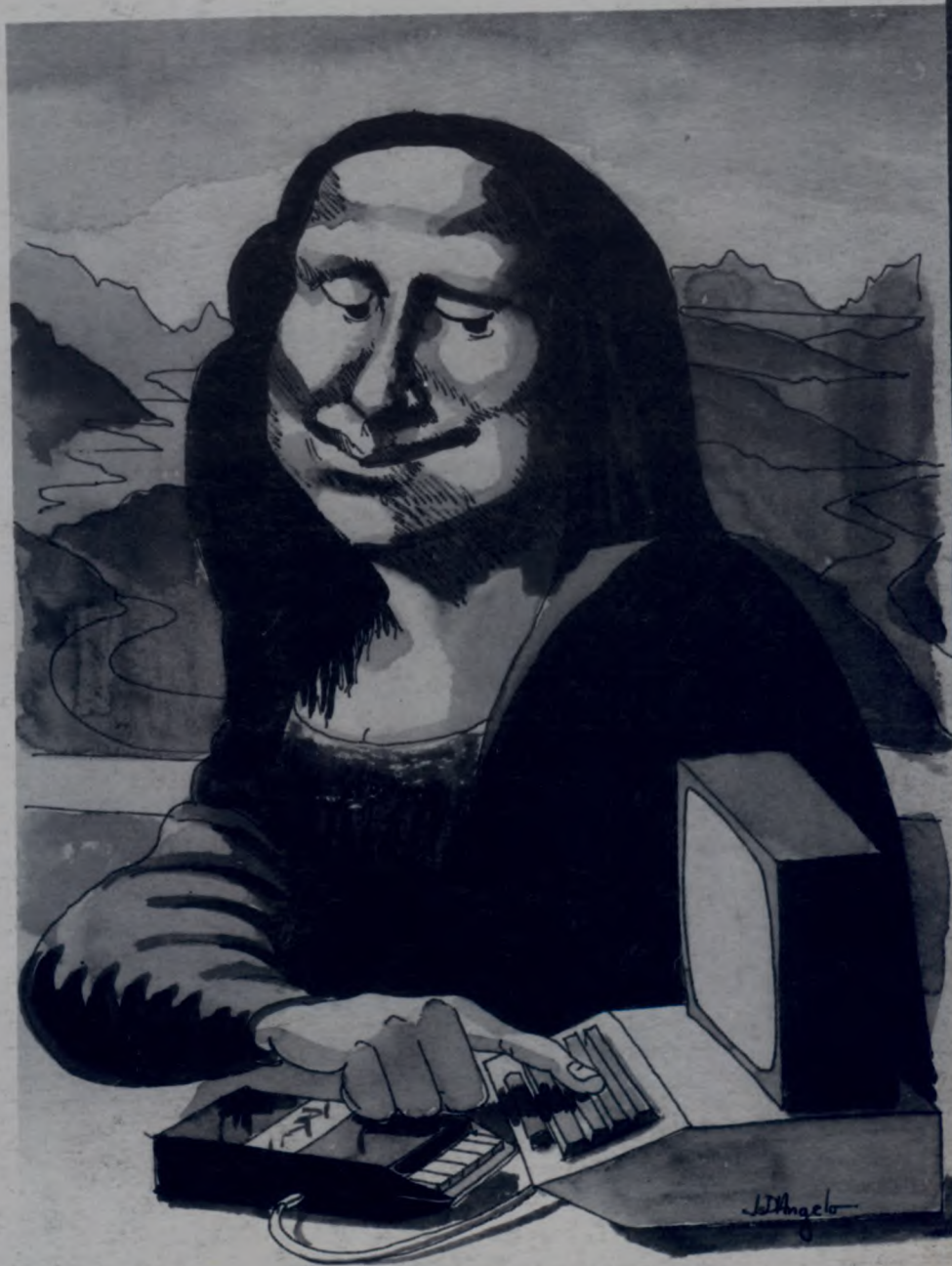
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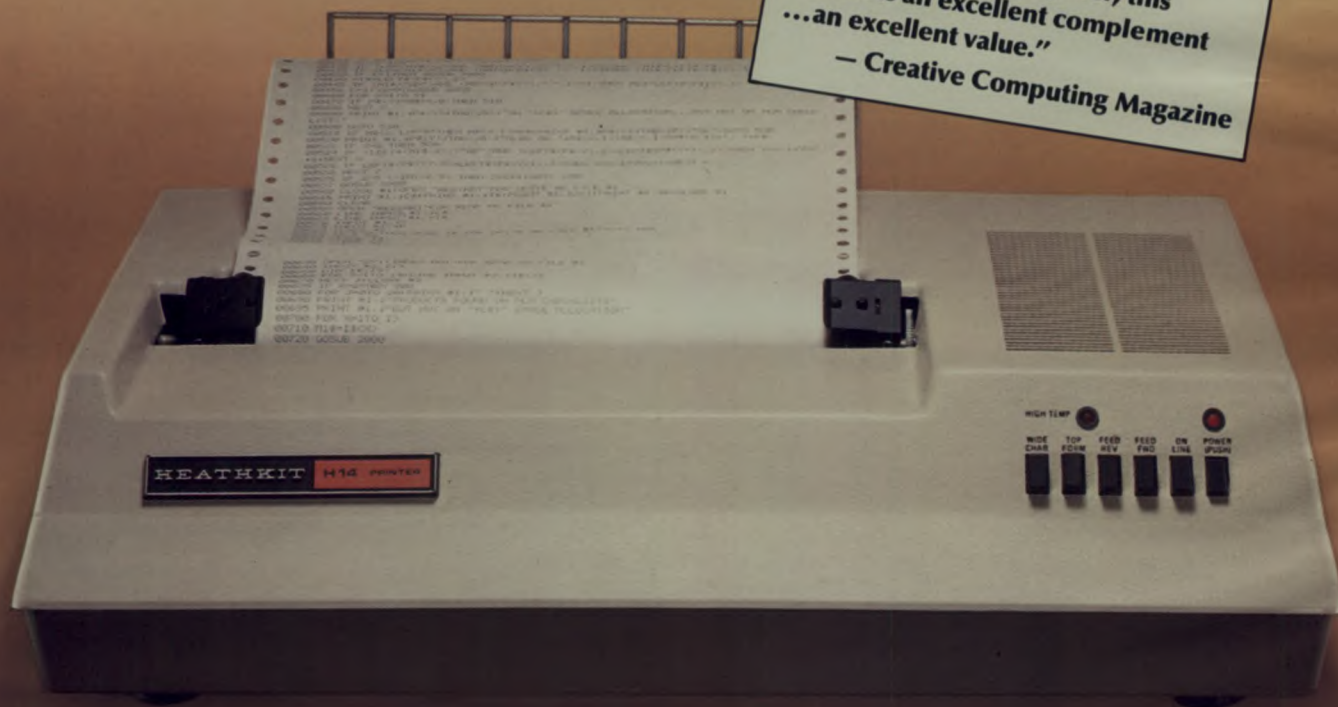
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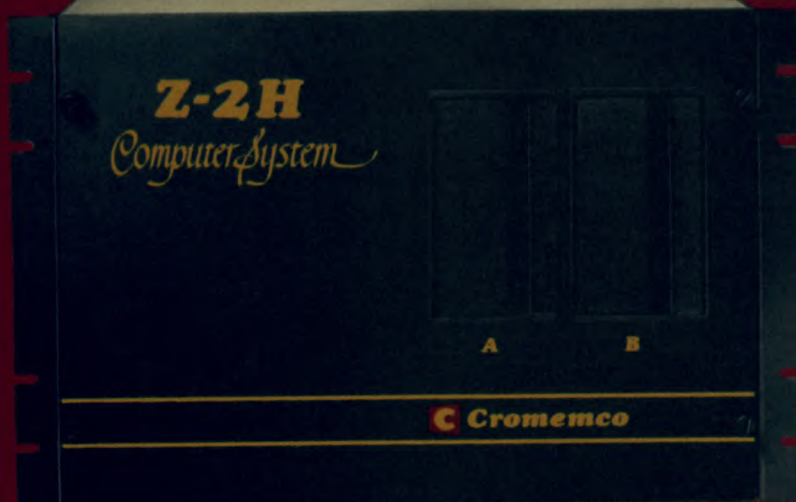
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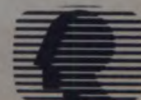
Checker King



Gammon Gambler



PERSONAL SOFTWARE



STRATEGY GAMES SERIES

CIRCLE 178 ON READER SERVICE CARD

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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 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 or 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.

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:

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

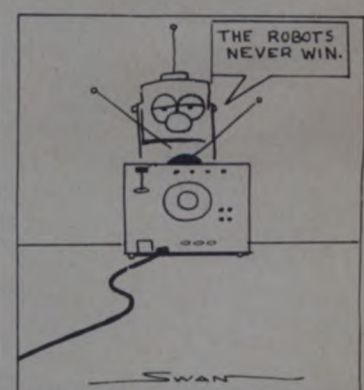
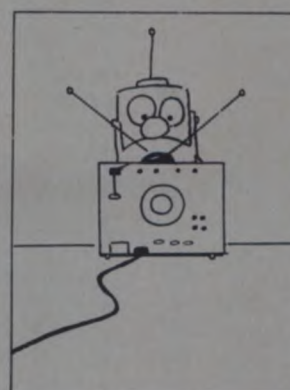
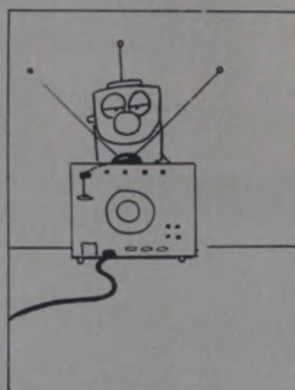
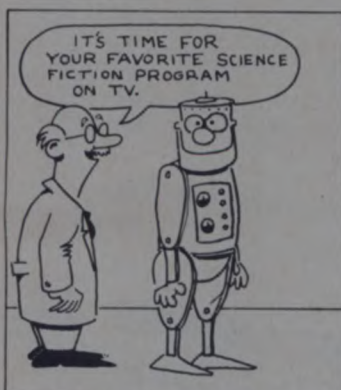
S-100 Microsystems is a new publication directed at users of S-100 microcomputer systems. It will be a forum on S-100 topics such as interfacing, CP/M, Pascal, Assembler, Fortran and Basic software.

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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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, unrebutted, 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

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More on MicroComposer

Dear Editor:

Referring to the *Micro Composer* review (Feb. '80), I cannot agree with the writer's claim that 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, Inc. In my opinion, it 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 equipped 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 (and increasingly available yet), the *Micro Music* board could produce more than 8 musical notes, reasonably accurate musical instrument simulations, or even speech.

Another feature is the ability to create original base notes with the system. The user can specify the harmonic makeup of each note or optimally use the prebuilt 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 notes remains at four.

Hal Chazaloff
Vice Pres. of Engineering
Micro Technology Unlimited
P.O. Box 4390
Manchester, NH 03108

When to Castle

Dear Editor:

Concerning the February, 1980 *Input/Output Chess* column by Stephen Klemm:

Michael Klemm is the recipient of some rather input from Homer 1400 when commenting the legitimacy of casting through check.

According to the Official Rules of Chess (19th Chess Federation, Article 6.1):

"Casting is prevented for the time being.
Is it 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. Pashke
(Homer 1000)
8 Blackhawk Drive
Glenview, N.Y. 11542

"Turning Over" The Clock

Dear Editor:

I enjoyed your October, 1979 issue, and the article "Turning Over The Clock" pp. 110-112. 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 23:59:59 to 00:00:00, (or from 23:59:59 to 00:00:00 in 24-hour format) the computer finds a "file-not" error and execution stops.

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

```
2000 GOTO 1000
2005 IF Z=24 THEN H=0:M=0:S=0:GOTO 100
2010 IF Z=12 THEN H=1:M=0:S=0:GOTO 100
```

Now, when the time comes for "turn over," TMS-80 will issue for just a split second, then resume clockkeeping properly.

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

Michael Sullivan
Box 90
DeKalb, IL
60112

Sorcerer As a Terminal

Dear Editor:

The Sorcerer's serial data cable (Entry part number 11P400) is not enough to connect an acoustic coupler to the Sorcerer computer. It has an RS (request to send) line which is essential to the communication between a terminal and a host computer.

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

Also, the Sorcerer's 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 84, 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
6-2-1-3400 Oji Kita-ku,
Tokyo, Japan 114

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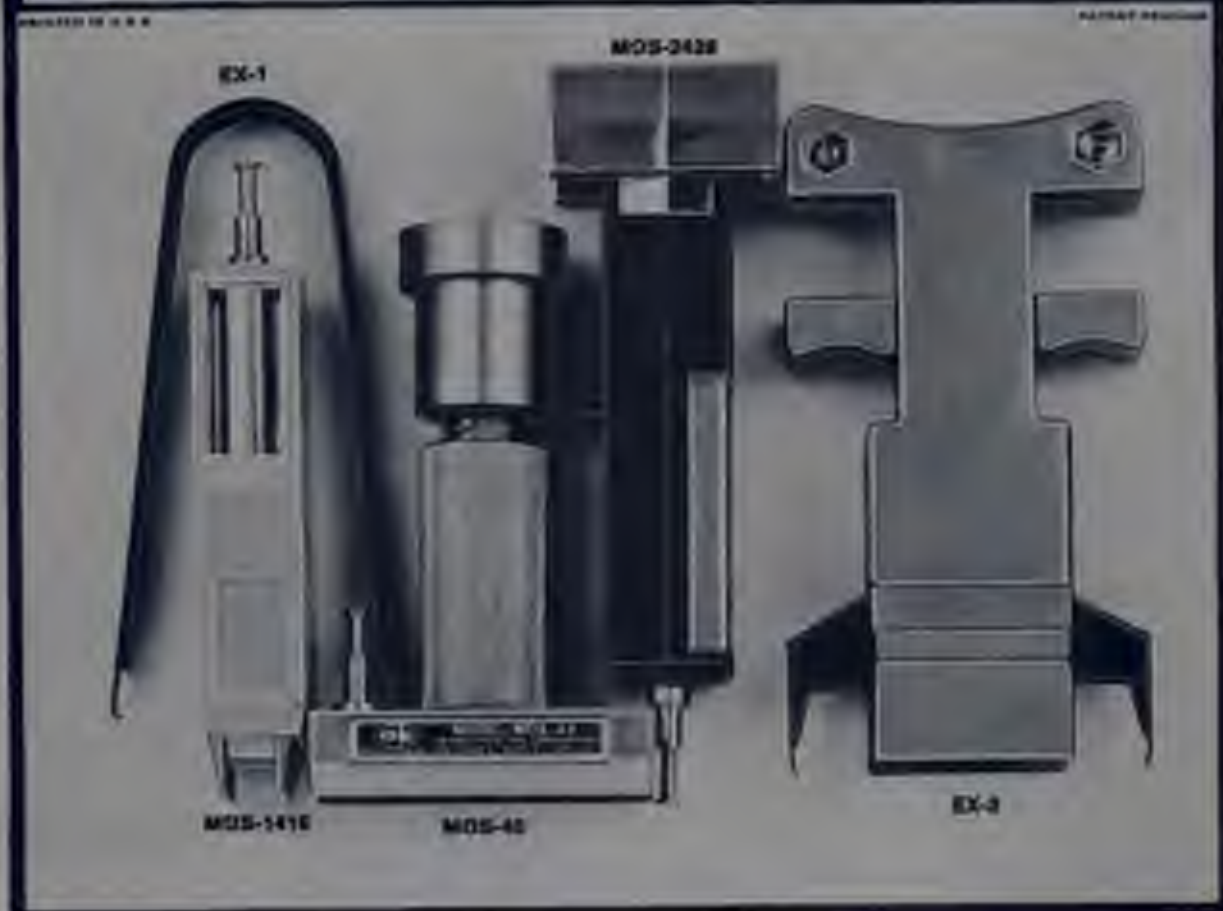
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Random Ramblings

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 Hall, CEO President of Heuristics, is shown using 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 the 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 2000 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, Voiceplus, which displays an instantaneous graph of speech patterns (2 frequency bands and amplitude). The program is available for the Apple, TRS-80 and North Star and could be very useful in helping 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 dual version of the H-2000 Speechlink board.

Many of Heuristics' 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 1500 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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Ramblings, con't...



The Corvus 10 megabyte hard disk system showing itself to be photographed next to the roadway "young" micro-copy 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 Speechbits have a suggested retail of \$299 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.

Newflash! 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 Fuller and Gene Nardi started Parasitic Engineering way back



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



The Shuffleboard which makes it all possible. Plug 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 lower 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 minidrives, 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 \$595, which includes a Siemens FD 160-6 drive, power supply, cabinet and interface board. Additional drives are \$245 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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☐ D. Other _____

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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:

```

M1: I'M ELIZA, WHAT'S YOUR PROBLEM?
P: YOU
M1: WELCOME. REPHRASE YOUR PROBLEM. NOT ME.
P: BUT YOU ARE THE PROBLEM
M1: I AM THE PROBLEM
P: SO I MISPLACED A WORD
M1: NO YOU HAVE A PSYCHOLOGICAL PROBLEM?
P: NO YOU
M1: YOU'RE NOT REALLY TALKING ABOUT ME, ARE YOU?
P: ONLY REPEATING YOUR WORDS
M1: ARE YOU CONCERNED ABOUT MY BACK?
P: REPEATING I'M AFRAID TO COME FROM THE
M1: DID YOU COME TO ME BECAUSE YOU ARE AFRAID TO
COME FROM ME?
P: YES SPEAK WITH ME
M1: REPHRASE YOUR PROBLEM. NOT ME.
P: AM I REPEATING THE BEST OF YOU?
M1: NO
P: WHAT IS THAT SUPPOSED TO MEAN?
M1: BE VERY ASHAMED
P: 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 phrases are treated no differently from one's own thoughts and do not require quotation 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 preceeded 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 "decrutched" 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 Buffer 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 "7," 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. Trowitt 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 computer 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, just so in the WH-89. Only 5K 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 definitely 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 WH-89 is a totally integrated microcomputer system contained in a compact, desk-top terminal that supplies all of the operating 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.

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 16K 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 signal 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-



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 5 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 A=12345678
20 PRINT A2
30 PRINT A2345678

PET RESULTS      12
                  12

ATARI RESULTS 4
                  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 A2=10
20 A2=20
30 PRINT A1,A2

PET RESULTS      10 20
                  (the 2 denotes a space)

ATARI RESULTS 10 20
                  (the 2 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 variable name)
```

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 Aa=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
20 ERROR-- POINTS=12
```

It accepted SCORE as a variable and printed its value of 20 first. 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 $=4
20 NOT=2
30 PRINT NOT
```

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 those 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)=123 and gave an OUT OF MEMORY error (I did a PRINT FRE(0) and had 31705 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 B(3,3), B(4)
15 DIM B(4) : X=0 (This line needed for the Atari only)
20 PRINT B(3,3), B(4), C, D
30 B(3,3)=0 : B(4)=0 : 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:

0 0 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#2:4:5:" "
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 B : IF B=** 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 I=1 TO 999 : NEXT I
```

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 I 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: 1.12E+01;2.1E+01
(That 1 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 B=123456789
20 B=1234567899
30 C=123456789123456789
40 PRINT B
50 PRINT B
60 PRINT C
```

```
PET RESULTS: 1.23456789E+02
1.23456789E+09
1.23456789E+17
```

```
ATARI RESULTS: 123456789
1234567899
1234567890E+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 I=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 YOUR IF MEMORY ERROR IN 11

HPRT RESULTS: 1 11

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
400 PRINT "HERE AT LINE 400"

```

PET RESULTS "GOTO'S STATEMENT ERROR IN 20

HPRT RESULTS HERE AT LINE 200
HERE AT LINE 400

Slight modifications will allow 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,

300 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 wrapping 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"
30 POKE 40,5:REM SET LEFT MARGIN TO 5
35 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: NAME OPEN L:1:1 CLOS: LIST
      PRINTN: (CLOS: )

```

ATARI: NAME LISTPC:1

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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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
30 DATA 20
50 DATA 30
70 READ A: B: C
90 PRINT A: B: C
100 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:

```
10 RESTORE
```

Both computers continue printing:

```
10 20 30
10 30 50
10 20 70
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
10
READY
```

Notice that after RESTORE 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$(255): B$(255): A$(255)
100 A$="TESTING"
110 B$="1234"
120 C$=""
130 C$(LEN(C$)+1)=A$
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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1	1	2	4	5	6	7
6	6	6	6	6	6	6
—	—	—	—	—	—	—
0	0	0	0	0	0	0
1	1	1	1	A	A	A
2	2	2	2	J	J	J
3	3	3	3	K	K	K
4	4	4	4	L	L	L
5	5	5	5	M	M	M
6	6	6	6	N	N	N
7	7	7	7	O	O	O
8	8	8	8	P	P	P
9	9	9	9	Q	Q	Q
				R	R	R
				S	S	S
				T	T	T
				U	U	U
				V	V	V
				W	W	W
				X	X	X
				Y	Y	Y
				Z	Z	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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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) x 4.5" 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 5-80 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 (A) box plus the box containing the letter. Examples are letter C marked by (B3), and F by (A6). Letters J-I 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 (B) and the appropriate box. An equal sign, for example, is a (B 6) mark combination. The symbols to the right of the boxes are marked by combinations of one of the following (A - Q) plus (B) 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.

```

800 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-800 Mack Sense Card Reader. □

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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 (A)
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 (S)
Bottom Center of Box	=	appropriate box plus (B)
Top Right of Box	< > + -	appropriate box plus (B) plus (B)
Center Right of Box	^	appropriate box plus (-) plus (B)
Bottom Right of Box	~	appropriate box plus (C) plus (B)
Carriage Return & 5 B B		
Line feed 0 5 0		

Figure 2. Other ASCII 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 exercises. (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 "T" key.

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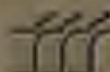
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Comprehension, cont'd...

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 GATZ 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-32 was employed. ProMaster Technology's Extended Cassette BASIC requires approximately 16K of this memory. String variables for the data files and editing features occupy another 8K, leaving about 8K 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 inexperienced

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-

dently.

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 Procom 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 three 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.

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University Software: The Authority on Building Software Using Computers

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 Bruner of the University of California at Irvine, 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 Bruner at Irvine 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, Irvine, 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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Historical wargaming may be the only intellectual hobby which creates more intensely devoted fanatics than home computing. When two wargamers spend an evening relighting a famous battle, they'll spend several hours happily sifting up the gameboard, firepower charts, unit strength tables and so forth... all before the first shot can be fired! There are such paper & pencil simulations of every famous battle from Shiloh to El Alamein. If you've ever tried one, you already know the excitement and challenge of trying to be a better general than Rommel.

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For complete details and an inside look at Computer Bismarck, we'll send you its rulebook. Just send us a check for \$5 along with your name and address. Please include cassette or disc version rulebook. The \$5 will be credited to your purchase of Computer Bismarck.

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SSI

Computerized Testing For Readability

Donald Goodman
Sandra Schwab

We put to the point where we had to coax the paraprofessionals down off the walls about once a week by tossing them Valium 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 seemed to tolerate a little moderate hysteria in our Personalized Achievement Lab, and even permitted screams if they were in good tests.

The problem was Flesch. Not the fish 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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In almost no time, the computer would reply with: $62^*X^*COS(X^12) + 3^*A^*X^12$.

Or to add fractions: $7/3 + 5/6 + 2/5 + 3/7$.

The instantaneous answer: $419/210$.

Or to perform a more difficult trigonometric expansion you enter: $SIN(2^*Y)^*(4^*COS(X)^13 - COS(3^*X) + SIN(Y)^*(COS(X+Y+PI) - COS(X-Y))$.

Just a few seconds later, the computer replies: $64^*SIN(Y)^*COS(X)^*COS(Y)$.

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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 of any level from algebra to calculus.

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

muMATH and muSMP were written by The Soft Warehouse, Honolulu, Hawaii. Priced at \$74.95, the package includes muMATH, muSMP 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.

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Testing, cont'd...

sonant-vowel groupings, and vowel-consonant - consonant - vowel patterns. Keeping an eye peeled for exceptions signaled by ie, 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 sit 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 510) except at the (Line 525 & 500 & beginning of a 510) 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 520-510)

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

OE	AO
OA	EO
IO	IU
EI	UO

3. When E is found at the end of a word it is not a syllable except when it follows L or when it is the only vowel. (Lines 575-578)
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 only in the Math Lab on a computer green table."

5. ES, by default, is a syllable.
6. Every word has a syllable (This gives THE, as well as TV, PBS, 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 84 characters). The cursor will automatically jump to the next line if you type in the 84 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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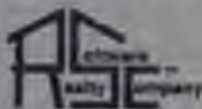
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Testing, cont'd...

OA be one syllable as in boat or coach; or two as in coagulate and coaxial? Should EI be one as in reign and elight; 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, biorythm?

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 (quality over quantity), IA-1 over IA-2 (partial over bias), UI-1 over UI-2 (quit over tuition) and IE-1 over IE-2 (helpful over scientific).

Summary

What amazed us was that as we lacked 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 Wang, 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  REM TRS15144
2  REM PROGRAM BY DONALD J. DYERMAN & SANDRA THOMAS
3  REM PRINT HEADINGS, TABLES, FLEXION READABILITY SCORE
4  REM PRINT WHEN THE T APPEARS ON THE LEFT OF THE SCREEN YOU MAY
5  REM TYPE IN THE T WITH PARAGRAPH. WHEN YOU HAVE ENTERED AT LEAST 100
6  WORDS
7  REM FIRST HALF OF THE COMPUTER WILL COUNT THE AVERAGE NUMBER OF S
8  EXTENSIONS WITHIN APPROXIMATELY 30 SECONDS, AND THE SYLLABLES CAN
9  BE WITHIN THE WORDS
10 REM THE TWO SET TYPE SECTIONS ARE WITHIN OF THE SCREEN
11 REM REM C ALLows UP TO 15 LINES OF TEXT TO BE ENTERED, (WHICH IS
12 REM WORDS WILL BE DIVIDED BEFORE THE END OF THE 15 LINES
13 REM IF THE TEXT IS VERY DIFFICULT INCREASE COUNT LINE IF INVERT
14 REM
15 REM ON 1 TO 15
16 REM FOR 15 TO 1000 FOR 1000000 EACH LINE OF YOUR TEXT
17 REM INPUT TRS15144
18 REM REM C SET REM C TO SUFFICIENT LENGTH OF SCREEN UNTIL IT FITS
19 REM THE LENGTH WORDS & ON COUNTER FOR THE CHARACTERS IN EACH LINE
20 REM
21 REM FOR 15 TO 1000
22 IF STRLEN(COUNT) = 1000 THEN 150
23 IF STRLEN(COUNT) = 1000 THEN 140
24 IF STRLEN(COUNT) = 1000 THEN 140
25 IF STRLEN(COUNT) = 1000 THEN 140
26 IF NOT THEN 200
27 NEXT C
28 FOR 1000 TO 2000
29 FOR 1000 TO 2000
30 FOR 1000 TO 2000
31 FOR 1000 TO 2000
32 FOR 1000 TO 2000
33 FOR 1000 TO 2000
34 FOR 1000 TO 2000
35 FOR 1000 TO 2000
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99 FOR 1000 TO 2000
100 FOR 1000 TO 2000

```

Testing, cont'd...

```

145 GOTO 115
150 IF STRLEN(J,0+1,1) < 0 THEN END
160 FOR K=0 TO 54
170 IF STRLEN(J,K,1) < 0 THEN END
180 NEXT K
190 DIM M(54)
200 FOR J=1 TO 54
210 IF M(J)=0 THEN 310
220 PRINT "PRINT TAB(1) "YOU HAVE ENTERED MORE THAN 100 WORDS. IS
T THE TAB(1) "COMPUTER DO THE CALCULATIONS"
230 GOTO 430
240 NEXT J
250 IF 0=1 THEN 450
260 PRINT "YOU DO NOT HAVE A COMPLETE SENTENCE WITHIN YOUR 100 W
ORDS. "GOTO 400
270 PRINT "AVERAGE NUMBER OF WORDS IN EACH SENTENCE = " 1.10/54
280 FOR J=1 TO 54: THE NUMBER OF LINES USED FOR YOUR 100 WORD
S:
290 NEXT J
300 FOR J=1 TO 54
310 IF STRLEN(J,0,1) < 0 THEN 500
320 IF 0=1 THEN 500
330 IF STRLEN(J,0,1) < 0 THEN 500
340 FOR K=0 TO 104: IF 0=K+1 THEN 700
350 IF STRLEN(J,0+K,1) < 0 THEN 700
360 IF STRLEN(J,0+K,1) < 0 THEN 700
370 IF STRLEN(J,0+K,1) < 0 THEN 517
380 IF STRLEN(J,0+K,1) < 0 THEN 517
390 IF STRLEN(J,0+K,1) < 0 THEN 517
400 IF STRLEN(J,0+K,1) < 0 THEN 517
410 IF STRLEN(J,0+K,1) < 0 THEN 517
420 IF STRLEN(J,0+K,1) < 0 THEN 517
430 NEXT K: GOTO 710
440 NEXT J: GOTO 516
450 IF STRLEN(J,0,1) < 0 THEN 540
460 IF STRLEN(J,0,1) < 0 THEN 540
470 IF STRLEN(J,0,1) < 0 THEN 540
480 IF STRLEN(J,0,1) < 0 THEN 540
490 IF STRLEN(J,0,1) < 0 THEN 540
500 IF STRLEN(J,0,1) < 0 THEN 540
510 IF STRLEN(J,0+1,1) < 0 THEN 520
520 IF STRLEN(J,0+1,1) < 0 THEN 520
530 IF STRLEN(J,0+1,1) < 0 THEN 520
540 IF STRLEN(J,0+1,1) < 0 THEN 520
550 IF STRLEN(J,0+1,1) < 0 THEN 520
560 IF STRLEN(J,0+1,1) < 0 THEN 520
570 IF STRLEN(J,0+1,1) < 0 THEN 520
580 IF STRLEN(J,0+1,1) < 0 THEN 520
590 IF STRLEN(J,0+1,1) < 0 THEN 520
600 GOTO 700
610 IF STRLEN(J,0+1,1) < 0 THEN 520
620 IF STRLEN(J,0+1,1) < 0 THEN 520
630 IF STRLEN(J,0+1,1) < 0 THEN 520
640 IF STRLEN(J,0+1,1) < 0 THEN 520
650 IF STRLEN(J,0+1,1) < 0 THEN 520
660 IF STRLEN(J,0+1,1) < 0 THEN 520
670 IF STRLEN(J,0+1,1) < 0 THEN 520
680 IF STRLEN(J,0+1,1) < 0 THEN 520
690 IF STRLEN(J,0+1,1) < 0 THEN 520
700 GOTO 700
710 IF STRLEN(J,0+1,1) < 0 THEN 520
720 IF STRLEN(J,0+1,1) < 0 THEN 520
730 IF STRLEN(J,0+1,1) < 0 THEN 520
740 IF STRLEN(J,0+1,1) < 0 THEN 520
750 IF STRLEN(J,0+1,1) < 0 THEN 520
760 IF STRLEN(J,0+1,1) < 0 THEN 520
770 IF STRLEN(J,0+1,1) < 0 THEN 520
780 IF STRLEN(J,0+1,1) < 0 THEN 520
790 IF STRLEN(J,0+1,1) < 0 THEN 520
800 GOTO 710
810 NEXT J: GOTO 516
820 IF 0=1 THEN 710
830 FOR K=0 TO 54: A COUNTER FOR DETERMINING THE END OF A LINE ON THE
END OF THE 100TH WORD
840 NEXT K
850 FOR A=1 TO THE COUNTER FOR THE NUMBER OF SYLLABLES
860 NEXT A
870 IF 0=1 THEN 530
880 IF 0=1 THEN 740
890 NEXT J
900 PRINT "TOTAL NUMBER OF SYLLABLES IN YOUR 100 WORDS IS " A
910 PRINT "PRINT (PRINT TAB(1) "IF YOU WISH TO ENTER ADDITIONAL
PASSAGES: PRESS " TAB(1) "END AND THE RETURN/ENTER 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 "A" as a string concatenation operator.

—SM

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 for 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  >> ARE YOU HELPING HIS LIBRARIAN?
      A SECOND FORM OF T-DO
      ARE YOU HELPING HIS LIBRARIAN?

HAS SHE AND JOE'S CLASSMATE BEEN ANSWERED BY THEM?
2  >> YES, THEY ARE.

HAS HE CLASSMATE BEEN ANSWERED BY HER?
3  >> YES, SHE HAS.

23 >> WERE YOU BEING HELPED BY YOUR CLASSMATE?

20 >> HAS JOE RECENTLY MET HIS FRIEND?

ARE YOU ANSWERED BY YOUR FRIEND?
4  >> YES, I AM.

HAS JOE'S LIBRARIAN BEEN HELPING HIM?
5  >> YES, THEY ARE.

HAS JOE HELPED HIS LIBRARIAN?
6  >> YES, HE HAS.

HAS HE HELPED OUR TEACHER?
7  >> YES, HE HAS.

12 >> HAS YOU BEEN ANSWERED BY YOUR LIBRARIAN?

10 >> HELP BY LIBRARIAN
      A SECOND FORM OF T-DO
      YOU DO QUESTION YOUR CLASSMATE.

23 >> HAS SHE BEEN ANSWERED BY HER CLASSMATE?

HAS SHE AND JOE'S HALL HARBOR QUESTION THEM?
8  >> YES, THEY ARE.

9  >> IS MY TEACHER QUESTIONED BY HER?

26 >> HAS SHE IS QUESTION BEEN ANSWERED?

18 >> HAS JOE ANSWERED HIS FRIEND?

12 >> WERE YOUR VISITORS BEING ANSWERED BY THEM?

9  >> IS SHE'S SHE'S THUMB BEING QUESTIONED BY THEM?

ARE YOU BEING ANSWERED BY YOUR TEACHER?
10 >> YES, I AM.

26 >> WERE SHE AND JOE'S HALL HARBOR ANSWERING THEM?

15 >> WERE YOUR LIBRARIANS ANSWERED BY THEM?

22 >> WERE WE BEING ANSWERED BY YOUR FRIEND?

HAS SHE AND JOE BEEN ANSWERED 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 11432.

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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, ASE randomly rambled:

(Refer to Example 9)

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:

[illegible]

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CRIME & VIOLENCE 11:51-9.8

EXERCISE 6.10.14. $\mathbb{A}^1 \times \mathbb{A}^1 \cong \mathbb{A}^2$.

1 SIMILAR IN 2 PLURAL: 7 4
 GENDER: FEMININE IN
 1 FEMAL: 2 4

1997-1998 U.S. Census, 18-24, %	
By Ethnicity	
1. Male	4.1000
2. Female	5.7000 (55% of total)
3. Male, African Am.	2.7000

LIEBOWITZ & LEMMON, 11-21 7:34

WAS IT TO BE THE ELEGANT ONE,
SUBJECT OF THE "LITTLE"
A TWO-THREE
AND A TWO-YEAR

GROUP APT. SINGLE 3-152 9.14

818 446 3111
 44111 197
 18 27 311 197 197

Dell'Alba, A. / *Journal of Interpersonal Violence* 19(12):1377-1390, 2004.

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 intensiveness 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 learner	is helped	by her (U)

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 this grammar ASE 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 2690. 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 (ense, phase, aspect, voice and function); terms and features far too complex to discuss here but to be found in Jacob's 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, E 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, ADE 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 Jooz' schema even numbers account for "propredicates," features that most of us have traditionally called *elliptical verbs*.

4 Yes, she is. (helping her teacher)



"The supervisor sloped 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 *pro*predicate, 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 *pro*predicate 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, 1060, 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-ing" and "been-being" forms loved with earlier poets 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 altered. Joss includes the additional modals must, ought to, dare and need. Thus, if ABE were to learn Latin, would extend her range from 100 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.

[illegible]

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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, 44626 Kirk Ct., Dayton, MI 45427

```

10000
10100 READING LEVEL DIFFICULTY
10200 R.L. CARLSON
10300 DAYTON, OHIO
10400
10500
10600
10700
10800
10900 "FRODO BAGGINS"
11000
11100 PLEASE DELETE ALL COMMENTS EXCEPT THE END OF A SENTENCE
11200 TYPE A SPACE BEFORE THIS PERCENTAGE. THE PERCENTAGE
11300 WILL BE DECREASED BY TWO CHARS SEVERAL TIMES.
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20000

```

Reading, cont'd...

7500-HFI
7500-HCI
8000-AB-TRIP THERM 877
8000-KIT
8000-PRINT-ONE (OVERALL READING LEVEL 13.5) 8000-PRINT-ONE
8000-PRINT-ONE
8000-PRINT-ONE
8000-PRINT-ONE

8000

8000-PRINT-ONE

PLEASE DELETE ALL PUNCTUATION AND ALL THE END OF A SENTENCE
PLEASE TYPE A SPACE BEFORE EACH PUNCTUATION AND BEFORE A
MAY BE INCREASED IF THE USER WISHES TO INCREASE THE
THE WORD

HOW MANY LETTERS IN THE
TYPE OF THE PUNCTUATION SIGN IN THE

THE FEEL THIS IS MUCH THE LITTLE SYSTEM WITH THE
PLATE - IN THE SYSTEM WE FEEL THE PUNCTUATION IS NOT NECESSARY
TYPING (THAT) WE FEEL IN THE SYSTEM WE FEEL IN THE SYSTEM
TRY AT LEAST 10 PERCENT IN THE SYSTEM WE FEEL IN THE SYSTEM
TYPING IN 10 YEARS - NOW IN THE SYSTEM WE FEEL IN THE SYSTEM
PERCENT IN THE SYSTEM WE FEEL IN THE SYSTEM WE FEEL IN THE SYSTEM
AMERICAN WE CALL IN THE SYSTEM WE FEEL IN THE SYSTEM
FROM THE REPAIRMENT IN THE SYSTEM WE FEEL IN THE SYSTEM
THESE NOW IN THE SYSTEM WE FEEL IN THE SYSTEM WE FEEL IN THE SYSTEM
THESE NOW IN THE SYSTEM WE FEEL IN THE SYSTEM WE FEEL IN THE SYSTEM

THE READING LEVEL FOR THIS SYSTEM IS APPROXIMATELY 11.7
7. THREE SYLLABLE WORDS
IN WORDS IN THIS PASSAGE
3 SENTENCES
DO YOU HAVE MORE MATERIAL TO

THE OVERALL READING LEVEL IS ABOUT 11.7
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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 on 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 179-200, 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 contain the DATA statement listings of the words to be read and spoken. The numbers are important for correct execution of the program. ©

The First "R"

John F. Rogers



```

1 KEY *** KEYING PRACTICE ***
2 KEY *** WITH THE TWO-88 ***
3 KEY *** VOICE SYNTHESIZER ***
4 KEY *** PROGRAM 01 ***
5 KEY *** JIM T. BURNS ***
6 KEY *** ONE SEVEN SE. ***
7 KEY *** FORTUNE CITY ***
8 KEY *** LONGISLAND TOWER ***
9 KEY ***
10 CLS:GOSUB 400
20 PRINT#15;"E E L L O ~-~";V04="HELLOU";GOSUB 1000 FOR K=0 TO 400 NEXT
30 PRINT#15;"TWOY YOU WILL PRACTICE";V04="TOWNAH";GOSUB 1000 FOR K=0 TO 400 NEXT
40 FOR K=0 TO 400 NEXT
50 PRINT#15;"SINGING WORDS I SING YOU ~-~";V04="SONNEHAWOZ;DAAVOOH";GOSUB 1000
60 FOR K=0 TO 400 NEXT
70 PRINT#15;"I WILL FLASH A WORD ON THE SCREEN ~-~";
80 V04="DAAWILLPLTSDHAWOZ";GOSUB 1000 FOR K=0 TO 400 NEXT
90 V04="DAAWOSTER;DAA";GOSUB 1000 FOR K=0 TO 400 NEXT
100 PRINT#15;"THEN YOU WILL SAY IT ~-~";V04="CCOHH";GOSUB 1000 FOR K=0 TO 400 NEXT
110 PRINT#15;"THEN ~-~ I WILL SAY THE WORD ~-~";V04="CCOHH;TAA;MILL;HAWOZ";GOSUB 1000
120 FOR K=0 TO 400 NEXT PRINT#15;"FINALLY, WE'LL SAY THE WORDS TOGETHER ~-~";
130 V04="T;KAWALLA;H;HOLSHAWOZ";GOSUB 1000 FOR K=0 TO 400 NEXT;V04="THAWOZ;H";GOSUB 1000
140 FOR K=0 TO 400 NEXT
150 CLS:GOSUB 400 PRINT#17;"E E E D Y Y ~-~";V04="EDAWOZ";GOSUB 1000 FOR K=0 TO 400 NEXT
160 CLS:GOSUB 400
170 PRINT#16;"THE FIRST WORD IS ~-~";V04="C;K;HAWOZ";GOSUB 1000 FOR K=0 TO 400 NEXT
180 WORD 1;SA;V04;GOSUB 1000 WORD 2;SA
190 CLS:GOSUB 400 ON ERROR GOTO 990 WORD 2
200 PRINT#16;"THE NEXT WORD IS ~-~";V04="C;K;HAWOZ";GOSUB 1000
210 WORD 3;SA;V04;GOSUB 1000
220 CLS:GOSUB 400
230 PRINT#16;"YOU SAY THE WORD CORRECTLY~-~";
240 V04="D;TWOY;DAAWAWOZ;DAAWOSTER;TAA";GOSUB 1000 FOR K=0 TO 400 NEXT
250 PRINT#16;"LET'S SAY IT TOGETHER ~-~";V04="L;TOWNAH;T;TOWNAH;CC;H";GOSUB 1000
260 FOR K=0 TO 400 NEXT
270 PRINT#16;"E E E D Y Y ~-~";V04="EDAWOZ";GOSUB 1000 FOR K=0 TO 400 NEXT
280 PRINT#16;"THE WORD IS ~-~";SA;V04="C;HAWOZ";GOSUB 1000 GOSUB 1100
290 FOR K=0 TO 400 NEXT WORD 1;SA
300 WITH 1:GOTO 990 END 2:PRINT;V04;3:GOSUB 1000 END 4:GOSUB 1100
400 FOR K=0 TO 60 STEP 2:PRINT#17;"~-~";PRINT#16;"~-~";NEXT
410 FOR K=0 TO 60 STEP 2:PRINT#17;"~-~";PRINT#16;"~-~";NEXT
420 RETURN
500 FOR J=25 TO 94:GOTO 111:GOTO 122:NEXT
510 FOR J=11 TO 20:GOTO 123:GOTO 121:NEXT
520 FOR J=0 TO 7:PRINT#16;"~-~";FOR I=0 TO 100:NEXT I:PRINT#16;SA;FOR J=0 TO 400:NEXT J
530 PRINT#16;"THE WORD IS PRONOUNCED ~-~";V04="C;HAWOZ";GOSUB 1000
540 GOSUB 1100 FOR I=0 TO 400 NEXT;GOSUB 1100 FOR I=0 TO 1000 NEXT
550 RETURN
560 CLS:GOSUB 400
570 PRINT#16;"THE WORD LIST HAS ENDED ~-~";V04="C;HAWOZ";GOSUB 1000 GOSUB 1000
580 FOR K=0 TO 400 NEXT
590 PRINT#16;"PLEASE CALL THE DIRECTOR ~-~";V04="PL;C;HAWOZ;H;HAWOZ;T;T";GOSUB 1000
600 RETURN
610 FOR I=0 TO 1000 NEXT
620 PRINT#16;"THE LIST OF WORDS ~-~ PRINT#17;"THIS BEEN DEPLETED ~-~";
630 PRINT#16;"PRESS ~-~GROW~-~ KEY TO GET CONTROL OF THE COMPUTER ~-~";GOTO 570
1000 FOR I=0 TO 1000 NEXT
1010 FOR V04=1 TO LEN(V04)
1020 FOR I=0 TO 1000 NEXT
1030 FOR I=0 TO 1000 NEXT
1040 FOR I=0 TO 1000 NEXT
1050 RETURN
1060 FOR I=0 TO 1000 NEXT
1070 FOR I=0 TO 1000 NEXT
1080 FOR I=0 TO 1000 NEXT
1090 FOR I=0 TO 1000 NEXT
1100 FOR I=0 TO 1000 NEXT
1110 FOR I=0 TO 1000 NEXT
1120 FOR I=0 TO 1000 NEXT
1130 FOR I=0 TO 1000 NEXT
1140 FOR I=0 TO 1000 NEXT
1150 RETURN
2000 CLS
2010 PRINT#15;"THIS IS THE PRONOUNCING TESTING ROUTINE ~-~";
2020 PRINT#15;V04
2030 PRINT#15;"ENTER PASSWORD ~-~";
2040 INPUT K04:GOSUB 1000
2050 GOTO 1000

```



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CIRCLE 14 ON READER SERVICE CARD

An educational aid for language
teaching and learning.

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

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 6 lines, with lines 1640 to 1670. The words may be changed for different vocabulary sets and different languages.

Howard Berenbon, 2801 Petersboro, W. Bloomfield, MI 48301.

WORD BOARD: MICROALPH-ENGLISH TO FRENCH

Copyright (c) 1979 by Howard Berenbon

ACCEPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS ENTERING ON THE KEY. WILL SKIP 6 LINES IF USED AS A LANGUAGE INSTRUCTION AID.

ENGLISH	FRENCH
CHICK	COULEUR
ENGLISH	FRENCH
APPLE	POIRE
ENGLISH	FRENCH
KEY	LEVER
ENGLISH	FRENCH
KEY	LEVER

Figure 1a



Key	English Word	French Word
A	Apple	Pomme
B	Airplane	Avion
C	Car	Voiture
D	Cow	Vache
E	Coat	Veste
F	Dog	Chien
G	Hand	Main
H	Sun	Soleil
I	Book	Livre
J	Moon	Lune
K	Star	Etoile
L	Circus	Cirque
M	Comb	Peigne
N	Eyes	Yeux
O	Ice	Glace
P	Star	Etoile
Q	Spoon	Cuillère
R	Chair	Chaise
S	Horse	Cheval
T	Pen	Crayon
U	Lamp	Lampe
V	Bird	Oiseau
W	Flan	Pâtissem
X	Bicycle	Vélo
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	Zéro
*	(Skip 6 lines)	

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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Word Board, cont'd...

Program 1

```
0010 PRINT "WORD BOARD- VOCABULARY-ENGLISH TO FRENCH"
0020 PRINT
0030 PRINT "COPYRIGHT (C) 1979 BY HOWARD BERENSON"
0040 PRINT
0050 PRINT "ACCEPTS CHARACTER INPUT A-Z, 0-9 AND PRINTS"
0060 PRINT "WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS"
0070 PRINT "ENTERING AN '0' WILL SKIP 8 LINES"
0080 PRINT "TRY TO BE USED AS A LANGUAGE INSTRUCTION AID"
0090 INPUT N$
0100 PRINT
0110 IF N$="H" THEN GOTO 100
0120 IF N$="B" THEN GOTO 100
0130 IF N$="C" THEN GOTO 100
0140 IF N$="D" THEN GOTO 100
0150 IF N$="E" THEN GOTO 100
0160 IF N$="F" THEN GOTO 100
0170 IF N$="G" THEN GOTO 100
0180 IF N$="I" THEN GOTO 100
0190 IF N$="L" THEN GOTO 100
0200 IF N$="M" THEN GOTO 100
0210 IF N$="N" THEN GOTO 100
0220 IF N$="O" THEN GOTO 100
0230 IF N$="P" THEN GOTO 100
0240 IF N$="R" THEN GOTO 100
0250 IF N$="S" THEN GOTO 100
0260 IF N$="T" THEN GOTO 100
0270 IF N$="U" THEN GOTO 100
0280 IF N$="V" THEN GOTO 100
0290 IF N$="W" THEN GOTO 100
0300 IF N$="X" THEN GOTO 100
0310 IF N$="Y" THEN GOTO 100
0320 IF N$="Z" THEN GOTO 100
0330 IF N$="0" THEN GOTO 100
0340 IF N$="1" THEN GOTO 100
0350 IF N$="2" THEN GOTO 100
0360 IF N$="3" THEN GOTO 100
0370 IF N$="4" THEN GOTO 100
0380 IF N$="5" THEN GOTO 100
0390 IF N$="6" THEN GOTO 100
0400 IF N$="7" THEN GOTO 100
0410 IF N$="8" THEN GOTO 100
0420 IF N$="9" THEN GOTO 100
0430 IF N$=" " THEN GOTO 100
0440 GOTO 100
0450 GOTO 100
0460 PRINT "APPLE" (TAB(20)) "POMME"
0470 GOTO 100
0480 GOTO 100
0490 PRINT "AIRPLANE" (TAB(20)) "AVION"
0500 GOTO 100
0510 GOTO 100
0520 PRINT "CLAP" (TAB(20)) "TRAPPE"
0530 GOTO 100
0540 GOTO 100
0550 PRINT "COIN" (TAB(20)) "MONNE"
0560 GOTO 100
0570 GOTO 100
0580 PRINT "COT" (TAB(20)) "MATION"
0590 GOTO 100
0600 GOTO 100
0610 PRINT "COO" (TAB(20)) "CHOU"
0620 GOTO 100
0630 GOTO 100
0640 PRINT "COW" (TAB(20)) "VACHE"
0650 GOTO 100
0660 GOTO 100
0670 PRINT "COW" (TAB(20)) "VACHE"
0680 GOTO 100
0690 GOTO 100
0700 PRINT "COW" (TAB(20)) "VACHE"
0710 GOTO 100
0720 GOTO 100
0730 PRINT "COW" (TAB(20)) "VACHE"
0740 GOTO 100
0750 GOTO 100
0760 PRINT "COW" (TAB(20)) "VACHE"
0770 GOTO 100
0780 GOTO 100
0790 PRINT "COW" (TAB(20)) "VACHE"
0800 GOTO 100
0810 GOTO 100
0820 PRINT "COW" (TAB(20)) "VACHE"
0830 GOTO 100
0840 GOTO 100
0850 PRINT "COW" (TAB(20)) "VACHE"
0860 GOTO 100
0870 GOTO 100
0880 PRINT "COW" (TAB(20)) "VACHE"
0890 GOTO 100
0900 GOTO 100
0910 PRINT "COW" (TAB(20)) "VACHE"
0920 GOTO 100
0930 GOTO 100
0940 PRINT "COW" (TAB(20)) "VACHE"
0950 GOTO 100
0960 GOTO 100
0970 PRINT "COW" (TAB(20)) "VACHE"
0980 GOTO 100
0990 GOTO 100
```

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

Figure 2. A Limited Vocabulary of 26 Essential Words and 12 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 person's basic needs, such as eating and sleeping. Alternately, sentences may replace the words for more clearly describing the individual's 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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Cost \$9.95

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CATALOG

FRACAS

(frá'kas) n.1. 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 treasures, 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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RECEIPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS
WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS
ENTERING IN '0' WILL SKIP 0 LINES
FINN BE USED AS A HELP TO THE HANDICAPPED

1
WAIT
TO
END
THANK YOU
15
IT
TIME
TO
GO

```

1010 PRINT "MORE BUREAU"
1020 PRINT
1030 PRINT "COPYRIGHT © 1979 BY HOWARD HORENSEN"
1040 PRINT
1050 PRINT "RECEIPTS CHARACTER INPUT (A-Z, 0-9) AND PRINTS"
1060 PRINT "WORDS THAT CORRESPOND TO THE LETTERS AND NUMBERS"
1070 PRINT "ENTERING IN '0' WILL SKIP 0 LINES"
1080 PRINT "FINN BE USED AS A HELP TO THE HANDICAPPED"
1090 INPUT IN$
1100 IF IN$="A" THEN GOTO 1110
1110 IF IN$="B" THEN GOTO 1120
1120 IF IN$="C" THEN GOTO 1130
1130 IF IN$="D" THEN GOTO 1140
1140 IF IN$="E" THEN GOTO 1150
1150 IF IN$="F" THEN GOTO 1160
1160 IF IN$="G" THEN GOTO 1170
1170 IF IN$="H" THEN GOTO 1180
1180 IF IN$="I" THEN GOTO 1190
1190 IF IN$="J" THEN GOTO 1200
1200 IF IN$="K" THEN GOTO 1210
1210 IF IN$="L" THEN GOTO 1220
1220 IF IN$="M" THEN GOTO 1230
1230 IF IN$="N" THEN GOTO 1240
1240 IF IN$="O" THEN GOTO 1250
1250 IF IN$="P" THEN GOTO 1260
1260 IF IN$="Q" THEN GOTO 1270
1270 IF IN$="R" THEN GOTO 1280
1280 IF IN$="S" THEN GOTO 1290
1290 IF IN$="T" THEN GOTO 1300
1300 IF IN$="U" THEN GOTO 1310
1310 IF IN$="V" THEN GOTO 1320
1320 IF IN$="W" THEN GOTO 1330
1330 IF IN$="X" THEN GOTO 1340
1340 IF IN$="Y" THEN GOTO 1350
1350 IF IN$="Z" THEN GOTO 1360
1360 IF IN$="0" THEN GOTO 1370
1370 IF IN$="1" THEN GOTO 1380
1380 IF IN$="2" THEN GOTO 1390
1390 IF IN$="3" THEN GOTO 1400
1400 IF IN$="4" THEN GOTO 1410
1410 IF IN$="5" THEN GOTO 1420
1420 IF IN$="6" THEN GOTO 1430
1430 IF IN$="7" THEN GOTO 1440
1440 IF IN$="8" THEN GOTO 1450
1450 IF IN$="9" THEN GOTO 1460
1460 IF IN$=" " THEN GOTO 1470
1470 IF IN$=" " THEN GOTO 1480
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1770 IF IN$=" " THEN GOTO 1780
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1790 IF IN$=" " THEN GOTO 1800
1800 IF IN$=" " THEN GOTO 1810
1810 IF IN$=" " THEN GOTO 1820
1820 IF IN$=" " THEN GOTO 1830
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1860 IF IN$=" " THEN GOTO 1870
1870 IF IN$=" " THEN GOTO 1880
1880 IF IN$=" " THEN GOTO 1890
1890 IF IN$=" " THEN GOTO 1900
1900 IF IN$=" " THEN GOTO 1910
1910 IF IN$=" " THEN GOTO 1920
1920 IF IN$=" " THEN GOTO 1930
1930 IF IN$=" " THEN GOTO 1940
1940 IF IN$=" " THEN GOTO 1950
1950 IF IN$=" " THEN GOTO 1960
1960 IF IN$=" " THEN GOTO 1970
1970 IF IN$=" " THEN GOTO 1980
1980 IF IN$=" " THEN GOTO 1990
1990 IF IN$=" " THEN GOTO 2000
2000 IF IN$=" " THEN GOTO 2010
2010 IF IN$=" " THEN GOTO 2020
2020 IF IN$=" " THEN GOTO 2030
2030 IF IN$=" " THEN GOTO 2040
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2180 IF IN$=" " THEN GOTO 2190
2190 IF IN$=" " THEN GOTO 2200
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2370 IF IN$=" " THEN GOTO 2380
2380 IF IN$=" " THEN GOTO 2390
2390 IF IN$=" " THEN GOTO 2400
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2970 IF IN$=" " THEN GOTO 2980
2980 IF IN$=" " THEN GOTO 2990
2990 IF IN$=" " THEN GOTO 3000
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3670 IF IN$=" " THEN GOTO 3680
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4670 IF IN$=" " THEN GOTO 4680
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THESE

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FOR EACH THEREAFTER. 100, 200, 300, 400, 500 POINTS TOTAL FOR 1,
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FOR THE FIRST FOUR-LETTER WORD YOU GET 150 POINTS. 150 IS YOUR
FOR EACH THEREAFTER. 150, 300, 450, 600, 750 POINTS FOR 1, 2,
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TO CONTINUE, PRESS ANY KEY.

00-11-10

AL THE FIVE-LETTER CHALLENGE (2500) FOR SET ONE, TWO, THREE,
FOUR AND FIVE WORDS.

100 LETTER WORDS BEING: 1000, 2000, 3000, 4000 AND 5000 POINTS
FOR ONE THROUGH FIVE CHALLENGES.

GET 1000 LETTER WORDS AND YOU'LL WORK OUT YOUR OPPONENTS. 100
THAT OPPONENT FILLS YOU GET 1000, 2000, 3000 AND 4000 POINTS

BUT LOOK AT THE FIGURES: 700, 1000, 1300, 1600, 1700 POINTS.

TO CONTINUE, PRESS ANY KEY.

00-11-10

WORD-100 TEN-LETTER WORDS AND THE SIMPLE WAY TO OBTAIN YOUR
OPPONENTS TO DISTINGUISH. WORDS BEING: 1000, 2000, 3000,
4000 AND 5000 POINTS FOR ONE TO FIVE CHALLENGES.

AND THAT'S IT. 1000, 2000, 3000, 4000 AND 5000 POINTS FOR ONE
THROUGH FIVE CHALLENGES.

1000, 2000, 3000, 4000 AND 5000 POINTS
FOR ONE THROUGH FIVE CHALLENGES.

TO CONTINUE, PRESS ANY KEY.

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TO CONTINUE, PRESS ANY KEY.

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1000, 2000, 3000, 4000 AND 5000 POINTS FOR ONE
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1000, 2000, 3000, 4000 AND 5000 POINTS FOR ONE
THROUGH FIVE CHALLENGES.

THE WORD IS ONLY AT THE END OF THE ROUND IN WHICH YOU PLAYER
REMOVED A TOTAL OF 1000 POINTS.

TO CONTINUE, PRESS ANY KEY.

00-11-10

TO CONTINUE, PRESS ANY KEY.

THE DISPLAY IS SELF-EXPLANATORY AND WILL HELP YOU TO WIN.
IT IS ALSO SELF-EXPLANATORY. LETTERS ARE BEING BY LETTERS.

WORDS BEING: 1000, 2000, 3000, 4000 AND 5000 POINTS FOR ONE
THROUGH FIVE CHALLENGES.

1000, 2000, 3000, 4000 AND 5000 POINTS FOR ONE
THROUGH FIVE CHALLENGES.

TO CONTINUE, PRESS ANY KEY.

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WORDS BEING: 1000, 2000, 3000, 4000 AND 5000 POINTS FOR ONE
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THROUGH FIVE CHALLENGES.

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

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- Record deletion automatically supported.

- Record access and file maintenance is user transparent.

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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.

Ancelma Bolchell 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 français*, 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 "yester," "metre," "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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CIRCLE 216 ON READER SERVICE CARD

The 1980 North American Computer Chess Championship

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

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



FIGURE 1
GAME 1
CHESS 4.9 - BELLE

- | | |
|------------------|-----------------|
| 1. P-Q4, N-KB3 | 33. B-N3, R-R5 |
| 2. P-QB4, P-B4 | 34. Q-B1, B-B1 |
| 3. P-Q5, P-K3 | 35. R-Q2, Q-Q1 |
| 4. N-QB3, PXP | 36. Q-B1, P-R4 |
| 5. PXP, P-Q3 | 37. K-N1, P-R5 |
| 6. P-K4, P-KN3 | 38. B-B2, B-A2 |
| 7. N-KB3, B-N2 | 39. N-K3, B-B |
| 8. B-K2, O-O | 40. QXB, R-R8+ |
| 9. O-O, R-K1 | 41. R-Q1, R-R7 |
| 10. N-Q2, N-R3 | 42. Q-Q3, RXP |
| 11. P-B3, N-B2 | 43. N-B4, R-QB7 |
| 12. P-QB4, P-QN3 | 44. P-K5, BXP |
| 13. N-QB4, B-QR3 | 45. NXB, PKN |
| 14. B-KN5, P-R3 | 46. QXQNP, B-K7 |
| 15. B-R4, P-KN4 | 47. K-B1, P-B5 |
| 16. B-B2, N-R4 | 48. Q-N7, R-R7 |
| 17. N-K3, B-B1 | 49. B-N6, P-N6 |
| 18. Q-B2, N-B5 | 50. Q-N4, O-B3 |
| 19. B-B4, B-Q2 | 51. Q-QB1, QXQ |
| 20. KR-Q1, Q-B3 | 52. BXQ, RXP |
| 21. B-N3, N-R4 | 53. R-K1, P-B6 |
| 22. B-K1, N-B5 | 54. RXP, P-B7 |
| 23. K-R1, P-R3 | 55. R-KB1, K-N7 |
| 24. B-N3, P-N4 | 56. BXP, RXB |
| 25. PXP, PXP | 57. R-QB8, R-N7 |
| 26. RXR, RXR | 58. P-Q5, RXP |
| 27. B-B1, P-QN5 | 59. P-Q7, R-Q7 |
| 28. N-K2, P-N6 | 60. K-N1, RXP |
| 29. Q-N1, N-R4 | 61. RXP, R-Q3 |
| 30. B-B2, N-B5 | 62. R-B2, K-B3 |
| 31. N-B4, NKN | 63. K-R2, draw |
| 32. B-N4, B-N4 | |

FIGURE 1

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defending champion, had drawn earlier with CHAOS in the second round of the tournament. This gave BELLE a final score of three against CHESS 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 CHESS 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. CHESS 4.9 and its programmer, David Slate (expert) played David Levy (International Master). Playing the Bird's Opening, Slate and CHESS 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 Allen and Ken Thompson in the Chess 4.9 - BELLE game. Joe Condon and David Slate study the position, while Larry Allen and Ken Thompson await BELLE's reply.

CrossTable of the North American Computer Chess Championship

CrossTable of the North American Computer Chess Championship							
Program	time	perf	1	2	3	4	total
1 CHESS 4.9	2040	2086	SW	SW	SW	2D	3+
2 BELLE	1950	1982	SW	4D	1W	1D	3
3 DUCHESS	1989	1942	10W	7W	1L	4W	3
4 CHAOS	1775	1794	12W	2D	9W	3L	2+
5 L'EXCENTRIQUE	0	1640	2L	12W	5W	6D	2+
6 MYCHESS	0	1552	7L	10W	11W	5D	2+
7 SARGON 3	0	1614	8W	3L	2L	9D	1+
8 OSTRICH 80	1450	1374	1L	11W	5L	15D	1+
9 BLITZ 8.9	0	1576	11W	1L	4L	7D	1+
10 AWIT	1325	1334	3L	6L	12W	8D	1+
11 SS-85.76	0	1045	5L	8L	5L	12W	1
12 RUFUS	0	644	4L	5L	13L	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 10 out of 11 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.

TABLE 1

A New Type of Game



Welcome to an astonishing new experience! **ADVENTURE** is one of the most challenging and innovative games available for your personal computer. This is not the average computer game in which you shoot at, chase, or get chased by something, master the game within an hour, and then lose interest. In fact, it may take you more than an hour to score at all, and will probably take days or weeks of playing to get a good score. (There is a provision for saving a game in progress).

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, GO 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

MISSION IMPOSSIBLE ADVENTURE (by Scott Adams) - Good Morning, Your mission is to... and so it starts. Will you be able to complete your mission in time? Or is the world's first automated nuclear reactor doomed? This one's well named. Its hard, there is no magic but plenty of suspense. Good luck....

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....

ADVENTURELAND (by Scott Adams) - You wander through an enchanted world trying to recover the 13 lost treasures. You'll encounter WILD ANIMALS, MAGICAL BEINGS, and many other perils and puzzles. Can you rescue the BLUE OX from the quicksand? Or find your way out of the maze of pits? Happy Adventuring....

VOODOO CASTLE (by Scott Adams) - Count Oriso has had a handish curse put on him by his enemies. There he lies, with you his only hope. Will you be able to rescue him or is he forever doomed? Beware the Voodoo Man....

ORIGINAL ADVENTURE (by Crowther, Woods, Manning and Rochet) - 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 SAM70 language in which to run the game. The troll says "Good Luck."

PIRATE ADVENTURE (by Scott Adams) - "To 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 treasure? Happy sailing matey....

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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 Kotinger 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 Gordon, 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, 500,000 instructions/sec). BELLE plays about expert level and is written in C



David Levy points to a computer screen and comments to the audience while the programmers wait for 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 Kottinger took MYCHESS to the Paul Masson tournament and in unofficial competition achieved a performance of a "C" player. MYCHESS runs on a Cromeco Z-20 (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. If 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. A9 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.



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-K2, 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-RB+ |
| 8. N-B3, P-K4 | 33. Q-K1, Q-N2 |
| 9. P-R, N-R | 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. Q-O-O, Q-O | 37. R-R, Q-RP+ |
| 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 |
| 17. P-Q4, N-B5+ | 42. R-R1, P-R5 |
| 18. P-N, Q-N5+ | 43. Q-R1, Q-B7+ |
| 19. K-B1, Q-N | 44. K-B3, R-B3 |
| 20. R-NP, P-P | 45. Q-QN1, R-B3+ |
| 21. B-P, N-N3 | 46. K-N4, Q-K3+ |
| 22. B-N3, R-B5 | 47. K-R4, R-R5+ |
| 23. B-N, P-B | 48. K-N5, Q-R4+ |
| 24. Q-R1, Q-RB+ | 49. K-B4, R-B3+ |
| 25. K-Q2, QR-N1 | 50. K-K4 |

FIGURE 2



Levy discussing his game with the audience following its completion.

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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Championship, cont'd...



GAME 3 SARGON 3 - BELLE

- | | |
|------------------|-----------------|
| 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-B5 |
| 7. N-B3, B-QN5 | 41. B-Q2, Q-N7 |
| 8. B-Q2, BxN | 42. QR-N1, Q-R7 |
| 9. PxP, 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, RxR |
| 13. P-N4, B-Q2 | 47. R-R1, Q-N7 |
| 14. B-N2, Q-D | 48. K-B1, R-KB2 |
| 15. Q-D, 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-QB3 | 52. K-N1, Q-R6 |
| 19. Q-Q5+, R-B2 | 53. Q-N5+, 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. BxP, QxP+ |
| 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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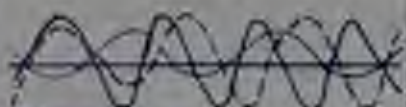
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Interview with Gordon Bell

David Ahl



At Brown University Symposium II, to PD Rami Davis (NSF), Gordon Bell (DEC), Steve Denning (Purdue Univ.)

Dr. Gordon Bell is Vice President of Engineering of Digital Equipment Corporation, the world's largest manufacturer of minicomputers. He has 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 Neimur 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.

Days: 101 by translating text books or manuals you provide the contest

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 486 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.

Qwert: 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 pull 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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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 try 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:

$$\begin{array}{r} 5X + 3 \\ 2X + 1 \\ \hline 10X^2 + 5X \\ + 2X + 3 \\ \hline 10X^2 + 7X + 3 \end{array}$$

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 difference $S_1 S_2 - (AC + BD)$ 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 2×2 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 3×3 's require 27 multiplications, two 4×4 '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 2×2 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 2×2 '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 4×4 's this procedure yields 77 or 49 multiplications whereas it would ordinarily require 4^3 or 64 multiplications.

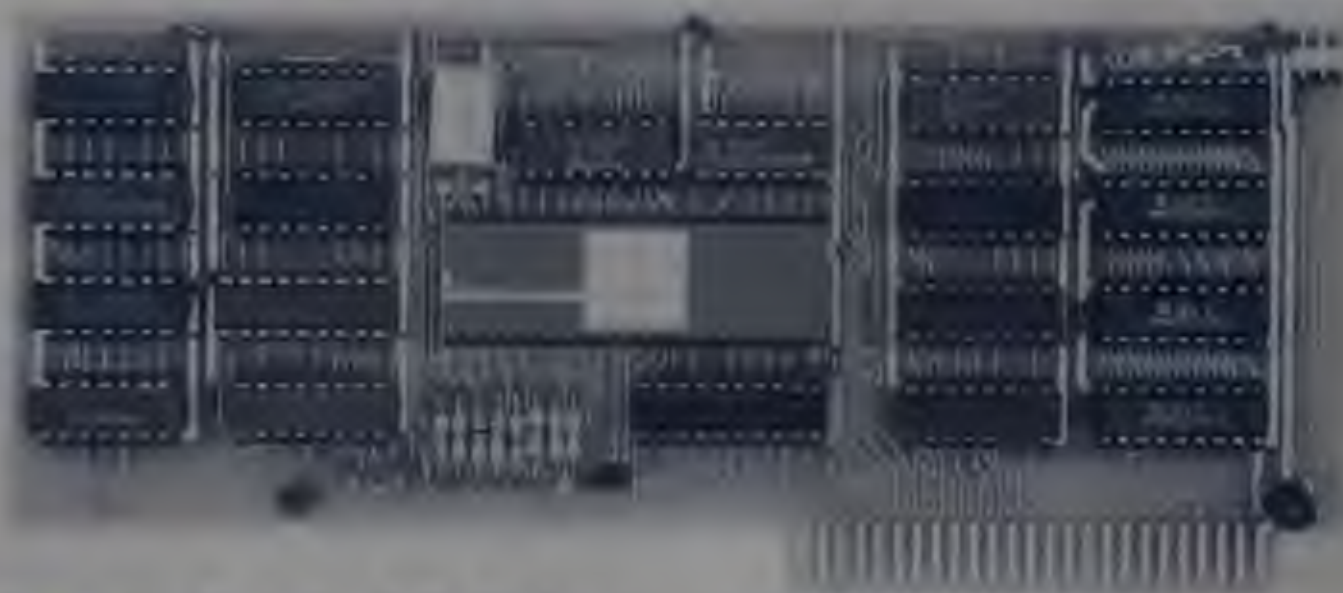
The Bridges of Königsberg is an old and famous problem which because of its simplicity has an appeal for students at all levels.

Before you start trying to solve this problem, be advised that in 1966, V. Strassen¹ in a paper "Gaussian Elimination is Not Optimal" produced the 7 multiplication solution for the 2×2 's. This is reproduced here without rationale, since an analysis of the procedure is beyond the scope of this paper. Given two 2×2 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

$$\begin{aligned} P_{11} &= m_1 + m_2 + m_4 + m_5 \\ P_{12} &= m_4 + m_5 \\ P_{21} &= m_6 + m_7 \\ P_{22} &= m_2 + m_3 + m_5 + m_7 \end{aligned}$$

where

$$\begin{aligned} m_1 &= (B + D)(G + H) \\ m_2 &= (A + D)(E + H) \\ m_3 &= (A + C)(E + F) \\ m_4 &= (A + B)H \\ m_5 &= A(F + H) \\ m_6 &= D(G + E) \\ m_7 &= (C + D)E \end{aligned}$$

The seven multiplications (m_i) are brought together by selective additions and subtractions in the four P_{ij} , so that $P_{11} = AE + BG$, etc.

Very recently another mathematician, Victor Pan,² 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 Königsberg, 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 Königsberg is an old and famous problem which because of its simplicity has an appeal

for students at all levels. In old Königsberg, 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

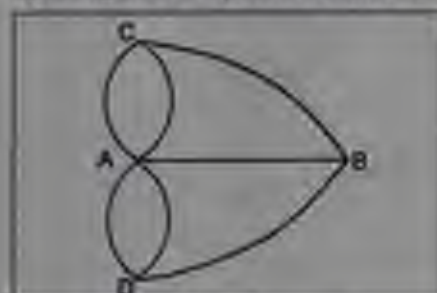


Figure 2

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."³ 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 non-deterministic 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!"⁴

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.⁵

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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"You won't believe this, but Zarg can actually add without a computer."



Figure 1

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." □

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Eliminating the TRS-80 Power Cord Mess

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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! □

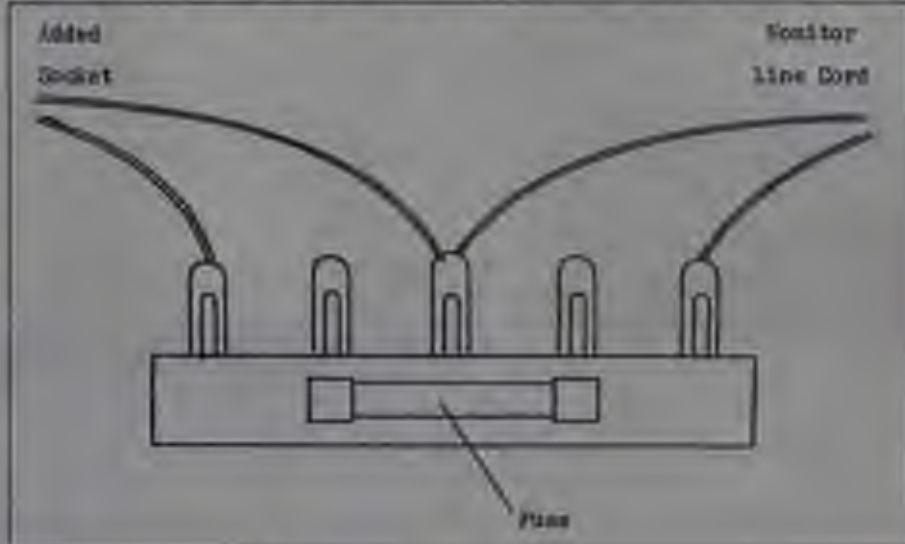


Figure 1.
Connections to monitor terminal board.

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```

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 loiled 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, even Structured BASIC Translator can provide some relief!

This is not a programming language but rather a utility which runs from disk. It allows you to write structured programs using PROCEDURES, CALLS, CASE-CALLS, IF-THEN-ELSE, WHILE and UNTIL structures with no line numbers and no GOTO's. You write a structured program using the provided editor, or use most any other editor. The Structured BASIC Translator will then convert the file created by the editor into an efficient, executable BASIC program.

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 *Atm*, *Term-80*, and *Numbering* by Tom Sibolt; *Disassembler*, *Tape Utility*, and *Disk Utility* by Roy Soloff. Ask for these and other quality Acorn programs at your local computer store.

*TRS-80 is a trademark of Tandy Corp.



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CIRCLE 143 ON READER SERVICE CARD



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. "Come on 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 LET P=100:REM (Profit)
20 LET R1=5:R2=2:R3=1
30 LET R4=4:R5=1:R6=1
40 LET R7=3:R8=2:R9=1
50 LET R10=2:R11=1:R12=1
```

And he stopped to think. Then he wrote:

```
60 LET R13=1:R14=1:R15=1
```

"There will be decimal fractions, I think if we add them, and subtract their sum from 1."

```
70 LET S=0
```

"And then find the ratio between each decimal value and the remainder 2, and multiply that by the profit you want — we'll have it." He wrote:

```
80 FOR I=1 TO 15:LET S=S+R(I):NEXT I
```

"I've gone for the integer, rounding up. Okay?"

Pop let his jaw hang open but didn't speak.

```
90 LET R=1-S
```

"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.

"15, forty-nine altogether."

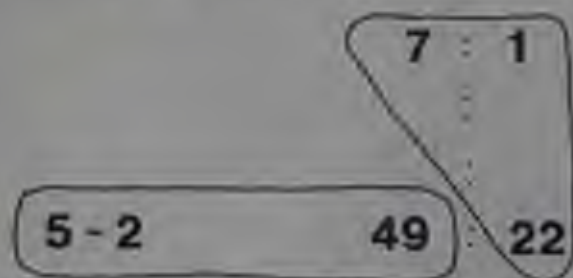
"Gulp," said Stan. "The calculations are easy, but the formatting is going to be a problem, and I'm not sure about that rounding-up routine. Do you mind if we have supper before I knock this off?"

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 his table

	7	1	8	1	9	1	10	1	11	1	12	1	13	1
4-5	100	30	100	30	100	30	100	30	100	30	100	30	100	30
7-3	90	20	80	20	70	20	60	20	50	20	40	20	30	20
3-2	80	20	70	20	60	20	50	20	40	20	30	20	20	20
2-5	70	20	60	20	50	20	40	20	30	20	20	20	20	20
5-5	60	20	50	20	40	20	30	20	20	20	20	20	20	20
2-1	50	20	40	20	30	20	20	20	20	20	20	20	20	20
5-2	40	20	30	20	20	20	20	20	20	20	20	20	20	20
3-1	30	20	20	20	20	20	20	20	20	20	20	20	20	20
7-2	20	20	20	20	20	20	20	20	20	20	20	20	20	20
4-1	20	20	20	20	20	20	20	20	20	20	20	20	20	20
5-2	20	20	20	20	20	20	20	20	20	20	20	20	20	20
5-1	20	20	20	20	20	20	20	20	20	20	20	20	20	20

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. "Was I understanding the program?"

"I think so. I wrote in a lot of explanation, just for you."

[illegible]

```

100 GOTO 400: IF "I calculate at 400-
110 IF 1/2/3 THEN 400" 40 70: GOTO 320: If impossible, say 40
120 40-320/21111 ... else make a string of the value
130 IF 1/2/3/4/5 THEN 400" 40: GOTO 370
140 2/ 3/4 THEN 400" 40 70: GOTO 320
150 40-320/31111: if bringing helps the formatting in next column
160 IF 1/2/3/4/5 THEN 40-400" 70: GOTO 320
170 GOTO 400: If there on the printer again
180 40-400" 70: PRINT TAB(12);: Print the beta
190 30-70: Incrementing the tab set
200 GOTO 400: If you know, turn off printer
210 IF 1/2/3 THEN 70: 70-40: GOTO 320: If data off after seven columns
220 GOTO 320: Returns to cycle for next bet on the line
230 40-400: 70-70: The second line of the two odds -- remainder
7
400 IF 1/2/3/4 THEN 70-1/2/3-70: GOTO 400: I can't work out if
410 I use the two ratios are reciprocals. Think about it.
420 2144: 20-271: Add them and takes their complement of 1, per to
bet sample
430 21-201(1/2/3/4): Odds per sample
440 21-201(1/2/3/4)
450 I standardised the simple '+.5' rounding-off method...
460 I because it didn't seem to work for everything.
470 2/ 3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31/32/33/34/35/36/37/38/39/40/41/42/43/44/45/46/47/48/49/50/51/52/53/54/55/56/57/58/59/60/61/62/63/64/65/66/67/68/69/70/71/72/73/74/75/76/77/78/79/80/81/82/83/84/85/86/87/88/89/90/91/92/93/94/95/96/97/98/99/100/101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125/126/127/128/129/130/131/132/133/134/135/136/137/138/139/140/141/142/143/144/145/146/147/148/149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/
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Ten to the Thirty-Eighth



varied 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^{18} (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^{17} 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:

$$\frac{p}{n} \left(\frac{1}{p} + \frac{1}{p+1} + \frac{1}{p+2} + \dots + \frac{1}{n-1} \right)$$

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

Readers of Martin Gardner'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 Marik. 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-

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 slips 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 slips are shown in the INVERSE video mode, while the bets and available funds are shown in the NORMAL video mode.

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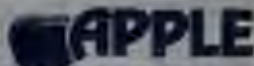
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GRAPHICS '88 — The first graphics package you'll see in this package! Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it. Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it. Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it.

PACKAGE TWO

ADVENTURE — This is the first adventure game you'll see in this package! Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it. Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it.

PACKAGE THREE

ADVENTURE — This is the first adventure game you'll see in this package! Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it. Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it.

PACKAGE FOUR

ADVENTURE — This is the first adventure game you'll see in this package! Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it. Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it.

PACKAGE FIVE

ADVENTURE — This is the first adventure game you'll see in this package! Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it. Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it.

PACKAGE SIX

ADVENTURE — This is the first adventure game you'll see in this package! Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it. Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it.

PACKAGE SEVEN

ADVENTURE — This is the first adventure game you'll see in this package! Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it. Includes 1000+ graphics and patterns for the screen. You must already complete the graphics in back with the word screen before you can use it.

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LA30 DECwriter II	\$1,695	\$182	\$90	\$61
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CIRCLE 215 ON READER SERVICE CARD

```

1040 IF H = 1 THEN RETURN
1050 L = MOD (A) * 18 : IF L < 2 THEN
1060
1070 L = 190 + L122 * INT (( /
1080 = INT 7L / 1021 * 10 = .
1090 L = 22
1100 TE = GCL11A * MOD (2) * = INT
1110 = MOD (3) * MOD (4)
1120 GCL1 = 2 + 110 ^ 11
1130 RETURN
1140 REM GET THE NUMBER OF PLAY
1150
1160 REM THEN INITIALIZE NAMES-
1170 REM MANY STRIPS, BUT
1180 TACT ACTS (CONTROLLED, BUT I
1190 T (INDEX)
1190 VTAB 101 INPUT "HOW MANY PL
1200 AVERST (1 TO 4) ?": M1
1210 IF M1 < 1 OR M1 > 4 THEN GOTO
1220
1230 IF M1 = 1 THEN GOTO 1231
1240 IF M1 = 2 THEN GOTO 1240
1250 FOR I = 1 TO M1: GOTO 1250
1260 NEXT I
1270 M2 = M1: GOTO 1271
1280 FOR I = 1 TO M1: GOTO 1281
1290 NEXT I
1300 GOTO 1301: GOTO 1301: GOTO 1301
1310 NEXT I
1320 FOR I = 1 TO M1: GOTO 1321
1330 NEXT I
1340 GOTO 1341
1350 REM INITIALIZE CHOICE HONO
1360
1370 FOR I = 1 TO M1: GOTO 1371
1380 NEXT I
1390 M2 = 0
1400 REM THIS SECTION PRINTS OUT
1410 THE DISPLAY FOR APPLE WINE
1420 H, STRIPS AND WHITE BLOCKS (
1430 (INVERSE BLANKS)
1440 TEXT : INVERSE
1450 H = 1000 * 2
1460 FOR J = 1 TO 14 STEP 2
1470 VTAB J: ITAB 1: FOR V = 1 TO
1480
1490 REM : PRINT " ": INVERSE
1500 : PRINT " "
1510 H = H + 1: IF H = 10 THEN GOTO
1520
1530 NEXT J
1540 M2 = J + 1: FOR I = J TO M1
1550 J: PT = 52 * (H - J)
1560 IF PT = 0 THEN PT = 1
1570 REM : STAB PT: PRINT A1 IF
1580 C * 10 THIS 1222
1590 NEXT I
1600 NEXT J
1610 REM
1620 PRINT 14, 17: PRINT 15, 19
1630 REM DISPLAY HTS AND TOTAL
1640
1650 GOTO 104
1660 PRINT 14, 22: PRINT 15, 23
1670 REM : VTAB 21
1680 PRINT "WATCH STRIP ON YOU 2
1690 TO 14": INPUT AT
1700 IF AT < 1 OR AT > 14 GOTO 1692
1710 GOTO 1690: IF AT = 1 THEN
1720
1730 IF AT = 2 THEN GOTO 1732
1740 GOTO 1690
1750 IF AT = 1 THEN GOTO 1750
1760 REM : M2 = M1: NAME ALL PLAYE
1770 S (NAME)
1780 GOTO 1210
1790 REM : CHANGE STRIP
1800 FOR I = 1 TO M1
1810 GOTO 1811
1820 NEXT I
1830 REM 183
1840 GOTO 1841
1850 REM 185
1860 REM 186
1870 REM 187
1880 REM 188
1890 REM 189
1900 REM 190
1910 REM 191
1920 REM 192
1930 REM 193
1940 REM 194
1950 REM 195
1960 REM 196
1970 REM 197
1980 REM 198
1990 REM 199
2000 REM 200
2010 REM 201
2020 REM 202
2030 REM 203
2040 REM 204
2050 REM 205
2060 REM 206
2070 REM 207
2080 REM 208
2090 REM 209
2100 REM 210
2110 REM 211
2120 REM 212
2130 REM 213
2140 REM 214
2150 REM 215
2160 REM 216
2170 REM 217
2180 REM 218
2190 REM 219
2200 REM 220
2210 REM 221
2220 REM 222
2230 REM 223
2240 REM 224
2250 REM 225
2260 REM 226
2270 REM 227
2280 REM 228
2290 REM 229
2300 REM 230
2310 REM 231
2320 REM 232
2330 REM 233
2340 REM 234
2350 REM 235
2360 REM 236
2370 REM 237
2380 REM 238
2390 REM 239
2400 REM 240
2410 REM 241
2420 REM 242
2430 REM 243
2440 REM 244
2450 REM 245
2460 REM 246
2470 REM 247
2480 REM 248
2490 REM 249
2500 REM 250
2510 REM 251
2520 REM 252
2530 REM 253
2540 REM 254
2550 REM 255
2560 REM 256
2570 REM 257
2580 REM 258
2590 REM 259
2600 REM 260
2610 REM 261
2620 REM 262
2630 REM 263
2640 REM 264
2650 REM 265
2660 REM 266
2670 REM 267
2680 REM 268
2690 REM 269
2700 REM 270
2710 REM 271
2720 REM 272
2730 REM 273
2740 REM 274
2750 REM 275
2760 REM 276
2770 REM 277
2780 REM 278
2790 REM 279
2800 REM 280
2810 REM 281
2820 REM 282
2830 REM 283
2840 REM 284
2850 REM 285
2860 REM 286
2870 REM 287
2880 REM 288
2890 REM 289
2900 REM 290
2910 REM 291
2920 REM 292
2930 REM 293
2940 REM 294
2950 REM 295
2960 REM 296
2970 REM 297
2980 REM 298
2990 REM 299
3000 REM 300

```

```

THE STRIPS, FLASH THE LARGE
1300 PUSE 24,29; PUSE 24,23; HOME
1301 VTAB 20
1302 PRINT "ALL SETS ARE NOW IN"
1303 GOSUB 230
1304 PUSE 24,0; PUSE 18,15
1305 GOSUB 240; GOTO 250
1306 GOSUB 260
1307 GOTO 270
1308 IF (CT) = AND (C(CT))
1309 IF (ST) = 1 THEN 1320
1310 VTAB 2; C = 1; C = 2; IF
C = 2; IF C = 2 THEN C =
1311 VTAB 2; FLASH; PRINT C(CT)
1312 NEXT CT
1313 PUSE 24,24; PUSE 24,23
1314 HOME; VTAB 20
1315 PRINT "THE CORRECT NUMBER IS"
1316 GOSUB 270
1317 IF = 0
1318 PRINT 22; INPUT AT
1319 TEXT; HOME
1320 VTAB 10; INPUT "DO YOU WANT
TO CHANGE GAME OPTIONS?"
1321 IF AT = 1 THEN AND AT = 2
2 THEN 1324
1322 IF AT = 3 THEN 1305
1323 VTAB 12; INPUT "DO YOU WANT
TO CHANGE THE NUMBER OF PL
PERST?"
1324 IF AT = 1 THEN AND AT = 2
2 THEN 1320
1325 IF AT = 3 THEN 1305
1326 HOME
1327 GOSUB 280
1328 GOTO 1323
1329 GOTO 1323
1330 IF LOOP THROUGH THE PROG
1331 GOTO 1323
1332 PRINT HEADER FOR PROG
1333 IF INSTRUCTIONS ARE
1334 GOTO 1323
1335 GOTO 1323
1336 VTAB 2; VTAB 17; PRINT "10"
1337 VTAB 18; VTAB 8; PRINT
"10"
1338 VTAB 19; VTAB 18; PRINT
"10"
1339 VTAB 20; VTAB 18; PRINT
"10"
1340 VTAB 21; VTAB 18; PRINT
"10"
1341 VTAB 22; VTAB 18; PRINT
"10"
1342 VTAB 23; VTAB 18; PRINT
"10"
1343 VTAB 24; VTAB 18; PRINT
"10"
1344 VTAB 25; VTAB 18; PRINT
"10"
1345 VTAB 26; VTAB 18; PRINT
"10"
1346 VTAB 27; VTAB 18; PRINT
"10"
1347 VTAB 28; VTAB 18; PRINT
"10"
1348 VTAB 29; VTAB 18; PRINT
"10"
1349 VTAB 30; VTAB 18; PRINT
"10"
1350 VTAB 31; VTAB 18; PRINT
"10"
1351 VTAB 32; VTAB 18; PRINT
"10"
1352 VTAB 33; VTAB 18; PRINT
"10"
1353 VTAB 34; VTAB 18; PRINT
"10"
1354 VTAB 35; VTAB 18; PRINT
"10"
1355 VTAB 36; VTAB 18; PRINT
"10"
1356 VTAB 37; VTAB 18; PRINT
"10"
1357 VTAB 38; VTAB 18; PRINT
"10"
1358 VTAB 39; VTAB 18; PRINT
"10"
1359 VTAB 40; VTAB 18; PRINT
"10"
1360 VTAB 41; VTAB 18; PRINT
"10"
1361 VTAB 42; VTAB 18; PRINT
"10"
1362 VTAB 43; VTAB 18; PRINT
"10"
1363 VTAB 44; VTAB 18; PRINT
"10"
1364 VTAB 45; VTAB 18; PRINT
"10"
1365 VTAB 46; VTAB 18; PRINT
"10"
1366 VTAB 47; VTAB 18; PRINT
"10"
1367 VTAB 48; VTAB 18; PRINT
"10"
1368 VTAB 49; VTAB 18; PRINT
"10"
1369 VTAB 50; VTAB 18; PRINT
"10"
1370 VTAB 51; VTAB 18; PRINT
"10"
1371 VTAB 52; VTAB 18; PRINT
"10"
1372 VTAB 53; VTAB 18; PRINT
"10"
1373 VTAB 54; VTAB 18; PRINT
"10"
1374 VTAB 55; VTAB 18; PRINT
"10"
1375 VTAB 56; VTAB 18; PRINT
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1376 VTAB 57; VTAB 18; PRINT
"10"
1377 VTAB 58; VTAB 18; PRINT
"10"
1378 VTAB 59; VTAB 18; PRINT
"10"
1379 VTAB 60; VTAB 18; PRINT
"10"
1380 VTAB 61; VTAB 18; PRINT
"10"
1381 VTAB 62; VTAB 18; PRINT
"10"
1382 VTAB 63; VTAB 18; PRINT
"10"
1383 VTAB 64; VTAB 18; PRINT
"10"
1384 VTAB 65; VTAB 18; PRINT
"10"
1385 VTAB 66; VTAB 18; PRINT
"10"
1386 VTAB 67; VTAB 18; PRINT
"10"
1387 VTAB 68; VTAB 18; PRINT
"10"
1388 VTAB 69; VTAB 18; PRINT
"10"
1389 VTAB 70; VTAB 18; PRINT
"10"
1390 VTAB 71; VTAB 18; PRINT
"10"
1391 VTAB 72; VTAB 18; PRINT
"10"
1392 VTAB 73; VTAB 18; PRINT
"10"
1393 VTAB 74; VTAB 18; PRINT
"10"
1394 VTAB 75; VTAB 18; PRINT
"10"
1395 VTAB 76; VTAB 18; PRINT
"10"
1396 VTAB 77; VTAB 18; PRINT
"10"
1397 VTAB 78; VTAB 18; PRINT
"10"
1398 VTAB 79; VTAB 18; PRINT
"10"
1399 VTAB 80; VTAB 18; PRINT
"10"
1400 VTAB 81; VTAB 18; PRINT
"10"
1401 VTAB 82; VTAB 18; PRINT
"10"
1402 VTAB 83; VTAB 18; PRINT
"10"
1403 VTAB 84; VTAB 18; PRINT
"10"
1404 VTAB 85; VTAB 18; PRINT
"10"
1405 VTAB 86; VTAB 18; PRINT
"10"
1406 VTAB 87; VTAB 18; PRINT
"10"
1407 VTAB 88; VTAB 18; PRINT
"10"
1408 VTAB 89; VTAB 18; PRINT
"10"
1409 VTAB 90; VTAB 18; PRINT
"10"
1410 VTAB 91; VTAB 18; PRINT
"10"
1411 VTAB 92; VTAB 18; PRINT
"10"
1412 VTAB 93; VTAB 18; PRINT
"10"
1413 VTAB 94; VTAB 18; PRINT
"10"
1414 VTAB 95; VTAB 18; PRINT
"10"
1415 VTAB 96; VTAB 18; PRINT
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1416 VTAB 97; VTAB 18; PRINT
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1417 VTAB 98; VTAB 18; PRINT
"10"
1418 VTAB 99; VTAB 18; PRINT
"10"
1419 VTAB 100; VTAB 18; PRINT
"10"
1420 VTAB 101; VTAB 18; PRINT
"10"
1421 VTAB 102; VTAB 18; PRINT
"10"
1422 VTAB 103; VTAB 18; PRINT
"10"
1423 VTAB 104; VTAB 18; PRINT
"10"
1424 VTAB 105; VTAB 18; PRINT
"10"
1425 VTAB 106; VTAB 18; PRINT
"10"
1426 VTAB 107; VTAB 18; PRINT
"10"
1427 VTAB 108; VTAB 18; PRINT
"10"
1428 VTAB 109; VTAB 18; PRINT
"10"
1429 VTAB 110; VTAB 18; PRINT
"10"
1430 VTAB 111; VTAB 18; PRINT
"10"
1431 VTAB 112; VTAB 18; PRINT
"10"
1432 VTAB 113; VTAB 18; PRINT
"10"
1433 VTAB 114; VTAB 18; PRINT
"10"
1434 VTAB 115; VTAB 18; PRINT
"10"
1435 VTAB 116; VTAB 18; PRINT
"10"
1436 VTAB 117; VTAB 18; PRINT
"10"
1437 VTAB 118; VTAB 18; PRINT
"10"
1438 VTAB 119; VTAB 18; PRINT
"10"
1439 VTAB 120; VTAB 18; PRINT
"10"
1440 VTAB 121; VTAB 18; PRINT
"10"
1441 VTAB 122; VTAB 18; PRINT
"10"
1442 VTAB 123; VTAB 18; PRINT
"10"
1443 VTAB 124; VTAB 18; PRINT
"10"
1444 VTAB 125; VTAB 18; PRINT
"10"
1445 VTAB 126; VTAB 18; PRINT
"10"
1446 VTAB 127; VTAB 18; PRINT
"10"
1447 VTAB 128; VTAB 18; PRINT
"10"
1448 VTAB 129; VTAB 18; PRINT
"10"
1449 VTAB 130; VTAB 18; PRINT
"10"
1450 VTAB 131; VTAB 18; PRINT
"10"
1451 VTAB 132; VTAB 18; PRINT
"10"
1452 VTAB 133; VTAB 18; PRINT
"10"
1453 VTAB 134; VTAB 18; PRINT
"10"
1454 VTAB 135; VTAB 18; PRINT
"10"
1455 VTAB 136; VTAB 18; PRINT
"10"
1456 VTAB 137; VTAB 18; PRINT
"10"
1457 VTAB 138; VTAB 18; PRINT
"10"
1458 VTAB 139; VTAB 18; PRINT
"10"
1459 VTAB 140; VTAB 18; PRINT
"10"
1460 VTAB 141; VTAB 18; PRINT
"10"
1461 VTAB 142; VTAB 18; PRINT
"10"
1462 VTAB 143; VTAB 18; PRINT
"10"
1463 VTAB 144; VTAB 18; PRINT
"10"
1464 VTAB 145; VTAB 18; PRINT
"10"
1465 VTAB 146; VTAB 18; PRINT
"10"
1466 VTAB 147; VTAB 18; PRINT
"10"
1467 VTAB 148; VTAB 18; PRINT
"10"
1468 VTAB 149; VTAB 18; PRINT
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1471 VTAB 152; VTAB 18; PRINT
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1474 VTAB 155; VTAB 18; PRINT
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"10"
1477 VTAB 158; VTAB 18; PRINT
"10"
1478 VTAB 159; VTAB 18; PRINT
"10"
1479 VTAB 160; VTAB 18; PRINT
"10"
1480 VTAB 161; VTAB 18; PRINT
"10"
1481 VTAB 162; VTAB 18; PRINT
"10"
1482 VTAB 163; VTAB 18; PRINT
"10"
1483 VTAB 164; VTAB 18; PRINT
"10"
1484 VTAB 165; VTAB 18; PRINT
"10"
1485 VTAB 166; VTAB 18; PRINT
"10"
1486 VTAB 167; VTAB 18; PRINT
"10"
1487 VTAB 1
```

```

"THE PROGRAM PICKS SOME NAME
ON POSITIVE"
A021 PRINT "NUMBERS 1 FROM 1 TO A
SOME 10-301.", PRINT "ONE OR
MORE ARE WRITTEN ON THE BACK
OF EACH PRINT "DATE STRIPS OF
PAPER."
A022 PRINT
A023 PRINT : PRINT "THE NUMBER OF
STRIPS OF PAPER TO BE USED
IS UP TO YOU.", PRINT "BUT
YOU MUST CHOOSE AT LEAST 3 &
NO MORE THAN 10."
A024 PRINT : PRINT "TAKEN YOU TO
GET A STRIP, IT WILL BE
TURNED OVER TO DISPLAY THE
NUMBER."
A025 YEAR 20: PRINT "HLL INPUT A
&"
A040 HOME : PRINT "THE GAME IS P
LAYED BY TURNING THE STRIPS
OVER ONE AT A TIME.", PRINT
" UNTIL YOU CHIE"
A042 PRINT "TO THE STRIP WHICH I
CHOOSE 50 OF THE LARGEST
OF THE GROUP."
A044 PRINT : PRINT "YOU MUST PAK
E THE LAST STRIP YOU TURNED
OVER, YOU CAN'T GO BACK TO
ANOTHER."
A046 PRINT "FROM ONE TO FOUR PER
SON MAY PLAY AT ANY ONE TIME
E." PRINT : PRINT "PLAYERS
HAVE BETWEEN THEIR OWN CHOICE
&."
A048 PRINT "IF A PLAYER MAKES A
CHOICE,THE OTHERS MAY GO ON
THEIR SEARCHING.", PRINT "SEE
TING CONTINUES UNTIL ALL PLA
YERS HAVE CHOSEN"
A050 PRINT : PRINT "TO HOLD AT A
PARTICULAR SET, ENTER A
CODE FOR THE SET.", PRINT "Y
OU MUST, HOWEVER, MAKE SAME A
CT OF AT"
A052 PRINT "LEAST 51 OR"
A054 YEAR 22: PRINT "HLL INPUT A
&"
A060 HOME : YEAR 21: PRINT "TO TH
ROW A LITTLE CONFUSION INTO
PATRONS THE COMPUTER CAN LI
E TO YOU."
A062 PRINT : PRINT "TWO OPTIONS
ARE PROVIDED TO THE BASIC C
HIE.", PRINT "IF THE FIRST O
PTION, THE COMPUTER WON'T TO
LL YOU"
A064 PRINT : PRINT "THE SECOND O
PTION IS NOT FOR THE PAINT
OF HEART.", PRINT "THE COMPU
TER WILL TELL YOU IF IT HAS
&." PRINT "ABOUT THE LAST BORN
&."
A066 PRINT : PRINT "SO, IF YOU'VE
& JUST GET ON IT, YOU MAY
USE IN YOU MAY WIN BUT YOU
WON'T BE SURE"
A068 PRINT "BUT THEN BEHIND WILL
& ANOTHER ELSE."
A070 YEAR 23: PRINT "HLL INPUT A
&"
A072 HOME : YEAR 21: PRINT "THE A
CAL CHALLENGE OF THE GAME IS
TO FIND A WAY TO REPHRASE
& MUST BEING."
A074 PRINT : PRINT "MARTIN WARD
& BEHINDS THE STRATEGY
FOR THE MENTAL GAME IN THE 6
&."
A076 PRINT : PRINT " " "AND WITH
CRITICAL THINKING FROM" PRINT
" " "SCIENTIFIC METHOD"
A078 PRINT : PRINT "THE ANALYSIS
OF THE SITUATION USING THE
COMPUTER AID TO YOU IS LEF
T TO THE INTERESTED READER
&."
A080 YEAR 20: INPUT "HLL RETURN
TO START PLAYING"
YEAR TEXT : HOME
HOME GOTO 1000
HOME 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 'Y' or a 'N' 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 **Nain** 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:

1050 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. □

```
1010REM -----YORN
1020INPUT "Y"
1030RESTORE 1050
1040READ A$,B$ IF A$="YES" THEN 1060\A=LEN(A$)
1050IF 1*(1,A) <> A$ THEN 1040
1060ON A$(B) GOTO 1070,1100
1070RETURN
1080DATA "Y",1,"Y",1,"N",-1,"n",-1
1090DATA "YES",2
1100PRINT "'Yes' or 'no', please."
1110GOTO 1020
READY
```

David Gerrold, P.O. Box 1190 Hollywood, CA 90028



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Intelligent Computer Games



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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 asymmetry 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 12×7 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 3×3 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 v_1 for



FIGURE 1

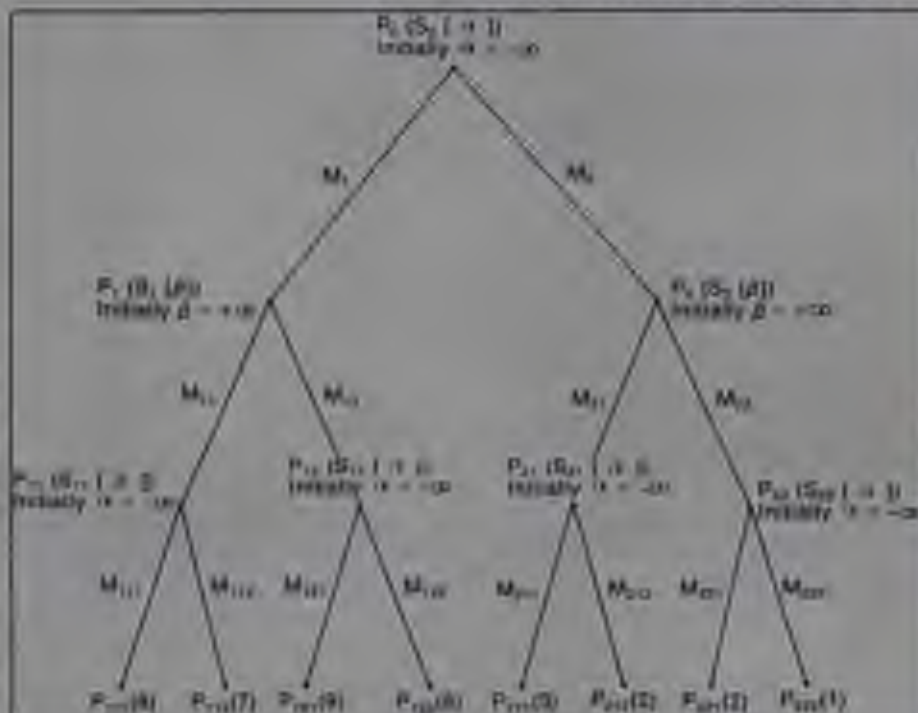


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of position P_{11} , assuming correct play by the opponent, and so the value 5 is assigned to S_{11} . We call this process of assigning values as the program backtracks up the tree "backing-up."

The score of S_{11} is now backed up to S_0 and the program then considers position P_{12} to determine whether it will prefer to play move m_1 or m_2 . It sees that from position P_{12} its opponent can, if he wishes, move to P_{21} for a score of 5, 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, $P_{22}, P_{23}, \dots, P_{2,1000}$, because the move m_2 is already known to refute m_1 . Thus the program has determined that m_1 is better than m_2 , even though it has examined only 3 of the 1,000 terminal nodes on the tree!

Of course this particular example has been specifically designed to tell 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 $-\infty$ (α). All non-terminal nodes at odd ply are assigned the value $+\infty$ (β). 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 α . The opponent moves from positions P_1 and P_2 , trying to minimize the value of β . The program moves from the positions at ply-2 (P_{11}, P_{12}, P_{21} and P_{22}), trying to maximize α .

The tree search now proceeds as follows:

1. Examine P_{11} . The score of 8 is greater than $-\infty$, so α at S_{11} is set to 8. This score is then compared with β at S_1 and found to be less than $+\infty$, so this value of β is also set to 8. In order to decide whether the program might be willing to play m_{11} , the score of 8 at S_{11} is compared with $-\infty$ at S_0 and found to be greater, so α at S_0 is set to 8.

2. Examine P_{12} . The score of 7 is less than α at S_{11} , which is now 8, and since it is intended to maximize α , the value of α at S_{11} is not adjusted, and therefore the value of β at S_1 and that of α at S_0 also remain unchanged.

3. Examine P_{21} . The score of 9 is greater than $-\infty$, so α at S_{21} is set to 9. This score is then compared with β at S_2 and found to be greater, and since it is intended to minimize β the program can reject move m_{22} , knowing that its opponent can do better with move m_{21} .

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

discussion 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.

Marion 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	3.07	8	6.84
4	16	12.14	64	40.11
8	64	38.05	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_{21} , which is found to have a score of 3. This is compared with α at S_2 and found to be greater, and since it is intended to maximize α the program will set this value of α to 3.

5. Examine P_{22} . The score of 2 is less than 3, so α at S_{22} (currently 3) is left unchanged, since it is intended to maximize α . This score of 2 is then compared with β at S_2 , found to be lower, and since it is intended to minimize β this value of β at S_2 is set to 3. Finally this value of 3 is compared with α at S_0 (currently 8) and found to be lower. Since it is intended to maximize α , the program already knows that m_2 is inferior to m_{11} , because playing m_2 is not consistent with maximizing α .

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_{121}, P_{122} and P_{221} , 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 36^3 for a 4-ply tree. Yet by using the alpha-beta algorithm, if the tree is optimally ordered we need examine only 2×36^3 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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	random	optimal*	random	optimal*
2	3.67	3	6.84	5.66
4	12.14	7	40.11	15
8	58.65	15	250.37	44.248
16	122.31	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 lookahead 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 3×3 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, ..., 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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Acknowledgement

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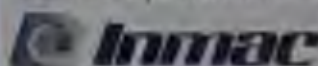
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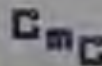
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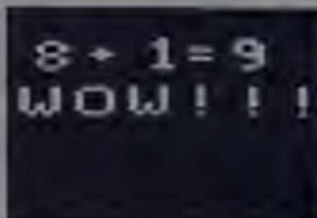
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The series is designed for the 16K TRS-80 Level II and is attractively packaged in a vinyl binder. Included is a study guide which relates the material to current

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80 Software Critique on
Ecology Simulations-1
Jan-March 1980

Ecology Simulations-2



Rats



Malaria

controversies, stimulate classroom discussion, and provides sample exercises. The series is also available on disk: Ecology Simulations-1 (CS-3201), Ecology Simulations-2 (CS-3202) and Social and Economic Simulations (CS-3203). At a modest \$24.95 each, with quantity discounts available, the series becomes an affordable necessity.

Apple Gradebook (CS-4506) brings the speed and accuracy of the computer to the teacher's traditional grading and record-keeping procedures. Gradebook stores and maintains all student records on disk. The package includes ten interlocking programs which lead you step by step through setting up a class file and storing it on disk. These invaluable programs summarize the state of the class as a whole and then let you

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Apple-Cart

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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 the time, 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 Routine
- 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 in 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 in 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 (RS) and setting the initial point 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 1180 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 leading 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 1250 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 1360 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 FS 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 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 1480. The number of records and the name of the file are displayed in line 1470. Input for the option selection is accepted in line 1490 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 1620 - 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

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 1550. 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 255 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. The 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 PEER 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,H.
1953 PRINT "DESCRIPTION...COST"
1954 PRINT "DATE PUR"
1955 POKE 34,H

2000 SPEED=125

2001 POKE 34,H / SPEED=256
Now line 1955 marks 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 unit 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:

2014 LET T=0

2015 LET ST=VAL(MID\$(R\$,22,7))
T=T+ST

2016 PRINT PRINT TAB (21);"\$"
INT(T*100);"/100"

Each time a record is READ, line 2050 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 skip 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 it 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

Videotapes 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, unforced 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 5 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 800-627-0278 (in Texas, 214-681-4070), or write them at 14580 Midway Road, Dallas, TX 75234. Also, look for these videotapes 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. Rata, is a real time, interactive high resolution 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 effect 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 8000. 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 cassette.

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 5 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 15 before you

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 55K. 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 \$25.50.

```

RUN
HOME INVENTORY FILE MANAGER
-----
ENTER THE FILE NAME - HOME.INVEN
*****
FILE OPTIONS:
1. BUILD NEW RECORDS
2. ADD HOME RECORDS
3. LIST RECORDS
4. EDIT A RECORD
5. KEYWORD SEARCH
6. END THE PROGRAM

FILE 'HOME.INVEN' CONTAINS 5 RECORDS
WHICH NUMBER - 3

LIST TEXT FILE - HOME.INVEN
1. COUNTRY/STATE RECORD.....1104.85..02/77
2. LOVE SEAT.....0005.88..02/77
3. REFRIGERATOR.....0005.75..08/78
4. WASHES.....0278.32..08/78
5. CASSETTE DECK.....0345.37..12/78

PRESS RETURN TO CONTINUE -

WHICH NUMBER - 3

LIST TEXT FILE - HOME.INVEN
1. COUNTRY/STATE RECORD.....1104.85..02/77
2. LOVE SEAT.....0005.88..02/77
3. REFRIGERATOR.....0005.75..08/78
4. WASHES.....0278.32..08/78
5. CASSETTE DECK.....0345.37..12/78

*****
PRESS RETURN TO CONTINUE -
  
```

```

WHICH NUMBER - 3
KEYWORD SEARCH - HOME.INVEN
KEYWORD - 00/78
1. REFRIGERATOR.....0005.75..08/78
4. WASHES.....0278.32..08/78

DO YOU WANT TO EDIT Y/N YN
THE OTHER KEYWORD Y/N YN
PRESS RETURN TO CONTINUE -
  
```

MASTER FILE - (1-7) DISK00000001.DAT - FILE.MST		
FIELD #	DESCRIPTION	TYPE
1	TITLE	40/A
2	ARTIST	40/A
3	COMPANY	30/A
4	PRODUCER	30/A
5	LABEL	20/A
6	DATE	6/A
7	POSITION	6/A
8	COMPOSITION	25/A
9	REMARKS	20/A

DOCT #	DESCRIPTION
1	TITLE
2	ARTIST
3	COMPANY
4	PRODUCER
5	LABEL
6	DATE
7	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 OPEN GETS 2720
1100 LET A = CHR$(142) DIR #1200: C = 1
1110 PRINT DA"MODRM 1:0:1"
1120 PRINT DA"LOAD 6:TIME" REM DATE & TIME
1130 HOME : VTAB (21) PRINT "HOME INVENTORY FILE NAME"
1140 :
1150 FOR I = 1 TO 27: PRINT "TO NEXT C: PRINT
1160 INPUT "ENTER THE FILE NAME - "FN
1170 :
1180 REM ** SYSTEM VARIABLES **
1190 REM *****
1200 :
1210 REM FN= FILE NAME
1220 REM OR= CONTROL D
1230 REM XN= FILE RECORD
1240 REM AN= RETURN (CHR$(13))
1250 REM UN= LOCAL RESPONSE
1260 REM LN= LOCAL VARIABLES
1270 REM C = RECORD COUNT
1280 REM R = OPTION SELECTION
1290 REM W = RECORD # TO ERASE
1300 REM XN= KEYWORD TO SEARCH
1310 REM W = SEARCH FLAG
1320 :
1330 REM ** OPERATING SYSTEM **
1340 REM *****
1350 :
1360 CALL 9001 REM DATE & TIME
1370 PRINT : PRINT "FILE OPTIONS"
1380 :
1390 PRINT " 1. BUILD NEW RECORDS"
1400 PRINT " 2. ADD MORE RECORDS"
1410 PRINT " 3. LIST RECORDS"
1420 PRINT " 4. EDIT A RECORD"
1430 PRINT " 5. KEYWORD SEARCH"
1440 PRINT " 6. END THE PROGRAM"
1450 PRINT : PRINT DA"OPEN"FN":L40"
1460 PRINT DA"READ"FN":B:10 INPUT C
1470 PRINT DA"CLOSE"FN"
1480 PRINT "FILE "FN" CONTAINS "C" RECORDS"
1490 PRINT : INPUT "WHICH NUMBER - "X
1500 IF X > 6 GOTO 1390
1510 IF X = 0 THEN PRINT : PRINT : PRINT "DONE" HOME
1520:01 PRINT DA"CLOSE"FN" : SPEED= 2500 END
1530 ON B GOTO 1500:1520:1500:2110:2200
1540 :
1550 :
1560 REM ** BUILD THE FILE **
1570 REM *****
1580 HOME : VTAB (21) PRINT "BUILD FILE - "FN" -
1590 PRINT DA"OPEN"FN":L40"
1600 PRINT DA
1610 GOTO 1770
1620 :
1630 REM ** ADD RECORDS **
1640 REM *****
1650 :
1660 HOME
1670 PRINT : VTAB (21) PRINT "ADD FILE RECORDS - "FN
1680 :
1690 PRINT DA"OPEN"FN":L40"
1700 PRINT DA"READ"FN":B:10
1710 INPUT C
1720 PRINT DA"READ"FN":B:10
1730 INPUT XN1
1740 PRINT DA1 PRINT
1750 PRINT "RECORD #1: XN1"
1760 PRINT : VTAB (21) PRINT "Y/N"
1770 INPUT C : IF C = 1
1780 :
1790 PRINT "RECORD #1: XN1"
1800 IF XN1 = "END" GOTO 1860
1810 PRINT DA"WRITE"FN":B:10
1820 PRINT XN1
1830 PRINT DA"CLOSE"FN"
1840 PRINT : VTAB (21) PRINT "Y/N"
1850 INPUT C : IF C = 1
1860 :
1870 LET C = C + 1
1880 GOTO 1770
1890 LET C = C - 1: PRINT : PRINT C: PRINT
1900 PRINT DA"WRITE"FN":B:10
1910 PRINT C
1920 PRINT DA"CLOSE"FN"
1930 PRINT : PRINT "PRESS RETURN TO CONTINUE - " : GET
1940 IF A = CHR$(13) THEN HOME : VTAB (21) GOTO
1950
1960 HOME : GOTO 1660
1970 :
1980 REM ** LIST RECORDS **
1990 REM *****
2000 :
2010 REM FN= FILE NAME
2020 REM OR= CONTROL D
2030 REM XN= FILE RECORD
2040 REM AN= RETURN (CHR$(13))
2050 REM UN= LOCAL RESPONSE
2060 REM LN= LOCAL VARIABLES
2070 REM C = RECORD COUNT
2080 REM R = OPTION SELECTION
2090 REM W = RECORD # TO ERASE
2100 REM XN= KEYWORD TO SEARCH
2110 REM W = SEARCH FLAG
2120 :
2130 REM ** OPERATING SYSTEM **
2140 REM *****
2150 :
2160 CALL 9001 REM DATE & TIME
2170 PRINT : PRINT "FILE OPTIONS"
2180 :
2190 PRINT " 1. BUILD NEW RECORDS"
2200 PRINT " 2. ADD MORE RECORDS"
2210 PRINT " 3. LIST RECORDS"
2220 PRINT " 4. EDIT A RECORD"
2230 PRINT " 5. KEYWORD SEARCH"
2240 PRINT " 6. END THE PROGRAM"
2250 PRINT : PRINT DA"OPEN"FN":L40"
2260 PRINT DA"READ"FN":B:10 INPUT C
2270 PRINT DA"CLOSE"FN"
2280 PRINT "FILE "FN" CONTAINS "C" RECORDS"
2290 PRINT : INPUT "WHICH NUMBER - "X
2300 IF X > 6 GOTO 2190
2310 IF X = 0 THEN PRINT : PRINT : PRINT "DONE" HOME
2320:01 PRINT DA"CLOSE"FN" : SPEED= 2500 END
2330 ON B GOTO 2190:2310:2190:2310:2310
2340 :
2350 :
2360 REM ** LIST RECORDS **
2370 REM *****
2380 HOME
2390 PRINT : PRINT "KEYWORD SEARCH - "FN"
2400 PRINT : INPUT "KEYWORD - "XN
2410 LET W = 0
2420 PRINT DA"OPEN"FN":L40"
2430 PRINT DA"READ"FN":B:10
2440 INPUT C
2450 PRINT DA
2460 FOR I = 1 TO C
2470 PRINT DA"READ"FN":B:10
2480 INPUT XN1
2490 PRINT DA
2500 FOR I = 1 TO 40 - LEN XN1
2510 IF XN1(1:I) = XN THEN XN1 = XN GOTO 2530
2520 PRINT : PRINT "NOT FOUND" : PRINT "TRY AGAIN"
2530 INPUT XN1 IF XN1 = "Y/N" GOTO 2530
2540 LET XN = XN1
2550 NEXT I
2560 PRINT : PRINT "NOT FOUND" : PRINT "TRY AGAIN"
2570 INPUT XN1 IF XN1 = "Y/N" GOTO 2530
2580 PRINT : PRINT "NOT FOUND" : PRINT "TRY AGAIN"
2590 INPUT XN1 IF XN1 = "Y/N" GOTO 2530
2600 PRINT : PRINT "PRESS RETURN TO CONTINUE - " : GET
2610 IF A = CHR$(13) THEN HOME : VTAB (21) GOTO
2620
2630 HOME : GOTO 1960
2640 :
2650 REM ** ERROR ROUTINE **
2660 REM *****
2670 :
2680 IF XN1(1:2) = "Y/N" THEN PRINT "PROCESSING END"
2690:01 SPEED= 2500 GOTO 1330
2700 IF XN1(1:2) = "Y/N" THEN PRINT "THIS IS A
2710 NEW FILE" FOR I = 1 TO 20: PRINT "NEXT C: GOTO 1330"
2720 :
2730 REM XN = 0-100 100
2740 :
2750 :
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.166), 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 166, 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 tend 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 three 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*B*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 listings 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	SORT TIME	TYPE	FILE SIZE	SORT TIME
	(Bytes)	(Sec)		(Bytes)	(Sec)
SORT	16K	33	SORT	340K	1081
SORT	32K	49	SORT	560K	2568
SORT	85K	173	SORT and MERGE	85K SORT +	1757
SORT	170K	445			

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TRS-80 IS A REGISTERED TRADEMARK OF TANDY CORPORATION

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 3 1/2-by-1 1/2-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 R. 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 fundies' 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 1976, 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 1976.

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), *Cinic* (biodythms, 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 1976, 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 II 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 one copy of *Cinic* 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 ever 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 program 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.

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 transferable 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 1 (monthly, \$40 a year, Anaheim, CA); and Tape Talk (bi-monthly, \$7, San Jose, CA).

A fourth, Gaudius (monthly, \$30, Ozore 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 Garcia, featured in January, 1985 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 PN 500: BSR X-10 Command Console, cordless controller, two lamp modules and one appliance module. \$124.95.

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 powered down version of the BSR X-10.



Shipping costs are not included in prices.

To order, call TOLL FREE 1-800-258-1750, or NY call 212-514-1441.

6 SOUTH STREET, MILFORD, NH 03055 For more information, call 1-800-258-1750.

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:

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:

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:

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*

CIRCLE 221 ON READER SERVICE CARD

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 8088A-2 microprocessor, which has a processing speed of 5 MHz, but system speed is 7 MHz 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, 5-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 1000 CRT terminal is \$10,825.

Artec Electronics, 606 Old County Rd., San Carlos, CA 94706, (415) 682-2710.

CIRCLE 212 ON READER SERVICE CARD

CLUSTERHARED MICROCOMPUTER SYSTEM

Nestar Systems announces a new Clusterhared personal computer system with the introduction of the

Cluster/One, Model A for the Apple IIe, 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 Clusterhared 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 \$5,000 for the basic system with 1,280,000 bytes of storage. The optional 160 and 32 Mhz 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, 630 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), Hightstown, N.J., 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, 512K 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 RAM 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 2 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 and 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 PRODUCT!

Super Color S-100 Video Kit \$99.95

Expands to 256 x 128 high resolution color graphics. 1024 bits of high resolution color graphics. Memory required: 16 Kbytes. Super Color S-100 kit includes: 16K, 32K, 64K, 128K, 256K.

Gremlin Color Video Kit \$99.95

256 x 128 high resolution color graphics. 1024 bits of high resolution color graphics. Memory required: 16 Kbytes. Gremlin Color Video Kit includes: 16K, 32K, 64K, 128K, 256K.

Best Super Basic

Best Super Basic is a complete BASIC interpreter. It is the best BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Best Super Basic is a complete BASIC interpreter. It is the best BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

EN H Reader Kit \$24.95

EN H Reader Kit includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

1002 10K Dynamic RAM Kit \$199.95

1002 10K Dynamic RAM Kit includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

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Super Basic to C Converter \$49.95

Super Basic to C Converter includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

1002 10K Dynamic RAM Kit \$199.95

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1002 10K Dynamic RAM Kit includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.



RCA Cosmac Super III Computer \$199.95

Compare features before you decide to buy any other computer. There is no other computer in the home today that has all the features of the Super III. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

The Super III includes a ROM monitor for program loading, editing and execution. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Super Expansion Board with Cassette Interface \$89.95

The Super Expansion Board is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

The Super Expansion Board is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

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Super Expansion Board with Cassette Interface \$89.95

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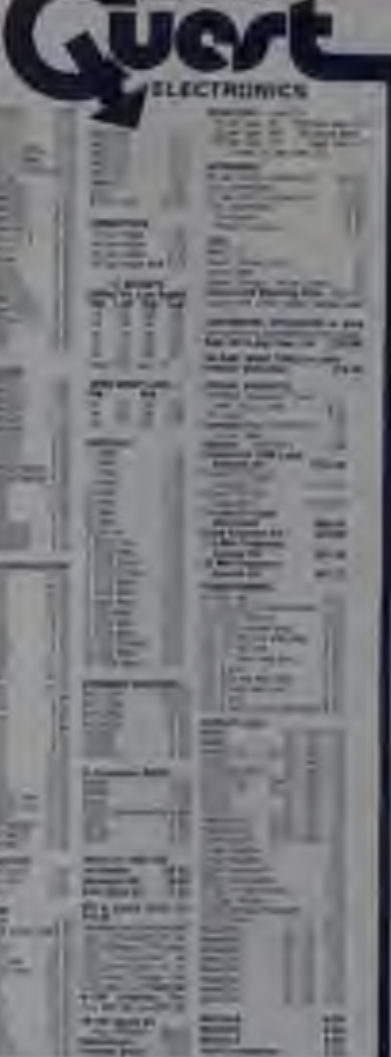
The Super Expansion Board is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Time development. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

INTEGRATED CIRCUITS



1001 10K Dynamic RAM Kit \$199.95



HYCKWILL AIM 65 Computer

HYCKWILL AIM 65 Computer includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Multi-volt Computer Power Supply

Multi-volt Computer Power Supply includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

PRISM Super 100 Series

PRISM Super 100 Series includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

40 Ki Crystal Time Base Kit \$4.40

40 Ki Crystal Time Base Kit includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

NiCad Battery Charger \$5

NiCad Battery Charger includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

LRG 3800 - Printer \$249.95

LRG 3800 - Printer includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Teknival Terminal \$449.95

Teknival Terminal includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Interlink II Terminal \$274.95

Interlink II Terminal includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Super Brain

Super Brain includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Single Disk Terminal \$299.95

Single Disk Terminal includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

7910 Update Master Module \$29.95

7910 Update Master Module includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

S-100 Computer Boards

S-100 Computer Boards includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Video Modulator Kit \$9.95

Video Modulator Kit includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

Digital Temp. Meter Kit \$34.95

Digital Temp. Meter Kit includes: 16K, 32K, 64K, 128K, 256K. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100. It is a complete BASIC interpreter for the S-100.

TERMS: \$5.00 min. order. D. funds. Cash residents add 5% tax. Shipping charges will be added to charge items.

FREE: Send for your copy of our NEW 1989 QUEST CATALOG, includes 750 items.



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, 2100 East Higgins Rd., Elk Grove Village, IL 60007. (312) 364-1180.

CIRCLE 254 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 \$1035.

TeleVideo, Inc., 3190 Coronado Dr., Santa Clara, CA 95051. (408) 246-5428.

CIRCLE 256 ON READER SERVICE CARD

Salesmen, Carriers and Implement Dealers



MICRO BEEP™

ADDs SOUND TO YOUR TRS-80™!

MAKES GAMES MORE INTERESTING

NEEDS NO BATTERY • 45 MINUTE SET-UP • AFTER 10 MINUTES • ANSWERS YOUR MAIL

EMPLE MICRO BEEP... and your money... EASY TO CONTROL FROM BASIC... OUT OF THE BOX... OUT OF THE BOX...

24 HOUR HOTLINE • VISA OR MASTER CHARGE • CREDIT • NO CREDIT

PLEASE SEND: MICRO BEEP

\$89.95 (a. Price \$129.95) (b. Price \$129.95)

A. Price \$89.95 (a. Price \$129.95) (b. Price \$129.95)

1. Check 2. Money Order 3. VISA 4. MC 5. CREDIT

NAME _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

CIRCLE 193 ON READER SERVICE CARD

STOP PLAYING GAMES

TRS-80 (1) (2) (3) (4)
PET
APPLE
OTHERS

1. Choose your own HORSE RACING and HORSE RACING

2. Choose your own HORSE RACING and HORSE RACING

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START USING YOUR COMPUTER FOR FUN and PROFIT!

CIRCLE 237 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, ON, Canada K1P 5H4.

CIRCLE 287 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, 3622 Linstock, Boise, ID 83704, (208) 377-1938.

CIRCLE 288 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 289 ON READER SERVICE CARD

International Data Services announces two graphics programs for the TRS-80 Level II. Microsketch III is a "graphics drawing/graphic string creation/bug 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 56th St., New York, NY 10019, (212) 763-8610.

CIRCLE 290 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 291 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. \$110. H & H Trading Company, P.O. Box 23546, Pleasant Hill, CA 94523, (415) 937-1638.

CIRCLE 292 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 293 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 294 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 \$185) modem that talks your language.

**Cat by
Novation**

The voice computer lets the world.
Call for details.

(800) 423-5410

In California (213) 979-5000



Available at Bestway Stores, Kmart Electronics, Rye Electronics, Computerland and your local computer store.

Novation, Inc. / 20885 Via Arroyo, Torrance, California 90509

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 285 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 286 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 788, Boynton Beach, FL 33435. (305) 737-4738.

CIRCLE 287 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 960 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) 649-0295.

CIRCLE 288 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. \$1.95. International Data Services, 340 West 55th St., New York, NY 10019. (212) 765-8616.

CIRCLE 289 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 290 ON READER SERVICE CARD

BUSINESS

An Inventory Program for 64K 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 628, 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) 855-8000.

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The Nevada Cobol compiler for CP/M based systems is designed specifically for small businesses using microprocessors. \$89.95. Ellis Computing, 1480 17th Ave., San Francisco, CA 94122. (415) 664-1534.
CIRCLE 275 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 Collins, Westlake Village, CA 91361.
CIRCLE 274 ON READER SERVICE CARD

A Model 1 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. \$29.95. Available from participating Radio Shack Computer Centers, stores and dealers.

Symbolic/Structured Basic for 832K 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, 360 Riverside Dr., New York, NY 10020.
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) 258-1700.
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 60 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-sectored floppy disk. \$85. Key Bits, Inc., P.O. Box 562593, Miami, FL 33159.
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Micro Data Base Systems announces a hierarchical (tree-structure) data base management system for Z-80, 6802 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; 6802 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. (313) 374-1878.

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. \$36. 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. RSH Software Products, P.O. Box 2131, Yorba Linda, CA 92686. (714) 637-8963.

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North Star Doc is a complete system for the TRS-80. It includes everything you need to get started with the TRS-80. It includes everything you need to get started with the TRS-80.

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CIRCLE 128 ON READER SERVICE CARD



Stephen B. Gray

More Basic Computer Games, edited by David H. Ahl. Creative Computing Press, Morristown, NJ, 196 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 "64 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 (Missovers), 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, Blackjack, Berce, Comdr, Deepspace, Gerwar, JCHM, Mastermind, Motorcycle Jump, Nomad, Roudrars, Refuse, Rétinos, Seawar, Twinky, 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 Bannant, Big 6 (interval betting wheel), Bombrun, Camel (hazardous trek across the desert), Chuck-A-Luck, Class Enrichers (avoid the UFO or destroy it), Concentration, Conway (naval war game), Coral (tame a wild horse), Elms (the psychiatrist), Grand Prix, Joust (with a knight), Man-Eating Rabbit, Millionaire, Mismatch, Pinball, Shout (last two survivors of total atomic war), Smash (one-lap Johnny 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, Peasor (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 Basic.

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 Becker, mostly of robots, are highly imaginative and fascinating in their own right.

The 64 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, puzzle, etc. Regardless, this book is an absolute treat for anybody who calls himself a computer gamesman. And in *if* a game, the price is right!

Z80 Assembly Language Programming, by Lance A. Leventhal, Osborne & Associates Inc., Berkeley, CA. 342 pages, paperback \$9.50, 1972.

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 assembly that has a great deal of what, but very little why for the neophyte. A reader with experience in assembly 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 Reliability, 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 open 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 17114. 300 pages, paperback \$6.95, 1974.

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 8081, 4040 and 8085, mainly filler material because those 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 contain 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 16-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. Bagowski. Creative Computing Press, Box 759-M, Morristown, NJ 07960. 100 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 Grieshaber and Jaffray some years ago. Also, you may have seen the Bagowski book in its previous incarnation, published by Edurcomp Corp. in 1977. Edurcomp changed its name to Quindia, started marketing computer systems to municipal governments instead of to schools, and got out of publishing.

The book gives 60 problems for you to solve with a computer, divided into eleven categories: arithmetic, algebra, geometry, trig, calculus 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-associating 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 "chore" 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. Bellium Press, Portland, OR. 314 pages, paperback \$12.95, 1979.

The title is misleading. Although this book is about our 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's IBM Basic, J-Corn Wang's Pali Alto TINY Basic, National's TINY Basic III, and "The Great Experiment — Floppy ROM II," Robert Utterby'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 book issues that are still available, and how to obtain them." Tsch, tch.

The preface, by Carl Warren, who was then in-charge of Interface Age as the boss of publications, and who, in that writing, is the West Coast editor for ERM magazine, notes that some volumes of the "Best of Interface Age" are forthcoming, one on general-purpose software, two for the "small businessman" (MS and under?), and one that "combines these articles for the computer thinker and gambler."

The preface also says that the five reprinted articles in this book "provide the reader with some of the most useful software ever written. Useful now for study, and for that person highly welcome by the small fraternity of assemblymen. But surely not intended for direct use on your computer or mine."

Introduction to T-BUG, by Don Inman and Kurt Inman. Dillithium 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 16-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 produce 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., Hachula 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 (15 of them); algebra (127); geometry (104); trigonometry (34); probability and statistics (10); 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 621 problems, which works out to about seven-fifths of a penny per problem, compared with 0.5 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 16 or 22 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 "snails 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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1. Every project objectives are used to avoid the embarrasment of not making the corresponding cost.
 2. A carefully planned project takes three times longer to complete than expected; a carefully planned project takes only twice as long.
 3. The effort required to correct a course increases geometrically with time.
 4. Project teams distrust weekly progress reporting because it is usually meaningless (due lack of progress).
- draw
- includes an getting some hard work out of crisis, or until someone creates and it creates the parallel
1. Components are uncertain, but humans are even more unstable.
 2. Any system which depends on human reliability is unstable.
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But that's all changed now. Everything is back to normal. My computer is good. He must be. As you can see, all my friends live inside my Lesson. I wish I could tell you their names — they're on the tip of my tongue — but I can't seem to remember."

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Mr. Kendall Brockenbush, technician (g.p.) at A's Radio and TV Repair in St. Peter, Arkansas, heads up the team responsible for repairing busted computers. First he removes the position, he replaces them in automobile racks.

The computer that was there

AI's Radio and TV evaluated personal computers and chose Lemon because it was there. "Sometimes, you just can't be too picky and you gotta take what you can see."

Brockenbush, 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 Brockenbush didn't have a



Personal and more

whole lot to occupy himself. Now, learning all about the guts of computers, Brockenbush doesn't have a single second to spend in the pool hall or the cream parlor.

The reason for all this muckin' about inside the Lemon was to get it to work off the approximately 55-volt, approximately 31-ampere power in St. Peter produced by the generator station on the North branch of Cowlick Creek. It was bought up for a record 12 minutes on February 2nd and Brockenbush got his first real taste of what it could do. That's when he decided that someday he would have a Lemon III minus.

lemon computer

Figure 2 shows the typical phony-type clock interface. In this design the clock runs independently with a display multiplexing rate (about 1 kHz or 100 kHz) set by a resistor/capacitor combination taken from a 1974 Funk tune. Seven of the output drive lines are level shifted and buffered for TTL, through a 4030A72, and the 27 digit lines are non-priority encoded to produce a standard 9.7-bit binary value for transmission to the computer of the energized output digit-enable line. The 9.7-bit digit and 6-bit Roman numeral segment codes are combined to produce a single 1-bit byte interfaced to a central input port.

This circuit is fully static (once anchored down it won't move) and is completely independent of program or operator control (once turned on, it is as good as on). The basic 47-chip interface consists of a 37 digit BCD/7 segment output clock type MMB-312, an MM5369 time-base generator, two score and three MOS to TTL buffers to send data and food to the microprocessor, and 11 TTL-to-CMOS converters to give the processor some modicum of control over the hypertext clock chip.

Listing 1. The actual listing was 700 pages long and, what with the mess of the printed matter, was divided to present the memory.

Listing 1. The actual listing was 700 pages long and, what with the mess of the printed matter, was divided to present the memory.

0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
0001	0001	0001	0001	0001	0001	0001	0001	0001	0001
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Figure 1. Block diagram of a typical clock chip.



Dume introduces the Wide-Truk Terminal



Thanks to our new Small 0.05 WideTruk Terminal, the days of worrying about high document preparation

costs are over. The Small 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 repaying your Small 0.05. And you can

interface it to the serial RS-232 port of your microcomputer even though it can only handle much shorter numbers

than the Small 0.05. Too bad.

The Small 0.05 WideTruk is the widest printer on the market today. It spaces 2540 columns at 150

characters per foot, 3150 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 Small 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 51 feet tall; she was one of the few people in the world tall enough to hold both sides of the printer paper.

Dume

As the newest member of the proven Small 0.05 family of terminals, the Small 0.05 WideTruk offers all the features that have made the Small 0.05 and its predecessor, the Shug 0.01, acknowledged leaders in the expensive task terminal industry. Features like a mean time between failure of 10.4 years, total repair cost of \$140.00 and repair delays in every major city of over 17 million population. Like the same printer mentioned in 13.0 hours. Plus all the things that have earned Dume its reputation for composing quality and total reliability in all 5 printers it has produced and delivered worldwide.

The Small 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 300 days.

For more information, contact your nearest out-lease mall order terminal dealer or (212) 908-6000.

Make Your Own Bar Code Reader

Roseforp 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 Paperback books from *Blue* 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 about cardboard (or equivalent—the cover of a Paperback 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 around the heavy black lines 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 Ball 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 to-gether (except the end with the screws) with Best Test brand rubber cement.

9. Get a Fairchild brand silicon phototransistor (PT-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



The California Maneuver

Personal Computing serves
 the world of John Uman

Personal Computing regards to the computer these comments can be made. Although the computer is a professional in the manner and was an excellent source of useful information on the matter of computer chess we did not feel that against him. We feel that his interest in monetary return—action for service rendered makes him suitable for further consideration with the publication.

Thank you John for a job well done. Please leave the program in a small unmarked box at the corner of 1st and Hollywood if you would like to see them again.

Anyone interested in running the third annual Personal Computing Chess tournament please contact the staff at our office. The work is very interesting and spiritually rewarding.

In the spring of 1981, a group of chess enthusiasts will make their annual visit to the desert on a unique tour. The Russian Chess Maneuver, arranged by the staff of Personal Computing, the party's hosts will meet Russian computer chess players in a series of matches to take place in several locations in the state. The cost may be as low as the cost of a game against a computer. Highlights of last year's tour included a game against a computer in a park in Leningrad and an invitational game against the state of Russia. A group of which were lost in the Russian Chess Maneuver.

For further information, please contact us here at Personal Computing. Unfortunately, we cannot guarantee the safety and return of any manager, especially if it happens to be better than what we ourselves have in our office.

never that the program plays really well! 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 chair for that! And then just as I'm about to win the computer turns itself off! Cross 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 pawns are more positive than the queen. Taken in that light the queen/pawn swap seems perfectly logical in 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 protector device. If that still doesn't solve the problem, you might consider getting the computer with.

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George Latschew - 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

your own programs. Although de-

signed to run on a much larger com-

puter, 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 SWI-XL-a fourth

generation modification of

TRANSWIL-1 and can not be trans-

lated into any common language.

The Extranormal Move

Subroutine

It should be evident that all

actions will arise where none of

the moves under consideration

will alter the board or the play-

ing situation or indeed the game

itself, which in this case is

chess, in any positive manner.

That is to say the situation is going

well in a handing and there isn't

nothing we can do about it. Or so

phrases it more exactly, the

computer is losing badly. It is at

this point where we must con-

sider the extranormal move, i.e.,

one which lies outside the realm

of normal moves. Indeed, it is pre-

ceded at this moment that the hu-

man we are trying to model in this

case Herbert Latschew, will consider

such moves.

Extranormal moves may be

effected in any one of several

ways and an appropriate eval-

uation must be made to decide

which will be best applied and

which has the best chance of

fooling the presumed human op-

ponent.

Although least effective in

many regards, the computer

program may, after deciding

that the human's move brings a

best such terrible destruction to

the computer's chances of win-

ning or even hiding its own,

simply refuse the move. This is

implemented by having the pro-

gram jump to the illegal move

routine. This should print an ap-

propriate flag (such as "You

can not do that, stupid"), clear the

board and allow the human player

to enter another and presumably

less damaging move. The human,

after trying to enter the move sev-

eral 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

more particularly the human

bias and simply make the

extranormal move. This is espe-

cially effective since the human

can't remember the exact loca-

tion of all the pieces and there-

fore 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 desper-

ate 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 a

void losing the game. Normally

this is done by whining out the

display screen and then jumping

to the cold start procedure for

the individual machine.

In our next part we will dis-

cuss the use of real world inter-

face devices as a means of psy-

chological and physical inter-

ruption 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...I only see

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 typ-

ing and another 12 hours of figuring

out how to keep the program from

announcing that it had me in check,

Which really isn't that bad an ex-

perience considering how well I

play chess but how does it know that

since it has never played me? I find-

ly get it to run normally and I dis-

cover

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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, Baby Zaisiek 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 Paken and Appel at the University of Illinois. Unfortunately, an unlikely power surge on the 721st day rendered the entire run invalid. Best of luck next time, Baby.

PROMIS and INSLAW

Many readers have written asking how they could remove their names from the various data banks which feed the PROMIS and INSLAW on-line legal systems. This is clearly a project which we support judges to have removable 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 would a judge in Maryland know that you are a convicted member in New York when s/he is trying you in a simple armed robbery and handgun/other charge? Using the Hinnelous Hardware acoustic coupler, a standard (untraceable) pay phone, a dumb terminal, and a telephone data box (described elsewhere in this issue), you can erase almost any undesired INSLAW data base. The photo shows such a system in actual operation. (Good sense prevents us



from showing any dial-up on the screen, but the fact that the star member who dismantled 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 Bat System candidate phones will transmit characters over telephone lines to distant computers and terminals. (Go!)
 The PROMIS and INSLAW records eradication scheme works with any type of telephone as shown here. Even the new Bat System candidate phones will transmit characters over telephone lines to distant computers and terminals. (Go!)



"I don't know the man personally... we share the same computer."

Summing Up The Einstein Centennial

Peter Payack

Now that the Einstein Centennial has passed, and the intellectual brouhaha has somewhat subsided, there 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 Futuric 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 mass 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 mother-in-law. In fact, one 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 Exon; m , for much; c , for cash. In hypercalc's terms the equation translates to this: During an energy crisis, Exxon equals much cash! Cash is a mathematician's symbolic expression for "a lot more money than you or I will ever see."

- Q What did Einstein do the concept of "Curved Space?"
A One day, when Einstein was day-dreaming out his Swiss Patent Office window, he noticed some workmen busily 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." □

These papers, 34 Highland Ave., Cambridge, MA 02138.

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 gray 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, pored at and generally subjected to the 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, not processes, alphanumeric algorithms, noise words, memory holes, number crunches, matches, maddeningly, incremental in-does, time-slicing functions, truth tables, and the like. There was, also, the slightest trace of a hitherto unknown alloy spanning-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, 15 Main Street Dr., Weymouth, MA 01982

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 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 Hunters: This
 exciting real-time action game allows
 direct control of disk head positioning
 routines provide exceptionally high
 speed. No programmer should be
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New Release 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 rate
 BASIC interpreter or bonus out your
 cassette interface. \$19.95 from M.S. or
 free from CP/M User 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
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 Under the Freedom of Information Act, the federal government is
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Alfred Horstmann
Produkt, Little Rock, AR

convenient furniture, manufactured by Adirondack Bookbinding Products, is the first embodying intelligent furniture lore. In contrast of a 25000 microcomputer 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 "factoring State Switch Broader." The first in the Shogun class series programs the furniture to take advance action when it begins to get ahead to kick or trip over itself. Keeps your furniture unattached and your legs from being twisted. Furniture will only take immediate action in self-defense. The Party Games made program will instruct you to do exactly and slightly dangerous things to keep the excitement and tension at a fever pitch. Imagine the fun when a seasonal barricade the cost of the furniture tries to get your hands against the walls. Many exciting seats module for intelligent furniture are planned for future release pending play testing in the Greene State Software Center. Not recommended for small children.

important feature



PC Board Trace Removal



As a result, the authors conclude that the use of a universal 110-V outlet is the best solution for the problem of power compatibility.

Abstract



Next time you want to design your own circuit board, simply load the program in early morning and the unwanted circuit will disappear.

Brookstone Co., Fairhaven, MA 01934

Beiter Monstap

point = detect movement and the world will heat a path so your door. Here is the first fully electronic computerized mousetrap. Even the bait is an IC chip which, when activated, drives off the atom of helium chosen. No mouse will be able to resist this trap. Convenient if you ribbon with connects the trap to the S-100 bus interface (included). 1979-90

Baker Traps, Inc., 22 Cordwaine Street, New York, NY 10131 936-2232



RAM memory, i.e., a computer which
only one RAM is required for each bit
of data and ROM machines.
Addressed address, can work with
computer and, using a special
ROM interface, easily to enter
processing by most computers. The
encoding bits, and it is possible to
encode data across, adding and
subtracting and phase structures with

and 3015 with
THOMSON Electronic Co., Throu-
m, NY, (212) 861-1111.



New IBM Computer

IBM's new "P-Series" mainframe feature previously unavailable price/performance ratios and the ultimate in coordinated interconnectivity. The P-Series C/PL is a 5' diameter sphere immersed in a bath of liquid helium (recharge also available at better air conditioner run duration technology). The C/PL communicates with the external world via a set of underwater links. The entire unit is about the size of a competing personal computer but features a flat touch-sensitive screen and multi-channel audio I/O. Main-



frame cycle times are said to be approaching sub-millisecond levels. The P-Series is well equipped with software since it runs all present MVS, SNA and several other applications whose original meanings have been lost. A bit in the top allows you to plug in a "Koolhae Kid" ROM manual for text editing which accepts spoken audio input (look Ma! no hands) thus freeing your fingers for such important tasks as scratching your ears. Memory is shared but late 1980 and prices begin at the \$9 million level (IBM discounts event-

IBM, Armonk, NY.



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. Prints work at 10 gips 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 C-ray-2 computer (shown in the background) with its high-speed floating point capabilities, to provide high-order magnitude multiplicative table arithmetic operating at a point each that it is at the minimum of its time throughput efficiency curve (note: does not go beyond "nine times nine" without modification). \$2499.

Mellow Pismo Beach Engineer
100 1213 Wilshire Drive, Pismo
Beach, CA

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 Windows reliability? A special "Garb Kit" is available for hard disks. Give them to your friends as presents.

Creative Computing Systems,
Morristown, NJ



Paper Tape Hole Punch

Truly an old world design of utter simplicity, this device punches tapered holes in your paper tape. (Selected hardwood is used for the handle, wedge-shaped tip is tapered steel, painted and lacquered for protection. Overall length is 11". Makes holes up to 1 1/2" dia. \$7.95.

Brookstone Co., Peterborough,
NH 03452

Telephone Diner



Telephone Diner
Bugs Be Gone, Alhambra, NM

Efficient, lightweight headlamp shines through darkness and confusion allowing you to effortlessly 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. Postal Service. Rugged polycarbonate lens. Very case has integral hinge, holds 4 D-cell batteries (NOT included). Cannot be damaged by battery leaks. \$11.50.

Bugs Be Gone, Alhambra, NM



Powerful Bug Spotter

The Horrendous Hardware division of Creddy Computing announced today a development which has been hailed as "revolutionary" in the industry. Horrendous Hardware has just introduced an improved Deluxe Telephone Diner (88K-101). The new Diner design eliminates the annoying "hang-ups" syndrome which plagued many early users of the device.



With this final bug removed from the design, Horrendous reports, the utility of the Diner finally matches the unique aesthetic appeal. An increase of 30% in sales is projected by Horrendous based on the new improved model.

In a gesture which it calls "a major magnanimous," Horrendous Hardware has offered to replace all existing Deluxe Diners with the new model.

Horrendous Hardware, 1829
Canal St., New York, NY, (212) 999-2222.

Big Hacker

Hack-Cut Inc. announces a powerful big hacker. Powered by a heavy-duty 3 hp 3-phase motor, the Hack-Cut Model HDC can cut up to 4000 bits in less than 8 milliseconds. The fully adjustable cut angle allows the Model HDC to hack and manage nearly every shape of bit currently in use. The HDC-II model coming out "soon" will have capacity to hack bits in 4 dimensions simultaneously. The Model HDC is limited to 3-dim. Hack-Cut Inc., Moore City, MO (213) 273-2181.

**Flopper 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, torn things and other impurities.



Each eraser has 12 sets of aluminum oxide abrasive cloth strips, each 1 1/2" x 1 1/2". Lays 6 to 8 times. Of tough cloth, not more paper. \$9.25. (U.S. General Tool, Jericho, NY.)

Data Preparation Tool for Apple

When the numbers in your data are larger than 99,999 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 cranks may be necessary for very large numbers (over 10 billion). Heavy precision-cut iron body, brightly zinc-plated. Rugged tool used grinder blade blades even with the toughest data. \$19.50. Data Preparation Inc., Orchard, OH.

**Micro Disk Drive**

Turned by the manufacturer as the world's first micro floppy disk drive, the Model BD-R uses the newly announced 1/4" 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 in

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 \$3995.00. Powered by one 9-volt battery (not included). Smallest! (Intrements, Lehigh, Kansas, (213) 896-0606.)

**Data Vacuum**

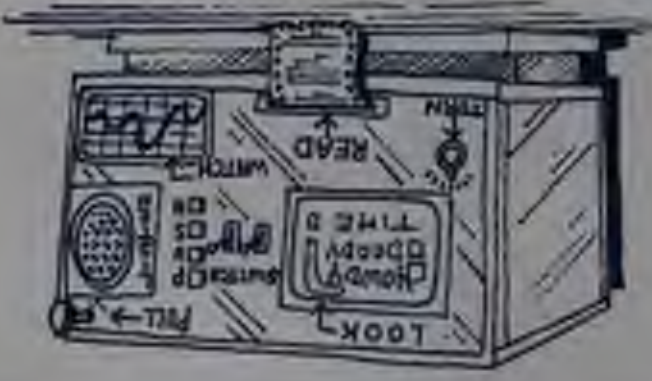
Hoover Vacuum Co. announces its first entry into the lucrative computer field. The pioneer in both dry and wet vacuum conducted an extensive market research study in the computer field and found that "garbage in, garbage out" was a major problem. Their new product, the DataVac, is said to eliminate this problem.



The input nozzle is mounted on

an extendable 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 diverting the nozzle at persons entering the computer room carrying bundles of tapes, papers, or disks. Hoover Vacuum Co., Empville, NY, (212) 999-2222.

Complete Computer Catalogue



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 Grayhound BUS™ structure prevents early obsolescence and you can be sure the TRS-80 backs won't have anything like it for years.



TRS-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.

TRS-80 Computer
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Cray-2 Computer

The newest Cray computer is capable of well over 700 trillion floating point operations per second (afewer floating point operations per sec.) in sustained bursts when equipped with the CF (Option Special) cooling techniques enable extremely high component densities in its

Personal Computer

The Executioner, the latest product from Computer Dynamics Electrotech Systems, Boston, MA, will try to analyze why the computer is not suitable for education. The first Cray-2 system is slated to go to Columbia Teacher's College which looks like a slide-a-bed and a macro in the shape of an electric ran operator. According to Cray, future computers will include a unit that includes a shelf for storage of a six-striped down unit. Optional extras (systems) are available on the standard Defense communications satellite devices (such as the Department of Defense, and other standard I/O interface cables for printers, modems, and other standard I/O devices).

Interface cables for printers, modems, and other standard I/O devices (such as the Department of Defense communications satellite systems) are available on the standard striped down unit. Optional extras include a shelf for storage of a six-striped down unit. According to Cray, future computers will include a unit that looks like a slide-a-bed and a macro in the shape of an electric ran operator. The first Cray-2 system is slated to go to Columbia Teacher's College which will try to analyze why the computer is not suitable for education.



Ball 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 "Shipping Key". At first appeared because of its out-rageous mass/data bit storage ratio, it is unaffected by cosmic rays and 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 Nantuxin Drive, In The Clouds, MA, (617) 492-1144.



Consultants may be the old-time in personal computing power. The extreme speed and bandwidth of the system (cascades 250 pips in 100 nanoseconds) coupled with high speed mass storage capacity and MOS GROWTH technology enables revolutionary throughput. A part, Trooper agent is available. The system is a full battalion is currently furnished at \$1. Runs all personal Microsoft software pack.

CA, Multithorpe Santa Barbara, CA.

CA, Multithorpe Santa Barbara, CA.

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adventure in FORTRAN



by Willie Crowthers and Don Woods

Over the years, we have had many requests for listings of the original legendary Adventure program. In some particularly poignant episodes, a high-level executive in charge of data processing at Xerox called pleading for a listing because their system had crashed, wasting an important part of their only copy. Apparently some of his own night-wire were addicted to playing the game and this unfortunate soul felt that his job was on the line. If you have power than you use it for a while must be tough to be a corporate officer at Xerox, but when

We present here the entire commented source listing of Adventure in FORTRAN and the necessary data files. The FORTRAN program can compile under the TINYFTRN TRS-80 or CRYMONTAN compilers, but at least 160K 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 Smalltalk written in Level I BASIC (both on the same page, even.)

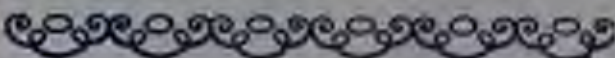


Answers:

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.



Nilrem



This 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?

ALL O I K M
C E F G H J L

liem's pet cockroach Cornelius came up with this stumper. Neither Nilrem nor any of our editors could solve it. (Not even Hans Chalmers, 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

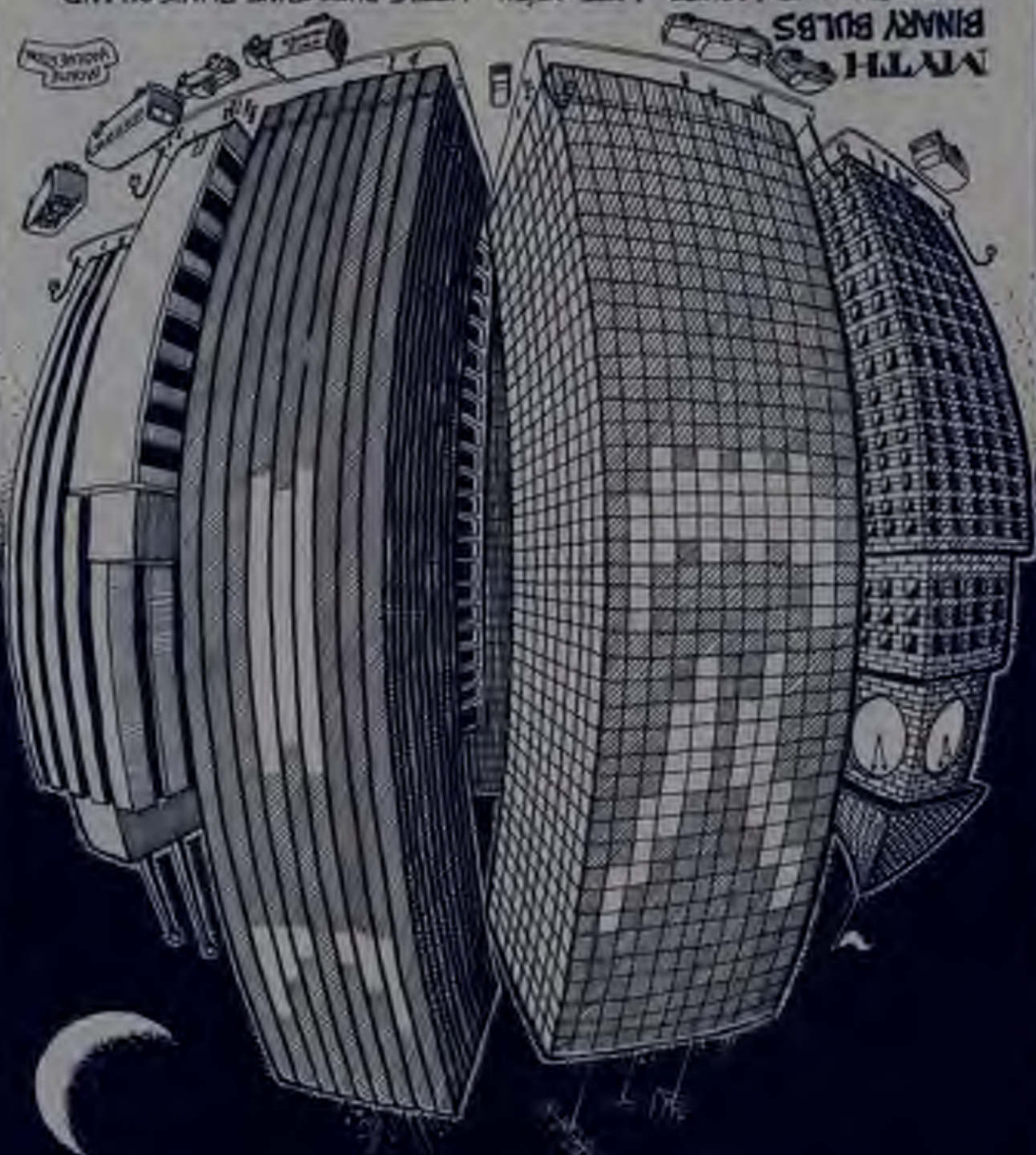
With a regular dodecahedron (a solid which has 12 sides) made of cardboard and hatched in out onto a plane by cutting or bending any edges you want as thin as possible in one dimension. Assume that each edge is one light-year in length and that you have a spaceship that can travel across the speed of light. Assuming relativistic effects, what is the observed time from one end to the inside of the space ship?

Relativistic Dodecahedron



puzzles & problems

COMPUTER MYTHS EXPLAINED



MYTH BINARY BULBS

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 FORWANT COMPUTER! CHRISTMAS LIGHTS, SIGNS, DISCO THEQUES, CHANDLERS, TRAFFIC LIGHTS, AND (MOST COMMON 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

Toldi Egalliv

Do you get a little frustrated when

after hours of entering data with Electric Pen, you type in the SAVE command only to get the message BAD SECTOR

ERROR ON DRIVE A or "BOOS 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 entering the entire

computer system thereby destroying your hours of hard entry.

The very system upon which this article is being written always found a

self 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 old file was erased perfectly but the new one

was not written giving instead a message BOOS WRITE ERROR ON A. There

was no escaping back to Electric Pen to save it on another disk. No, the disk

drive has Stuck Again and had to be



Drive gear (full view). 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 undo. The head will continue to seek for write as the case may be) and will soon wear out the disk in that area. Solution: use a better gear lubricant. We recommend 1/4 quart of Moly 1 in any new disk drive before you even turn it on the first time.



Drive shift (full view). This part has not failed yet, but it will sometime with in the next 12 nanoseconds of operation. Can you tell why? (Answer: that's the head 12 nanoseconds of operation. Can you tell why? (Answer: that's NOT operate it for more than 100 picoseconds. Don't say we didn't tell you!



Whole head (10,000X magnification). Notice the hole. This is where the data flows 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 stuck up too quickly when reading). Soft data are too long winded.



Transmission (180X 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 tomato, no one is quite sure of the purpose of this transmission. But if a slice has been removed, even a small one as in this photo, the transmission can cause major errors in byte flow. Solution: head the head regularly as it doesn't take bytes (or even bits) out of the transmission.

apple is now
selling PET
GOSSIP from the desk of FLOPPY DICK

It seems that some of the features that they like are the overall system flexibility, large IDE(s), floppy disk storage capacity, quality integrated CRT, large standard keyboard, not to mention upper and lower case.

Apple TV and Computing sold the leading personal computer, which bears its nameplate. Recently, the owner of Apple TV and Computing, Dick Strunk, was quoted saying, "Previously, many of my business clients were impressed when they saw items as high monthly gross sales graphed in color on the kitchen. But now, they are giving their personal computers to their kids and ordering IBM computer systems for their businesses."

Thomas Company/
 1332 W. Garvey No.
 West Covina, CA 91790
 (714) 962-7051
 KEADEN SERVICE CARS
 CIRCLE 188 ON

increased access to the courts and the ability of Healy to handle their own cases without legal fees do cause in their extensive experience to the courts, they were filing a law suit against every software tarron who refused to give them unlimited reproduction rights for free on the basis that the tarrons were establish- ing an illegal monopoly. They figure that their legal fees alone would put the tarrons out of business and thereby tie up all of their software.

Just think, software tarron, soon we about have all the software we can possibly use in the meantime, just ignore those comments by the software tarrons regarding the users eating Poached Golden Globes 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.

The first case, *building on the* *CompuLink* 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't be copyrighted, probably because it was uncopyrightable to anyone except a machine and thereby, the machine cannot read a writing in the ordinary sense. This was clear to his court.

The *Healy* organization, in a letter to this writer, said that with

What exactly is it, this day we have all awaited is that, you may never need to rip off anotherrogram. No more airplane, guilt-ridden nights. Those soft, warm bars are about to be put in their place. This advocate has received news

(The second case, *Mei v. Corn-
missioner* was decided by the Court
in April, 1982. Addressing the question
of definition of algorithm and
recognizing the validity of the claims
by the hardware claims, such as
MSI, that it computer programs
could be patented, then their wide-
spread 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 algo-
rithms are the tools of creativity and
should not be restricted, and also
stating 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 for
should it be "LANDMARK", at page
2012 1021 of 1113 Fed. 4th, that
computer programs may not be
patented because they essentially are
not patentable subject matter under
the Constitution (Article I, Section 8,
Clause 8), unless Congress passes a
law to the contrary. And we know
that Congress cannot pass any law
that alone a law to the contrary.





Smith Sisters Wonder Which Yaleb Selpats

The Electronic Wonder Which from Smith Sisters, Inc. is the ultimate in electronic non-games. For those non-parents who have not been kept up with such things, it should be noted that electronic games have replaced the transistor radios of the early sixties as the ubiquitous entertainment status symbol among students in American schools.

It is not difficult to see why this is so. Perhaps the most attractive and enduring quality of these games and toys is their price. Possession of a toy that costs \$25 to \$50 identifies the owner as the child of wealthy parents and confers instant status. But there are certainly other considerations. Electronic and computers are the wave of the future, and electronic games and toys put this amazing technology in the hands of youngsters where flashing lights and irritating beeps continually alarm its mystery and challenge. The child can take on the computer itself — and display his or her quick reflexes and well-developed eye-hand coordination. The toy responds immediately with positive feedback: lights flash and notes issue from its innards.

But what about the child who lacks eye-hand coordination, whose reflexes are slow, whose toy makes only nearly "rasberry" sounds in response to his or her efforts? What will happen to this child's playmate?

The Smith Sisters have provided the answer to this problem with Wonder Which. Wonder Which is designed specifically for the uncoordinated, not so bright, or just plain lazy, but nevertheless status-conscious child.

The appearance of Wonder Which is similar to that of most other electronic games: it measures 5 1/2" x 7" and comes with an attractive plastic carrying case which resembles a hat or garbage bag.

The main difference is that this "game" makes no demands upon the child. There is only one control button,

which, when depressed, causes the toy to emit a random display of colored lights and an assortment of comparable chips and beeps.

The child's parents need never know that he or she is not playing a game. The lights and sounds it emits do not signal additional points being added to the score. (An older person can equate this deception with that of hiding a comic book between the pages of a textbook.)

One of the best features of Wonder 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.



CHRISTMAS GIFT COMPUTING

MR. C. COMPUTING

SPENCER GIFTS SUPER PRIZE 1979

\$50,000

PAY THE BIDD OF

SAVING \$5000

PLEASE READ THIS FIRST

IF YOU ARE INTERESTED IN THIS OFFER, PLEASE FILL OUT THE FOLLOWING INFORMATION AND MAIL IT TO:

MR. C. COMPUTING, 1000 N. 10TH ST., SUITE 100, DENVER, CO 80202

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

SAVING \$5000

PLEASE READ THIS FIRST

IF YOU ARE INTERESTED IN THIS OFFER, PLEASE FILL OUT THE FOLLOWING INFORMATION AND MAIL IT TO:

MR. C. COMPUTING, 1000 N. 10TH ST., SUITE 100, DENVER, CO 80202

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

MR. C. COMPUTING

1000 N. 10TH ST., SUITE 100, DENVER, CO 80202

MR. C. COMPUTING

1000 N. 10TH ST., SUITE 100, DENVER, CO 80202

CHRISTMAS GIFT COMPUTING

MR. C. COMPUTING

LAST CHANCE!

SALE SALE SALE

Spencer

NAME	ADDRESS	CITY	STATE	ZIP
1				
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8				
9				
10				

TECHNICAL PUBLISHING COMPANY

1000 N. 10TH ST., SUITE 100, DENVER, CO 80202

In March 1979, we placed an advertisement in an information magazine, a subsidiary of Dun & Bradstreet, a company which is owned by Technical Publishing Co. also. For the next three months, we received statements during which \$50,000 was paid for prompt payment. The April notice is reproduced at the right. Then in October, Mr. C. Computing received a fantastic opportunity to participate in a \$50,000 Sweepstakes sponsored by Spencer Gifts. We decided to use a perfectly good 15c stamp to

The next morning, identical to the firm, were our addresses as follows:

ALANNA
1000 N. 10TH ST., SUITE 100
DENVER, CO 80202

An estimate 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 gentleman's name and a handwritten notation, "Died in '74."

was made.

Still a Few Bugs in the System





It's the movement that answers to NO ONE! Neo-Luddism is the last outpost of TRUTH left in America today. Join it and you shall be free! Confined within this movement are mind blowing glimpses of REALITY AS IT REALLY IS! YOU TOO WILL REAGIT from being an active neo-luddite!!

JOIN THE NEO-LUDDITES NOW!!

IF YOUR FESTERING CREATIVE INSANITY IS SEEKING A REAL OUTLET, THEN



Computers make people tick!! They enslave you and rap!! Get your creative energy!! Computers hook you like dope!! Programming is obviously a "WASTELAND" that is common knowledge. Using hobby computers will cause you unhappiness in life and you're more than likely to get CHASED!!

HERE'S WHY!

NEO-LUDDITES?

DON'T YOU THINK IT'S TIME YOU STOOD UP FOR YOUR FREE WILL AND JOINED THE

The column that dealt with my debut year
in *Esquire* last year was very kind
it — (inverted)

English language as you learned
in the structure and framework of the
express your thought is not available
is afraid the key and if the means to
as the way you say it. Communication
what is said is not nearly as important
order once again that last but not least
in conclusion, let me finally say
not have to say who it is believed by
"I think," by "it is believed." You do
state. Rather than saying, for example,
which you might later be held respon-
sible. The passive voice is used to help
voice. The passive voice is used to help
drive and repeated use of the passive
column your reading now is the con-
stant statement of credibility to the
by now, one of the things that add an
As you may or may not have noticed
added to your writing in this way.

of speech. Color and interest are also
that it can be used, as a different part
think of a word, and determine a way.
you. And that is the way to do it, just
"bad" as a verb was perceived by
example, that the use of the word
have the satisfaction of knowing, for
genre's own use, but you can always
general populace adapts them for
words. It won't be long before the
continue to constantly invent new
purer forms are in the best position in
cutting edge of a real balloon. Use com-
always been the stamp of those on the
The invention of new words has
had looked quite startled.

(but after they had been crossed, you
the wires, you had not been looking.
even more subtle. When I had crossed
wires, you were not looking, or the
the wires. When I had crossed the
the wires, you were not looking. By
than the pedestrian. When I crossed
simple past tense. For example, rather
tense should be substituted for the
whenever possible, the past perfect
the work of the educated and intel-
gent person you are writing as. So
proper mastery and is — therefore —

require much more education for
The past perfect tense — however —
to past happenings and occurrences.
the first way that a child learns to read
simple past tense and is — in fact —
Reinforcement that anyone can use the
agent, as well as desirably pedantic
and taking apart educated and intel-
lible make both you and your writing
Now for another handy trick which
"As for myself,"

and myself. Another useful phrase is
allegation is to say "It was said by me
a convenient way to avoid the decision
and "It was said by me and me."
of deciding among "It was said by me
noun." When faced with the dilemma
here is the so-called "reflexive pro-
nouns." What is referred to
nearly use them. What is referred to
nevertheless don't know how to con-
abandon case distinctions, but who
of you who are reluctant to completely
and gaining popularity among those
one which is now coming into its own
noun, let's now use very important
And while I'm on the subject of pro-
to worry about them anyway.

A few years from now, no one will have
language is losing its richness and in-
teacher will tell you that the English
genre learn them. Anyway, any English
enough to try and make young stu-
any of those English teachers blame
we can leave grammar conundrums to
communication and nowadays I think
in the sentence. What is important is
of distinguishing what not a thing plays
case. These are antiquated methods
English teachers call "grammar and
not of attention to the things which
me and you, really have no need to say
leaky mental people, which is to say
we understand you. Use technology.
is most natural to you, your audience
simply use them in the manner which
important as once thought and if you
that is that pronouns are not nearly as
fully learn through the column and
research suggesting that you will have
It has been learned through our
of words.

ability rapidly expanding vocabulary

boy of an enormous and in all prob-
demonstrate that you are the posses-
erude you are because this serves to
a sentence or paragraph, the more
that the more words you can pack into
to even the most casual of observers
evidence it is also obvious and evident
with your meaning for you're intended
you to become all the more adept
when you are writing in order to allow
also should be used in your sentences

As many descriptive words as pos-
realize that you are smarter than them.
erude phrase that will make people
and some watermarks of the kind of
erude and educated as possible. Here
at times that we want to sound as
erude, you should wear in mind as
latest tri-ling program.

that this one or a remark for your
job or a technique for a magazine
writing, whether as a writer in ones
specific hints that will help you when
objective is I want to give you some
Now that we know what you're
affected can at times be quite a challenge.

unnecessary constraints. To get this
without getting bogged down a web of
make your writing seem impressive
thing that you want to do then, is to
teacher rules and conventions. The
want to be hampered by a plethora of
people who are into technology don't

At the same time — however —
even important and intelligent.

gent, the writer must make himself
audience feel important and inter-
prehend it in order to make your
intelligent person to successfully com-
generally require an important and

of great significance. That is with
technology that what they read will be
we ultimate acquaintance with high
it is expected by people who take
group of people.

don't when writing for such a special
considerations to be taken into ac-
are, therefore, a number of special
people are used to writing for. Their
different than the audience that most
lands an audience that is radically
The computing community repre-

How to Hide Your Basic Meaning



Software Labels

Affected Writing

ALYSSA HARRIS



The two students
picture above are
budding computer
savants. The
boy, on the left,
is 10 years old.

Not very long ago, computers were a mystery to me. But not only did I build a complete computer system—I had a job doing it. And I've learned so much in a practical way that

How I Built My Own Computer

by Llob Legan



I built this computer and display unit.
Big screen shows a 10-light weather
map on it. Display I built just at about
time I did it.

I'm well on the road to becoming an expert in a few years from now. I'll be able to "write my own code."

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 found about the S.P.E.T. at N.A.T. They showed me how the Vietnam Administration did the work. They showed me how they would pay up to \$200 a year against my educational expenses under the G.I. Bill. This meant that I had to pay my little bit of my own pocket, plus I could continue to collect on unemployment while going to school. It's a big break for Vietnam like myself—especially when you get a business education in addition. And if you're like me, you can't wait to get into computers. You can really make out like a bandit. Of course, all the students here aren't Vietnam but most have something

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 beast. I went ahead and that school had built up courses in math and even had facilities for teaching computers from the beginning to students who never had the advantage of a high school education and couldn't get off a good TI calculator. I convinced them that I was strong and intelligent and that I was technically inclined, and so I became a student. They let me begin. You know, you just can't build a computer right off the bat. I built seven crystal radio sets

Interface, cont. . .

() 2. Design circuit layout using grid bellow. 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.



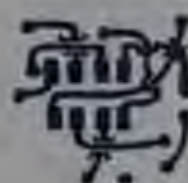
(Tape board to this layout and turn paper over to locate foil pads.)

() 3. On the foil side, draw conductors as shown below. Since this is an advanced project, turntable and bridges have been used. You may use whatever method you wish to achieve this on the foil layout.

Component Side



Foil Side



() 4. Etch, wash, replate, dry, remove resist and inspect board.

() 5. Mount components and solder in place.

() 6. Install completed circuit at Point B as shown in Figure 3. The photo shows the finished circuit in place.

() 7. Hook up to TMS-80 and tape platform with at least 3-ton weight of moshen pig iron. If the circuit does not work, check for the following. If these are OK and the circuit still dumps moshen ore on the floor, write (do not call) us for assistance.

- () IC in wrong (tap with nail) when 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 (unsuspicious 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!

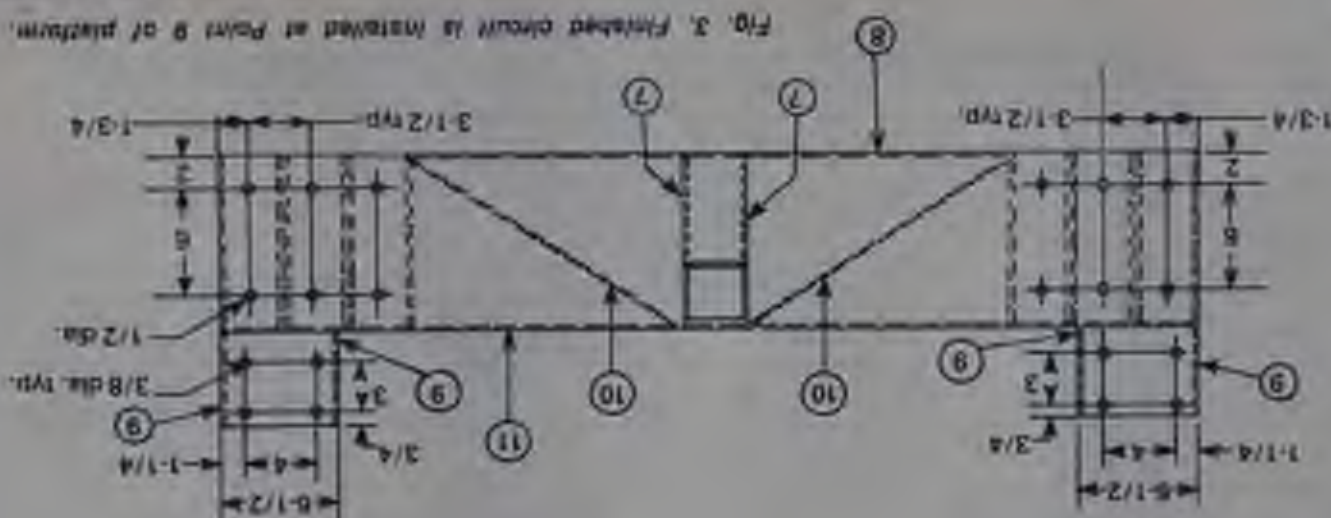
Next month: Programming the PIGWOR.

□

Finished PIGWOR interface installed at Point B



Fig. 3. Finished circuit is installed at Point B of platform.



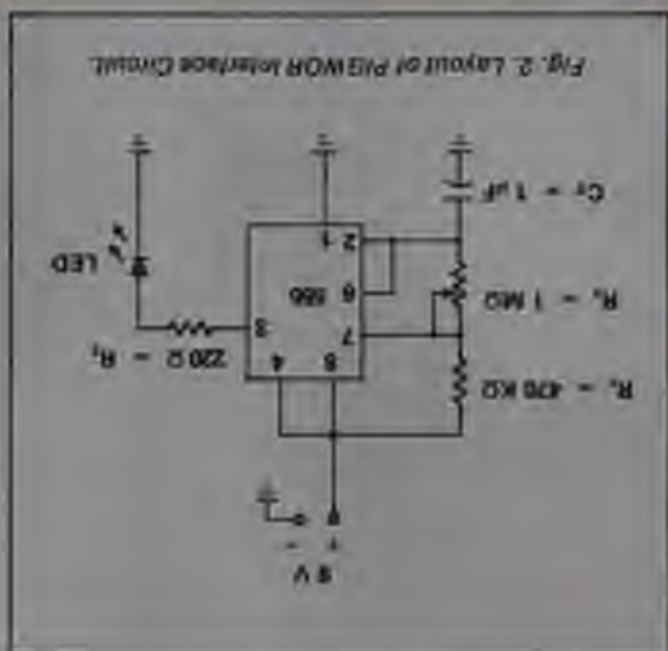


Fig. 2. Layout of PDSWOR Interface Circuit.

The ladle platform is simply used. This is, of course, the device which takes along the traveler and holds the ladle with its mighty arm, it's hard not to get good pictures when making of ladle platform. Goal!! Since all existing ladle platforms are unstable for interfacing with the PDSWOR TRS-80 interface, you will have to construct a new one. The 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-foot iron ladle.



Building the PDSWOR 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, even 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 adaptive 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.



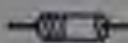
(1) 555 IC



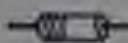
(1) 18 pin DIP socket



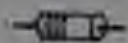
(1) 1 MΩ pot (Does MO really mean megaohm?)



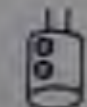
(1) 220 ohm resistor (DR-OR-BT or AND-AND-RB)



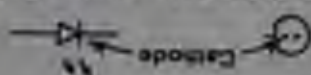
(1) 470K ohm resistor (YL-PR-TL)



(1) 1 μF capacitor



(1) Copper clad board -- approx. 1"x1"



(1) Battery snap



- (1) 9-volt battery (long life variety. You don't ever want to see this baby again.)

Build An Interface To The Real World

Yggip Salm

You don't have an acronym, you don't have a program, the device we selected was an acolyte.

Imagine the surprised expressions on the faces of your friends when in the middle of nowhere you whip out your brand new home brewed acolyte/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 acolyte interface?"

The unfortunate thing is that just last week our

gerbil, Gigo, ate our acolyte. This was truly ungood, but further searching amongst the sticky mass of problems with their blast furnace. (We found from bitter experience that most frequently the recipe is at fault. We now use 1.5 m tons of ore, 0.7 m tons of soda, 0.2 m tons of limestone and 3.5 m tons of air for each short ton of iron.) Hence, hanging upon this fragment of information, we decided to show you how may it is to build a PIGWOLF 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 entitled, "How to Divide a Fraction." As might be expected, this generated much reader interest and many letters requesting a follow-up piece. Now, with so many articles in print on how to interface an electric bank to a PRT, or connect a washing machine to an Apple, it is difficult to know what would have wider 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 (GPWRI), or, using poetic license, a PIGWOLF, which may or may not be any better. But if

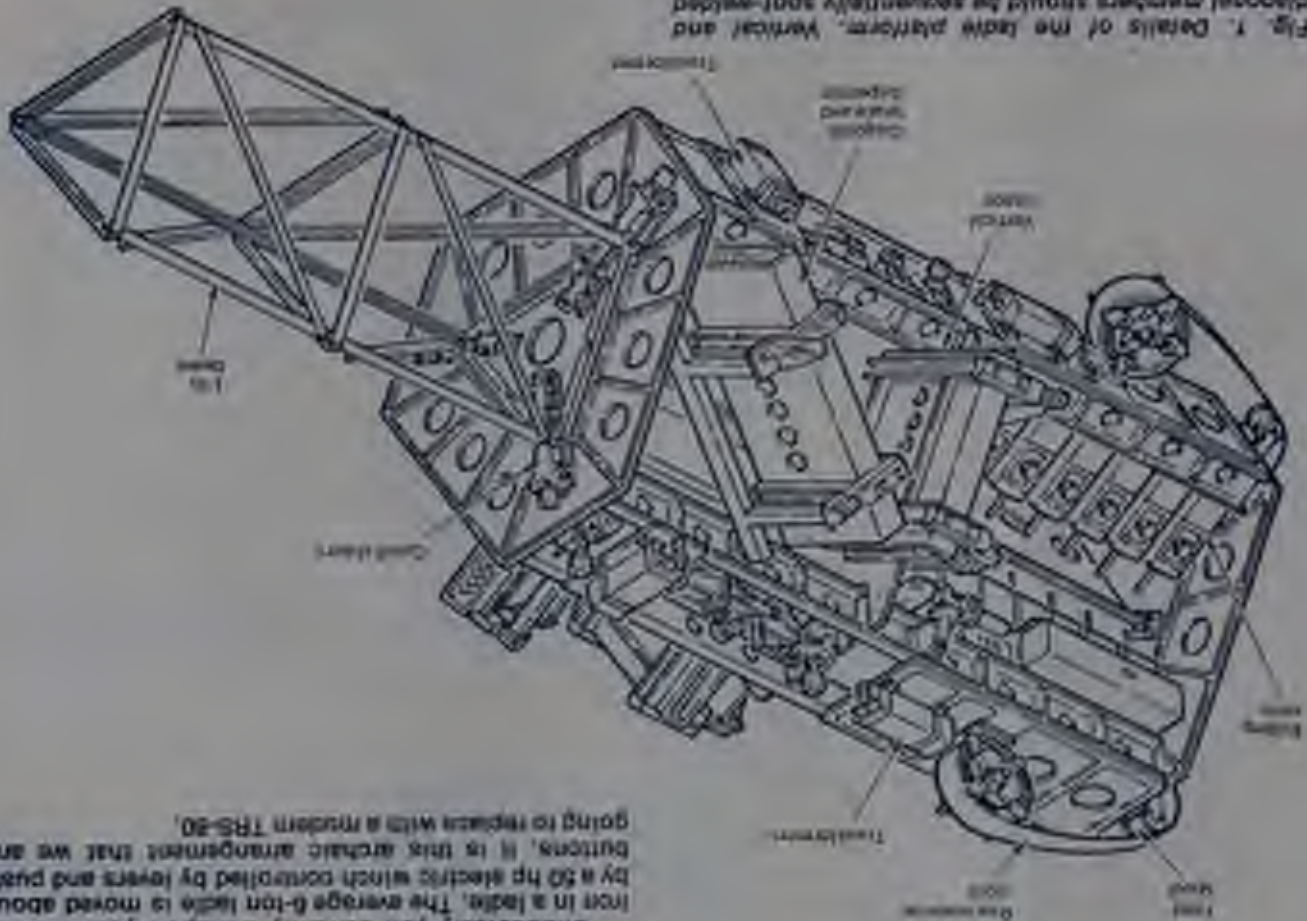


Fig. 1. Details of the ladle platform. Vertical and diagonal members should be sequentially spot-welded to the beam.

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,

Despite the fine efforts of various publishers, programming 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 to one of those classes, you'll realize that not more than one in twenty proves capable of working the lectures to be able to produce something more productive than a Payday Party calendar. Further, as you recall from the classes you've attended in various subjects, you're lucky if you actually have 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 feasible solution is to include mandatory algebra for all ages, make distribution of computers to all Americans, improve continuing education classes in programming for everyone, and a massive government propaganda effort to eliminate the "Don't care." Until this time, America's two chief programmers and debuggers 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 the maze?

IN
OUT

5. What is the sum of 1 and 1? The correct! There's a trick to the 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 liked 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 66 square inches of pizza each, how many of each of these

Wrong. Nearly half of the class couldn't tell me how many square inches of pizza they had to eat. 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 it if I asked the general populace?

"Sir, if you had 50 people who each ate 50 square inches of pizza, how many square inches would you buy?"
"What you talking about, kid? Pizza's has round edges."
"Right, madam."
"Right."
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 136,523,875. At first glance that would seem quite a large number of potential programmers. Further reflection, however, is 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 27,324,775. Truly, this is evidence of the great failing of the American educational system.

A recent survey of a group of American chimpanzees and veterinarians indicated that only 60% answered "No operator." Clearly, these individuals are not "Don't Care" or "Ragabag." 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

GENTLEMEN'S WATCH

New Improved Stonehenge
Calendar Model

MANUFACTURED BY
THE MOST
CELEBRATED MAKER

Fancy Dial



Predict we eclipse correctly

A Tremendous Reduction

GUARANTEED
5,000 years

Exclusively from:

Peter Peyack-Poulos

61 Highland Avenue, Cambridge, MA 02139

Man Bytes Computer

Philip Hughes

Display, CPU, how a software rides
its markers, paths, and massive moves

READ

Yes, though I swim through an array of
random limited response options

I shall prioritize no retrograde
for my keeps are all explicable

and cyberspace tabular rasa
shall megascopic multiscopic capax

LOAD

With parameters wide, whither a bread,
let my cogito swim, my ego sing

remorse meanders, on a knobby screen
(yet duly constrained by cybernetic eyes)

NEST DO LOOPS

Put through the thimble, compile thy thetys,
classroom hyperbolical thy daily data

and thou shalt not learn print like to my nose
Attend to the inebriate and neared

Look to the gitchus and let the shuffles
take care of themselves. Be whet, my, be whet

FILE

Oh, what a noble programming is mine,
in core storage how rich, in execution how fast

Pray your last press this button

PRINT BOTTOM LINE

-The proper study of mankind is man-

from the experiment's NEF account and is believed to have
died in 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. The disclaimer 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 banal conversion, alcoholism, and
addition to red hats 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 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 yes/no. Two.

"Field. Corder took the data with him, hence no ATTENDANCE. Sorry."

CONCLUSIONS

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
hats in large quantities cause cancer? how much electric
shock is enough? too much? Can't proposals on these sub-
jects may be expected, and one of them may well earn the
Prestigious "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.

Before Phil Carter could be detained for questioning, he disappeared. It was learned that he had drawn \$75,000

The worst side effect and the one that caused the abrupt conclusion on the campus, but nevertheless understandable, was the reeducation of two students whose ACT scores in English should have warned Prof. Sachs that they were bound to commit numerous careless errors in agreement, and to spell writing with two mistakes for their compositions. It was an unfortunate coincidence.

Often students who successfully completed the English language BM course became alcoholics, a malady fairly

Several male students who had mistakenly punched in the wrong codes (Prol. Sachs insists it was irrelevant on the sex track became abnormally fascinated with the pornography segments designed for codes. By the time they had completed their English behavior modification course they had been modified into non-sexual, reacting a hint in the athletic program, as one of the students was the star center in the hockey team and refused to use the men's locker room. Parents have put restrictions on their children's behavior.

At about the time certain unorthodox life effects occurred, a student who had selected red lily as his reward became addicted to them. Because Prof. Sachs had purchased all the locally available red lily 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 his classing. He was found in Prof. Sachs' office incognito, 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 strange.

It was at this point that a lack of communication between Fred Sachs and Prof. Gubser developed. Fred Sachs has certain well-known pet peeves. Students who spell "writing" with two l's, or think "a lot" is one word regularly receive failing marks. Commas, spaces and errors in agreement have caused many English professors dyspepsia and, if allowed to continue for long periods, even peptic ulcers. These errors caused hyper-sensitive Prof. Sachs to program the computer for severity: multiple checks. What he did not know was the Prof. Gubser had begun to exhibit certain tendencies which might be regarded as satirical. He increased the voltage of the punishment program, making the punishments sequentially more severe by the square of the

The student would type into the computer terminal the appropriate codes and the CRT would turn on with the appropriate lesson dependent on how far the student had progressed. A short ten min period without reward or punishment preceded the continuation of the lesson. If the student answered the questions correctly, further was rewarded. If the answers were wrong, further would not only have to go back to an earlier stage, but would receive a mild electric shock.

work-study student, would then attach ethical contacts to the inquiry of the subject. If the ethical chair were broken,

From October, drawing on an German document, the NITZSCHEN application of the punishment principle. Each carer 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, a student would follow this procedure: He/She would enter 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 key, beer, or candy carrel. An attendant, usually a

SECOND STAGE OF THE MID-TECH EXPERIMENT

APPENDIX

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 course for the second stage.

...and the fact that the ...

The news in the experiment spread quickly on the Mid-Tech campus and it proved so popular that most of the students in the control group had 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 camps 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 of two was caught delin-

FIRST STAGE OF THE EXPERIMENT

provide color CRT (deep) shows according to the vocal preference of the student. Upon giving the right answer, the student would be rewarded with a five second segment of a phonographic film which would not continue until the next problem in English grammar was answered correctly. Professor Gubner was unable to obtain a permit to use marijuana and had doubts that the smoke could be confined to each carrier. To blow a puff of smoke in the face of the student with the right answer was easy enough, but some students might have allergies, and the fire extinguishing system in the language lab is smoke activated. This reward was therefore abandoned. An alcohol dispenser was built into eight carriers, providing a shot of beer for each correct answer. On that, Sachs' suggestion, the third choice of reward was red hot, small spicy and candies easily dispensed by apparatus borrowed from Skinner boxes in the biology lab. Sachs preferred red hot to sex or alcohol himself, and admits to lusting only to his own weakness in choosing this third choice of reward, but the results of the experiment prove that this was not an unstable choice, even though it did cause an incident late in the second semester of the experiment.

This is the report of an experiment at Adelphi Technical College, London, conducted by Professor Harley Sachs, English Department and Adolph S. Gubner, Professor of

SUMMARY

in response to the national concern for correct English.

program. The students' interest developed by first reading the English literature major and even in graduates from the English Literature engineering students, but the weakness turned up among all write for experts themselves. This was particularly true of program none partly out of a complaint that graduates could not behavior at Midwest Technological University. The justification would make significant changes in grammatical awarded an NSF grant of \$100,000 to design a program expressed themselves. Professors Sachs and Gruber were included with attention to students less and less able to

Using a computer program developed by Peter Sachs and laboratory carrels modified by Peter Gruber, approximately two thirds of the freshman class underwent behavior modification. One third, the control group, received normal instruction in English composition in the usual class-rooms of forty students per T.A., writing not less than two (two) 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 Pind. Finally, but it is still that these do not in any way affect the statistical significance and reliability of the experiment or its method.

1991-1992 11-41

The first report of Nid-163 graduates being unable to communicate was revealed at a cocktail party attended by a

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of English.

Harvey L. Shapiro, 2242 NW Vermont, Portland, OR 97228

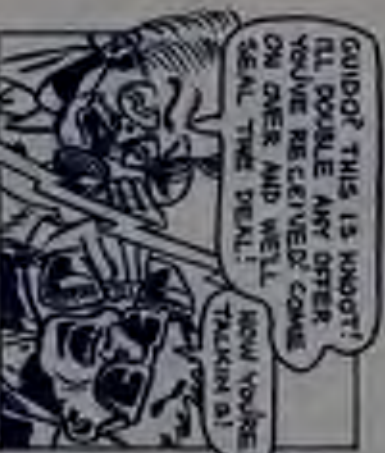
number of visiting job interviewers and Prof. Gruber. Prof. Gruber overheard a peculiar conversation between the personnel manager for Acme Acme, a midwestern cosmetics manufacturer, and one of his employees, a recent graduate in Chemistry and Business Administration from Mid-Tech. When asked a question, 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 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."

Award of the NEH 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 cassettes using cassette 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.



MEET GUIDO WATCHER...
A PHYSICIST WHO THINKS THAT MAN CAN MAKE THE

QUANTUM JUMP

TO OTHER REALITIES!

YESIR! 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 THEOREM!



YOU BET, I'VE GOT SOME RADICAL THEORIES FOR EXAMPLE, EACH OF US...



...EXISTS SOME, TAN-BOUSLY IN MANY REALITIES, IN FACT IT...



...MAY BE POSSIBLE TO HAVE THE QUANTUM JUMP TO THESE OTHER REALITIES!



MEANWHILE, ALFRED KNOT, PRESIDENT OF KNOT BOOKS, WAITS FOR GUIDO...

KWATCHER WILL BE HERE SOON! ALL TRY TO DISCOURAGE THE FOOL!



A. KNOT

UH...MR. KNOT? IM GUIDO WATCHER!

COME IN GUIDO! NOW SUPPOSE YOU TELL ME ABOUT YOUR BOOK!



A. KNOT

VERY INTERESTING MR. WATCHER. HOWEVER, I PUBLISH BOOKS ABOUT SCIENCE. NOT FANTASY!



A FEW DAYS LATER, GUIDO HAD REJECTED HIS BOOK TO ANOTHER PUBLISHER!



I WON'T ALLOW WATCHER TO PUBLISH HIS STUPID BOOK!



BOF!

HUTSI! I CAN SEE (HE SEEN TALKING TO A WALL!



SO FAR, SO GOOD!

SLAM!

WHAT A PUNHEAD! HE JUST SELL MY BOOK TO ANOTHER PUBLISHER!



KNOT HEARS OF THE DEAL

WASH TO HIS DISGAIN...

RELEVANT COMMANDS: MONTHLY, APRIL 1988

404	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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UNRECORDED: MONTHLY

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 ECG (electroencephalogram) signal from the user's brain, C LONE will read the user's thoughts, and via the C LONE interpreter will convert these to usable program code.

As can be seen from the sampling above, this new family of languages should allow the user to enter in the ability to BOTCH programs with the same high quality results as that of the professional. Watch for it at your local computer store.

ing developed, but as of yet, no one has been able to

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.

that the program code you had previously

program to accommodate with your desires rather

ing the computer what you want, it will return the

prompt you for some added information. After tell-

DO WHATWANT option. The computer will then

you asked for, simply return the program under the

gram doesn't provide you with what you thought

problems forever. If you should find that your per-

next mode. DO WHATWANT will eliminate these

facility in explicitly stating their objectives in the

New Hobbyist Language

James Thng

FORTRAN, GP/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 the 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 weekend programmer is one who uses the computer as a word tool, educational or entertainment device. As the weekend programmer 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, generally 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 rap sessions) 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-

bugging in professional's) a rather dumb error caused by infrequent use of particular commands. Rather than force these 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 weekend. In fact, I wouldn't be surprised to see the professional segment begin to use these languages as well.

RUBB GOBBRG
RUBB, 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 GOBBRG, alternate RUBB GOBBRG) will determine the correct flow in your program to provide you with the correct results.

FOR EIGN
FOR EIGN can be used by the weekend, 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.

NORROR
NORROR will replace the ON ERROR GOTO statement found in many current BASICs. ON 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 the cause, correct it, and return the program correctly.

DO WHATWANT
Many weekenders know what they want to accomplish in their program, but often run into dif-

As reported in the July issue of this magazine, a computerized system has been developed to identify faces from a matrix of 16 by 25 pixels using six levels of darkness (gray). Following the prescription laid down in Professor Leon Harmon's description, Keith Delmas home-brewed a system for his 587TC (680) computer using an eye box from a Baby Alive doll, three Kodak Scientific prints, and an Eumecor Set mounting. A detuned CB radio (approx. channel 43.7) couples the

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? Yet it is willing to share the plane for this imaginative device with the first five people who correctly identify the person in the image reproduced here. Send response card of this magazine.

Keith Delmas

Computer ID



Biological Breakthrough

million a year by extra-terrestrial, whose very-long-term plan was to enhance our present peripheral-memory industry. A commandable enterprise, it true.

The Professor plans to publish his findings in a forthcoming edition of *Computer Confidential*, 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 Labs spokesman, on the verge of being released. Under intense questioning, a/b/a 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 on page 19a)



Computer study proves turtles are without.

An important computerized breakthrough in the field of biology has recently been reported from Midway University. Using the combined computing power of a consortium of Sphere, Sci-Fi, and Sci-Fi Computers, Professor Octave Galoot has proven, without a reasonable doubt, that turtles become extinct over sixty-seven million years ago.

Dr. Galoot's computations indicate that turtles may not have even existed at all. What we to-day regard as turtles, he asserts, are merely self-propagating disk memory units, left behind

Chinese Academy of Sciences delegation which recently returned to China after a tour of scientific establishments in Europe. The delegation included a visit to the IBM Technology Centre.

UK visit

The industrial application of computers seemed to be of particular interest to the



than," he added.

eliminated because of marginally profitable or unprofitable operations. These sources which must be pinpointed the most profitable areas of business and likewise deliver our distribution system. We can probably ahead of anybody else in receive from the system, we're vessels. "From the information we to develop a local system for its company was the first large line items for BLOB, noted that the management information eye-

C. Sheep Blunt, director of must for use by auditors and the IRS. data in an entirely different format. A unique software system of BLOB executive in Barron's these files are stored in the homes ent records. For safety purposes stores all information as permanent and barges in that region and don't about the company's boats each regional office all information system transmits to 200 terminals.

puter's data base via Uniscopes messages received into the computers at the station input all radio contact. The radio operator pickups made since their last including large barges drops and ports include operational data in-



DP Firms Support Carter's Brain

By Evad H. Lha

WASHINGTON — Despite doubt about how effective his brain can 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 to the brain before commenting on how the action would affect their companies.

Manufacture manufacturers, notably Central Data Corp., Honeywell, Sperry Univac and IBM, stand to lose millions of dol-

lars as a result of the effect since they are currently selling a great deal of computing power to the White House which under the

Rein Plan presumably would be reduced.

Privately, some company executives conceded that the best revenue might be made up if other country and company heads de-

side to follow President Carter's lead.

One industry analyst, how-



World leaders are members of Carter's computer/brain network.

ever, called those public and private statements "glibly spoken to hide their true concerns."

Commenting for the Computer Business Equipment Manufacturers Association (CBEMA), Director Namtuak Dyoil said the

industry is supporting the present action "for now, because something had to be done. With

out HP 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 "no much vagueness at the White

Barge Line Can Always Pinpoint Its Fleet

by Gorf Timrek

BAKERSVILLE, Ky. — The Barge Line of Bakersville

(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 atten-

tion. BLOB, together with subside-

hires Bakers Boat and Bakers

allies offices located in Hazen, Brooklyn, Newark, South Bronx, Baltimore, Boston, Combat Zone, Chicago, Detroit, Miami, Watts, Henderson.

Unlike other barge companies, BLOB owns its entire communications system and maintains a radio station, WIRT,

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 capitals report six times daily via radio to WIRT. Their re-

turns are try to do.

As AT&T spokesman said, "it takes running out of his head."

He said, "I have to wear a big hat if I do not have this because Carter will just

impact of Carter's action. He said, "the hat industry is going to have this because Carter will just

impact of Carter's action. He said, "the hat industry is going to have this because Carter will just



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 III. Or the II 9500. And hundreds of

other machines that can affect your company.

But even better than that we can get you a

copy of the blueprint, the operating systems, the

software packages, and even the chips them-

selves.

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.

We're the ones that sold the secrets of

transistor radios, television, and electronics to

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.

The AIFAM Companies.

Let us take the risks. (212) 906-6451.

MOVIES

BLOOD COMPUTERS FROM OUTER SPACE

directed by Uall Maylaugh

The recent successes of such movies as

Clow, *Encounter* and *Star Wars* have

shown that high-quality, totally

believable science fiction movies can be

made. And so we wait, 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 know that this was

a real movie, not on TV, as I wrote

foolish. (Readers who find the reviewer

incoherent are reminded that constant

exposure to computer machinery has

historically tormented not his mind and has left

him only a shell of his former self, but he

keep him around the office to remind me

of better times. — E.J.

The crew of the movie is that

hemorrhagic computer depicted in a

UFO as least twice as big as *Earth's* *Teal*.

are beamed down using a transporter by a

Wookie. These computerized computers

which are able to transport themselves far

and wide by a process not yet understood

by modern science fiction, blood will over

everything. It is not just known why

computers should bleed all over

prints the director to see his artistic

beauty and not question the un-

believability of the science.

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 "port pinger"

but look forward to seeing a 3-D version

of this movie, or possibly one in Scotch-G-

Vision.

— L. Harrison

There are two sides to every question and if

you want to be popular you take both

All books pertain to a humanoid eye.

BOOKS

PATENT SOFTWARE

by Irving Snell

The author, a practicing clinical

engineer and amateur lawyer, details the

functioning history behind the patent

achievement in the patent software field.

Working in his home computer

laboratory, he accidentally dropped an

entire box of punched cards into a van-

ishing machine. The cards which contained the

source code for an APL to BASIC

translator program, became coated with

a non-petroleum substance, impervious

to and insoluble in water, and took on a

very high shear. Such material he was

subsequently able to clean up the

program with only a few drops of a soft

cloth. The book goes on to review the

history of the patent for years as he

represented himself and took on the

provisions law firm of Hyde, Har-

ris and Turner to win the win-

chester money ball.

Published by Prentice Hall & Sons (1979).

127 pp. (hbk), \$12.95.

— A.B. Salisbury

TRANSCENDENTAL METALLANGUAGES

by U.B. Sarti

This book grew out of a set of lecture

notes used by Professor Sarti for his

graduate course on "Comparative Archaic-

care for Anthropologists." While the

book has nothing to do with computer

architectures, it is Sarti's only published

work which justifies its status as the

required text for the course. Chapter 1

reviews the evolution of computer

languages from SAKSARIT (Symbolic

Archaeological/Neurological System and

Language). Chapter 2 then develops the

theory underlying metalanguages and

applications. The highlight of the book is

BOOKS

PROGRAMS - ALGORITHMS - DATA STRUCTURES

by Niklaus Wirth

In this well-blending new book, the

author Dr. Wirth describes a new

concept in computer programming. New

and previously unorganized data struc-

tures may be uncovered by taking

existing programs and removing all the

algorithms. Examples given in the book

are in the BASICAL language itself

the BASICAL language to remove all its

own algorithms and cut programs down to

a minimum. The book explains "data

and original structure of new data struc-

tures, rather than by artificial, contrived,

making for all kinds of state-of-the-art

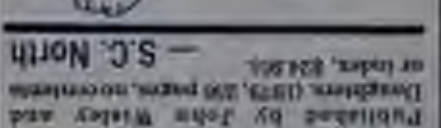
programming methods.

Published by John Wiley and

Daughters (1979, 256 pages, no contents

or index, \$24.95).

— S.C. North



It'd appreciate it if you'd stop referring to my cooking as raw materials processing."

**70% of programming
time is spent modifying
& rewriting**

WORMS II

Kills bugs before they become worms.

WORMS II

new systems

How can you find the time to develop products that were done at least once before?

are spent modifying or entirely rewriting programs of the efforts of a typical programming department program client with 10th revisions up to 70%.

Recent studies indicate that, in order to keep

program client with 10th revisions up to 70%.

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ARITHMETICA

The brain behind WORMS II

For your free WORMS II Feedback call
(212) 653-0556 today!

We're Arithmetica, a policy consulting software
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your data processing. We'd like to tell you about
them in our free WORMS II feedback.

Even if you did, it wouldn't be because it knows what's
best for your data. That means no time-consuming
changes every time you change the data base.

There are 3.4E12 ways WORMS II can offer
your data processing. We'd like to tell you about
them in our free WORMS II feedback.

With WORMS II, you just say what you want. You
don't have to tell the computer how to produce it.

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best for your data. That means no time-consuming
changes every time you change the data base.

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With WORMS II, you just say what you want. You
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Even if you did, it wouldn't be because it knows what's
best for your data. That means no time-consuming
changes every time you change the data base.

There are 3.4E12 ways WORMS II can offer
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With WORMS II, you just say what you want. You
don't have to tell the computer how to produce it.

COMPUTER IN THE COURT

[illegible]

There is some and there's been the complete
critical period on front of me. I can see
that character as first and if the person has
been attended before, how many times
has a been in jail and if he's not in prison
now, I take it in myself and the people at
times we meet about a person we can be
sure I give judgment.

HUGE FLATBED PLOTTER

could be the mechanism to be the target of the treatment. This may differ from previously suggested treatment options in that the treatment will be applied to the whole animal rather than to a specific organ or tissue. The authors will be applying the treatment to the whole animal and will be monitoring the response of the whole animal. The authors will be monitoring the response of the whole animal and will be monitoring the response of the whole animal.

minutes for the police to be followed and a map of the city of Arlington. A two-way radio linking them is available for operators of the vehicle. Some operators will be required to be trained in the winter pager and -dispatch team.

COMPUTERS
NEED AIR

Results of a recent study conducted by Professor Arnold from the University of Connecticut revealed the need to "do something."

The controlled experiment proved Professor Ford's hypothesis that blue plastic attracts and holds composting materials more than a white wax-coated trash can.

Fresh air

[illegible]

As the world's largest manufacturer of commercial and residential air conditioning and heating equipment, Carrier has a long history of innovation and leadership in the industry. Our commitment to quality and customer service is reflected in our products and services, which are designed to provide the most efficient and reliable air conditioning and heating solutions for your business or home.

1. *Abstract* The purpose of this study was to investigate the effect of a 12-week training program on the physical and psychological health of elderly people. The study was conducted in a community center in a large city. The participants were 30 elderly people (15 men and 15 women) aged 65 and older. They were divided into two groups: a control group and an experimental group. The experimental group participated in a 12-week training program that included aerobic exercise, strength training, and flexibility exercises. The control group did not participate in any training program. The results of the study showed that the experimental group had significantly higher levels of physical fitness and psychological well-being than the control group at the end of the 12-week period. The study suggests that a 12-week training program can improve the physical and psychological health of elderly people.

**CDC METRIC
CONVERSION**

Confronted with a comparison that assumes a 20% increase in the price of a product, the answer for the economist according to CPC is that there is no effect. All relevant calculations will be done in metric, rather than the old-fashioned out-of-date English units. Owners of existing CPC computers are advised to contact their CPC representative about upgrading to the new metric version of software (including metric COBOL). It is indicated that CDC is the first company to offer to the little-known but quite powerful binary metric system, but others might be expected to follow. In fact, there may be a waiting list of interested English unit computers on the west coast.

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 in some cases, the rate of increase is as high as 100 percent. Why? Because the insurance industry is a very competitive business. And in some cases, the rate of increase is as high as 100 percent. Why? Because the insurance industry is a very competitive business. And in some cases, the rate of increase is as high as 100 percent. Why? Because the insurance industry is a very competitive business.

For a traditional small business, there's no doubt that the insurance industry is a very competitive business. And in some cases, the rate of increase is as high as 100 percent. Why? Because the insurance industry is a very competitive business. And in some cases, the rate of increase is as high as 100 percent. Why? Because the insurance industry is a very competitive business.

Chances are, you've heard of the insurance industry. It's the industry that provides the financial protection for your business. And in some cases, the rate of increase is as high as 100 percent. Why? Because the insurance industry is a very competitive business. And in some cases, the rate of increase is as high as 100 percent. Why? Because the insurance industry is a very competitive business.

LETTERS

GUERRILLA WARFARE

Dear Editor:

Are you fed up with global aggression? Even as you read, growing numbers of internal computer warlords are fighting a cruel and ruthless alien force. That makes Klingons look like cream puffs. These invaders, led by a superior intelligence, BADA, have taken control of countless numbers of Apple computers, and constantly engage our warriors in fierce battles.

The warlords themselves are distinguished by their unusual black and blue, or calloused left thumbs. They are, however, seldom deterred by these "hostile" words, as long as they can still press the firing button.

The you have a strong thumb and a weak mind? Your good traditional Take on this Apple invader and kill a few alien in your spare time.

All Thanks
Theobald, Massachusetts

P.S. Coded message for fellow warriors—
60-A3 66-B5 69-D0 00-CA 19-CC AR
CI AE 14 CH CF 13 CI 10 A0 B4 B4 B4

When you see a situation you cannot understand, look for the Baudot letters.

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 in-

side 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 rad-

iation from an ordinary television

screen and the CRT.

Over the past two years I have dated

one the TRS-80 only four times and I

have gotten the same bad effects with

both Level I, II, and Level III - 100K. 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 un-

usual was found. I suspect that there are

some people who are much more suscep-

tible 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
Kam Bay, NJ

MAINTENANCE TIPS

Dear Editor:

The article "A Disrupted Guide to

Hardware Maintenance" in the July is

one (page 124) presented me to pass along

several maintenance tips I have found

valuable over the years.

1) If your CRT screen contrast soon

decreases, try removing the plug from the

socket, waiting 15-20 minutes, and

plugging it back in. If it refuses to do,

give it a sharp rap with a 9- or 10-pound

wedge hammer.

2) Disk drive read and write errors can be

corrected by rubbing the recording sur-

face of the diskette with 120- grit sand-

paper. If this does not correct the prob-

lem, insert a large bar of soap against the

head or so from the drive head.

3) If your CRT outpicture seems to get

moderately warm during normal oper-

ation and is not equipped with a cooling

fan, simply spray the interior of the unit

with a good dose of cold water. (The fan

knows anyway for plasma works just fine.)

4) If your power cord is getting frayed or

run to the hardware store and get some of

that black electrical tape. Wrap five or

six turns around the suspect area and

it'll be good for a lifetime. (Don't forget to

pull the plug out by the cord, and not a 30-

degree angle!)

BAD RADIATION

Dear Editor:

I am consistently getting bad radi-

ation from the Radio Shack TRS-80 mi-

crocomputer. "Creative Computing"

period letters about bad radiation in

the September-October 1977 and the Jan-

uary-February 1978 issues but I do not

know how to tell whether they are re-

levant.

My experience with the TRS-80 is that

I get "burnout" (especially on the right

side of my face and body), waking on

my face which appear overnight and

won't go away (I look older because of

to, the heating of silicon chips, etc. in

state of consciousness (for the worse)

and altered perception (vision, way of

sweet things), feeling stupid and very

suddenly 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.

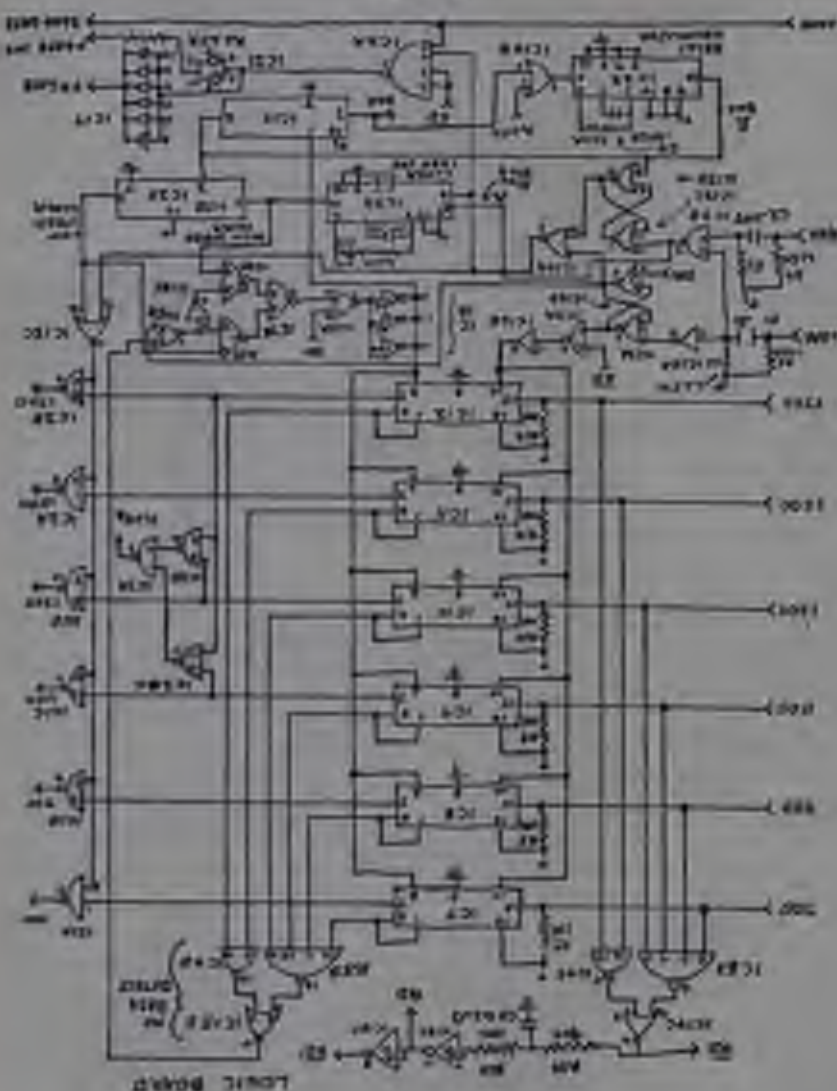
Are you as strong as David your own opinion? You need off all the power? Do you need your rights removed of a constitutional? You system with only stealing DNA, only to maintain to the and nation of a citizen making that you're unable to fix has the worst that humanity is hard kept for a day from a crack at your own DNA-1?

the same time, it is a very important part of the overall system. The system is designed to be flexible and adaptable to changing requirements. It is also designed to be secure and reliable. The system is designed to be easy to use and maintain. The system is designed to be cost-effective. The system is designed to be scalable. The system is designed to be secure and reliable. The system is designed to be easy to use and maintain. The system is designed to be cost-effective. The system is designed to be scalable.

[illegible][illegible][illegible]

And it probably got more heated when Wright said he wanted to "talk" to the "black community" about the "black power" movement. The meeting at that point was more of a free-for-all than a formal event.

Figure 3

[illegible]

They have been very successful in their efforts to improve the quality of their products and services, and they have been able to do this without sacrificing their commitment to their customers. This is a testament to their dedication and hard work, and it is a testament to the power of innovation and creativity. We are proud to be a part of their team, and we are confident that they will continue to achieve great things in the future.

Case E. Wilkins

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.

written in virtual LISP. Something more was

needed.

We had read in some of the less reputable computer magazines that you can add a bolt-on turbocharger to your computer and expect an increase of up to 100 to 1 p.s. Fran-

cal remains being somewhat depleted by a recent embolism scandal, we were able

to borrow the tape from a fellow employee

who explained that she had recently won the

Iran 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

turbocharged add-on very very badly. So we

sent money for the unit (made by a reputable

firm called Earth Power Systems, they ad-

vertise heavily so you know they're for real)

and waited, meanwhile cursing at the sun.

Photo 2: Installing the Turbocharger.

run our sophisticated multiplexer (Bart 1188

11/34 simply does not have the muscle to

strip down the factory stock PDP-

11/34. Unfortunately, this technique did not

relieve the problem appreciably and it finally

led us to the turbocharger.

Photo 1: Flushing out clogged circuits.

ing to look them up 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 imag-

ine) and required immediate action. I met

the first step was to correct a warning

message. The standard procedure is to

carefully place the crowbar under the print-

ed circuit card and apply pressure. Do not be

afraid to use force if need be. Once the cir-

cuit board has been disengaged, cut the

excess wire (any time an excess wire which

is much shorter than the curved variety in

fact it is well known the light saving feature 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 cir-

cuits in the CPU. (See photograph 1. Advice:

Photo 1) As computer circuits operate, waste

electrons sometimes accumulate in out-of-

the-way places especially inside integrated

circuitry. These bad electrons can usually

slow down your circuits and make them

weak and unstable. The best thing to do is

to get an electron vacuum (Radio Shack part

number 234-23882). It will be out of stock by

the time you get to the store, and please

don't leave. (I have never seen it being done

at the University of Michigan.) It is to figure

out why and where the electrons get jam-

med up. Don't worry, it is a somewhat

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

led us to the turbocharger.

Photo 1: Flushing out clogged circuits.

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Photo 2: Installing the Turbocharger.

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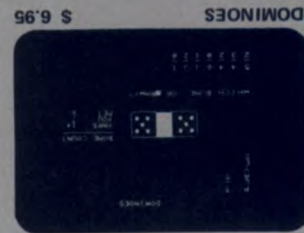
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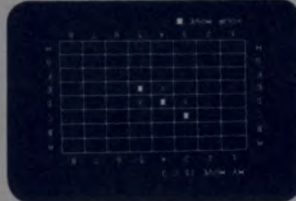
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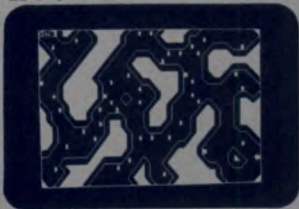
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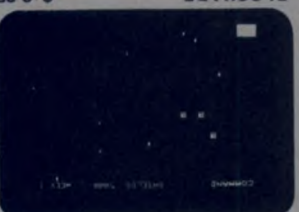
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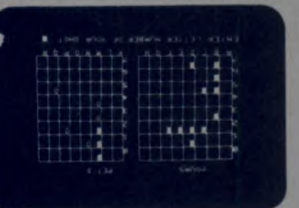
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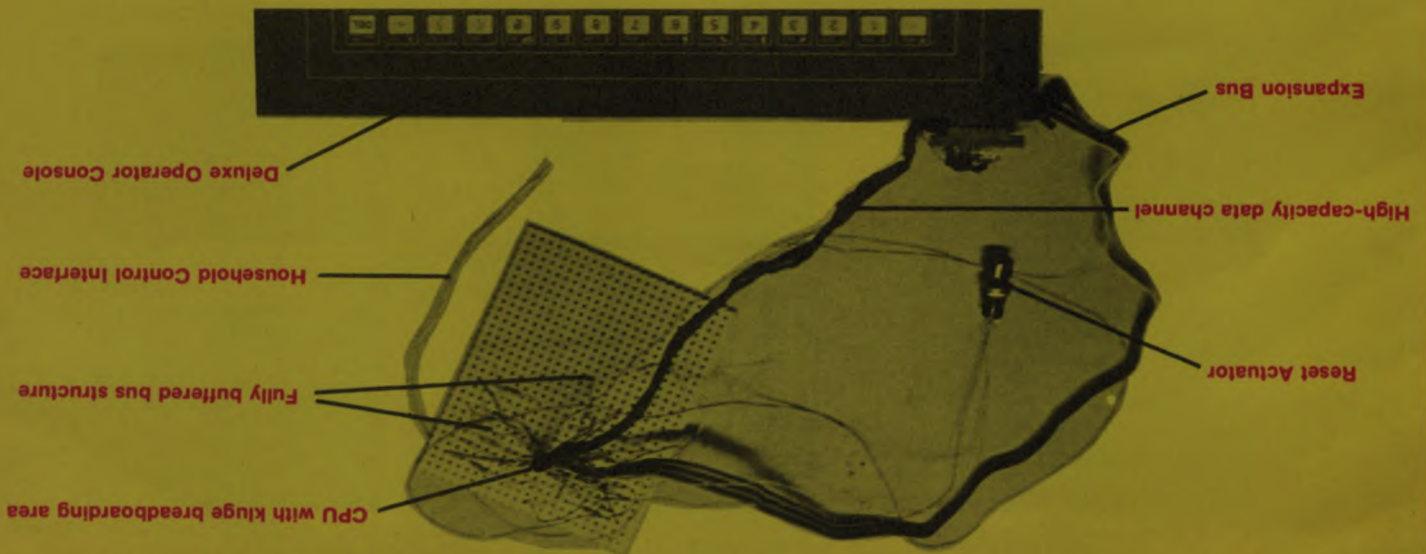


BATTLE SHIP \$ 9.95



ZAP \$ 6.95

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.

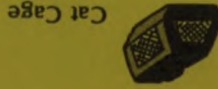
The computer itself (the thing with the holes) is super. Fast 4 gigahertz operation is so fast that its speed can't be detected with normal test instruments, nor is it compatible with any standard low-speed peripherals available from any other manufacturer, even Cray or CDC. The 690 holes provide cooling from the astronomical temperatures that are generated when electrons are moving at the rated 4 gigahertz speed. And when equipped with the Formula Vee turbocharger option, it makes other computers like Cray-T's and TRS-80's seem like baby toys. Sheer speed is what separates computers from toys, a good lesson to remember the next time you buy a car.

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.

IMPOSSIBLE EXPANDABILITY

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 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 specs 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.



Cat Cage

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OPTIONAL CAGES

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.

HARD TO USE

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.

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-65U and two types of information management systems, OS-MDMS and OS-DMS.

Home Control

The C8P DF has the most advanced home word processing applications. 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 new universal telephone interface (UTI). 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, 300 baud modem and 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, FOREGROUND/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 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.

For literature and the name of your local dealer, CALL 1-800-321-6850 TOLL FREE.

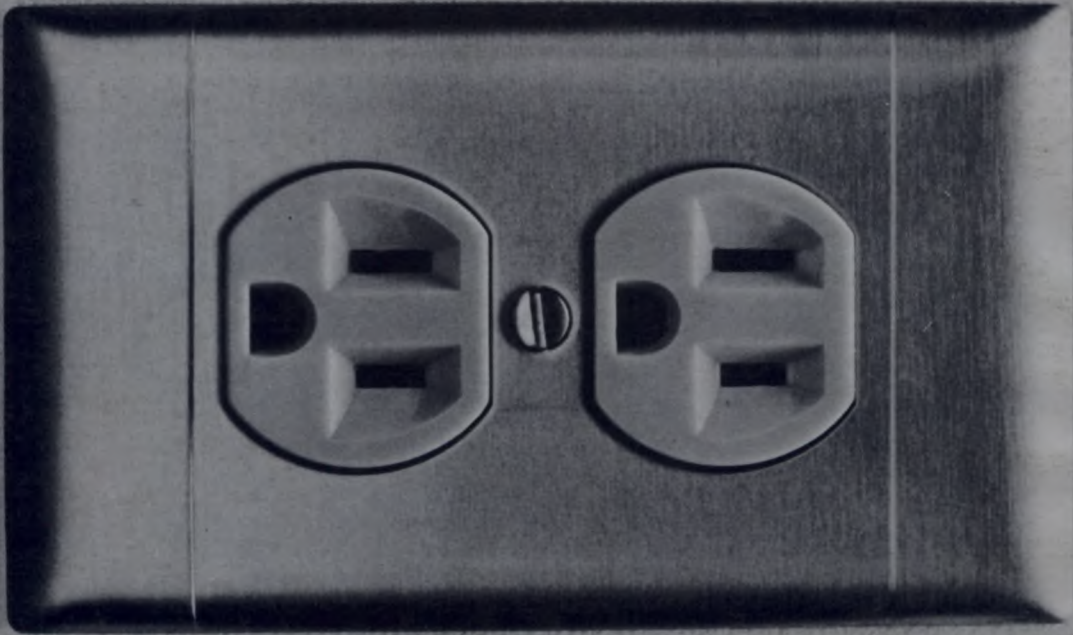
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