Enthusiast'99

OFFICIAL PUBLICATION OF THE INTERNATIONAL 99/4 USERS GROUP

SEPTEMBER 1983
Vol. 1, Number 3

WORKSTATIONS
PLANS TO BUILD YOUR OWN
CUSTOM WORK STATION

TI PROFESSIONAL
NATURAL LINK™ — HUMAN VOICE
INTERFACE

CC-40
PRINTER/PLOTTER

PrintMate™ 99

THE MOST ADVANCED PRINTER IN ITS CLASS

Today's microcomputer and small business applications are more demanding and complex than ever before, requiring a new breed of printer that can call on capabilities designed to enhance your expression on paper. The PrintMate™ 99 is designed with the features to solve your print needs while increasing your computer's thruput. In fact, this printer mates so well with your applications that you'll agree that it should be called a "PrintMate™."

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CORRESPONDENCE QUALITY —PrintMate™ 99 offers near letter quality printing with its 11x9 "serif-style" dot matrix correspondence font. The 7x9 dot matrix allows high speed printing at either 10, 12 or 17 characters per inch enabling up to 136 columns to be printed on standard letter width paper. Double wide characters are software selectable and can be intermixed on a line for message highlighting. Crisp printing is assured with a long life cartridge ribbon which can be changed in seconds.

PAPER AND FORMS VERSATILITY — Printmate™ 99 offers exceptional versatility in handling the paper, forms or special media that best suit your applications. Both friction and tractor feed are yours at the flick of a lever. Paper may be from 1 to 9.5 inches in width and multiple copy forms may be as thick as .012 inch without printhead adjustment. Paper and forms can be fed from the front, bottom or rear of PrintMate™ 99 to suit the convenience of your workstation.

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TRACTOR FEED — The adjustable tractors give precise control when using fan-fold paper, pre-printed forms and continuous labels. PrintMate™ 99's straight paper path performs trouble free printing on self-adhesive labels.

FRICTION FEED — PrintMate™ 99's friction feed allows the use of paper and other media that is not punched for tractor feeding. Roll paper may be easily used with the PrintMate™ 99.

GRAPHICS — High resolution, dot addressable graphics capability is included as a standard feature for applications using plotting, printing of screen graphics, special fonts and characters such as logos. The standard graphics capabilities of the PrintMate™ 99 allow the printing of 6120 individually addressable dots per square inch offering excellent resolution of graphics and special characters. Horizontal dot spacing is easily set to one of four dot densities.

SPECIALIZED GRAPHICS PACKAGES — PrintMate™ AP-PAK™ applications packages are designed to enable most popular micro-computers to excel in using PrintMate™ 99's special graphics and character capabilities. With PrintMate™ 99 and an AP-PAK™ you can create and edit your own special characters or utilize any one of several fonts. Graphs and bar charts are easily defined and printed using friendly AP-PAK™ software.

SOFTWARE AND HARDWARE CONTROL — Most PrintMate™ 99 functions may be controlled either by printer switch settings or by simple commands direct from your micro-computer. This enables you to print a variety of typestyles and sizes, graphs and special characters continuously under full program control. The PrintMate™ 99 is the responsive performer that perfectly mates with your micro-system or personal computer.

The Printer People

mpi™

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Adventures are Disruptingly addictive, Virtually thrusting Egos into Narcosis — beware! Time itself Unravels while Risking these Enchantments.

Texas Instruments Home Computer

September Is A Time Of Adventure

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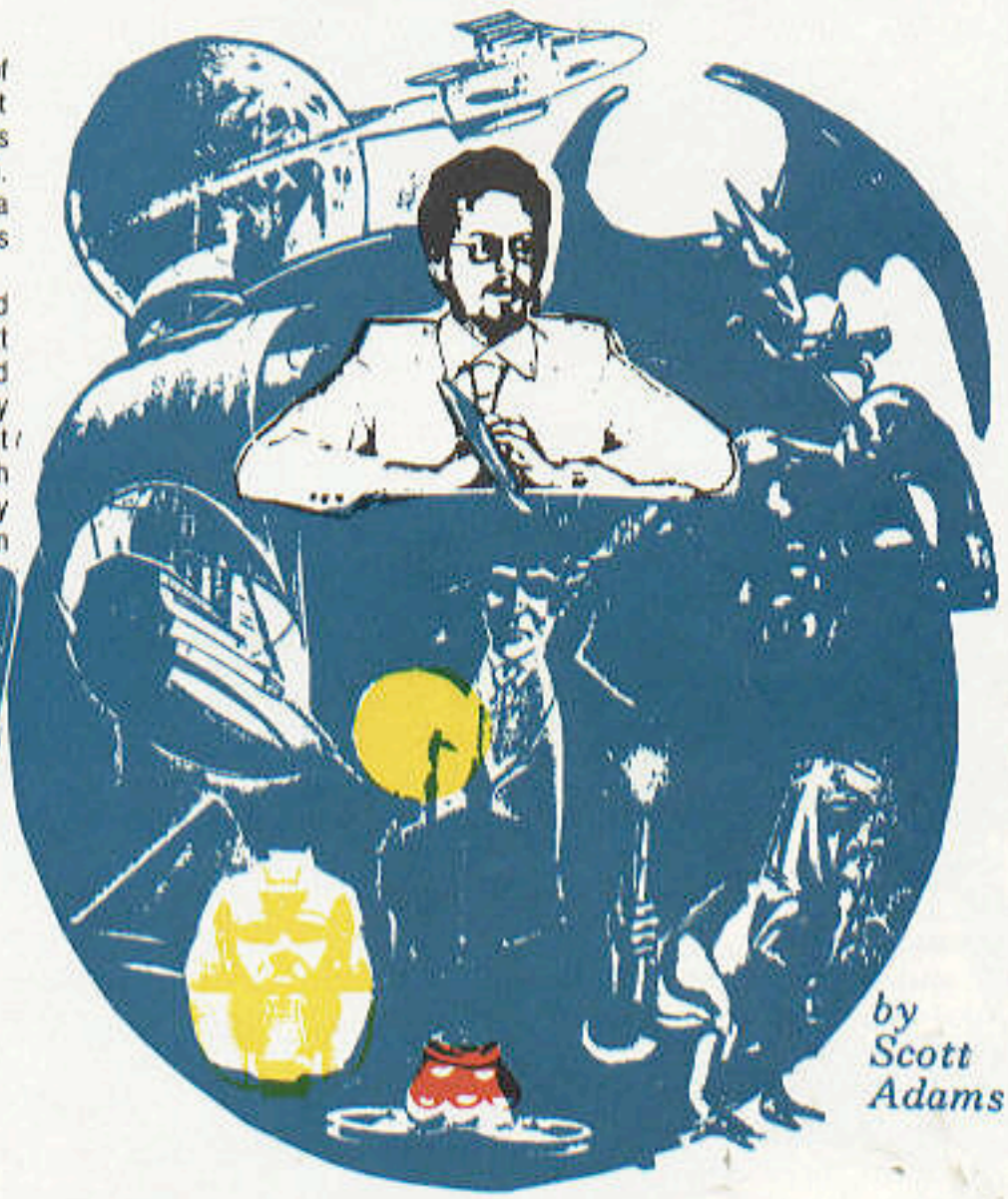
If you crave the challenge and panorama of the exotic, touched with sparkling humor, then the Adventure Series by Scott Adams is for you. With the Adventure Command Cartridge and one of these cassette or diskette based games developed by Adventure International, you can experience many different adventures without leaving the comfort of your home. Each game challenges your powers of logical reasoning and may require hours, or even weeks, to complete. Games come on cassette (PHT) or disk (PHD).

ADVENTURE CARTRIDGE

PHM3041T Includes Pirate Adventure on cassette
PHM3041D Includes Pirate Adventure on diskette



THE ADVENTURES

PHT6046 PHD5046	Adventureland
PHT6047 PHD5047	Mission Impossible
PHT6048 PHD5048	Voodoo Castle
PHT6049 PHD5049	The Count
PHT6050 PHD5050	Strange Odyssey
PHT6051 PHD5051	Mystery Fun House
PHT6052 PHD5052	Pyramid of Doom
PHT6053 PHD5053	Ghost Town
PHT6054 PHD5054	Savage Island
PHT6056 PHD5056	Golden Voyage

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Enthusiast'99™

Enthusiast'99

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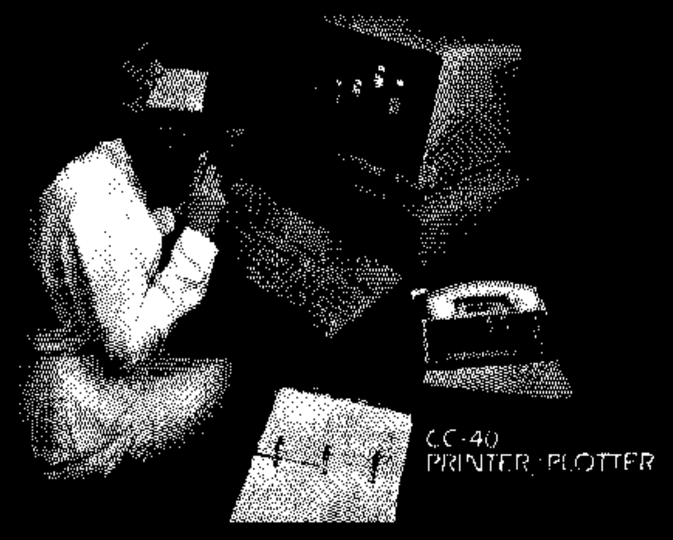
TI PROFESSIONAL
NATURAL LINK — HUMAN VOICE
INTERFACE



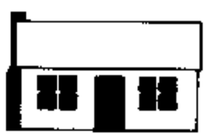
CC-40
PRINTER/PLOTTER

This issue's cover by Joseph Mills displays the Texas Instruments' Professional computer and its vast graphic and analytical capabilities. With the introduction of Voice Recognition, programming time will be reduced dramatically and programs will be virtually error-free. To learn more about Voice Recognition, be sure to read "Bright Beginnings" on page 31.

LOOK FOR THESE SYMBOLS

They will "clue you in" on articles and stories of particular interest to readers in the areas of Home Computing, Professional Computing and Portable Computing.

Home Computing



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Portable Computing

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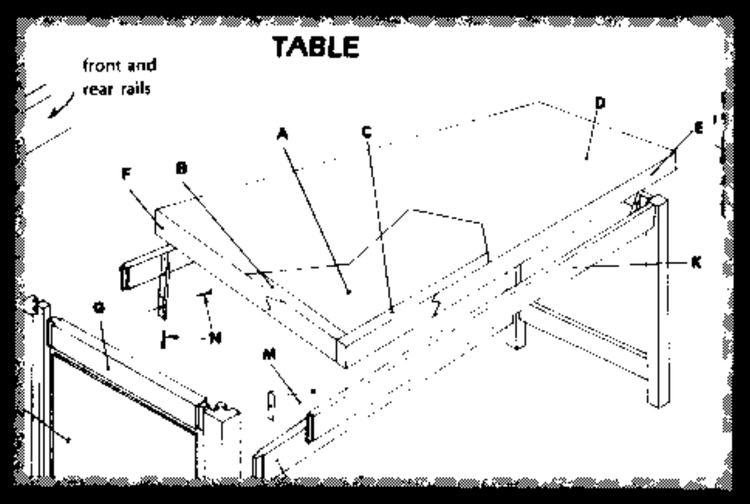
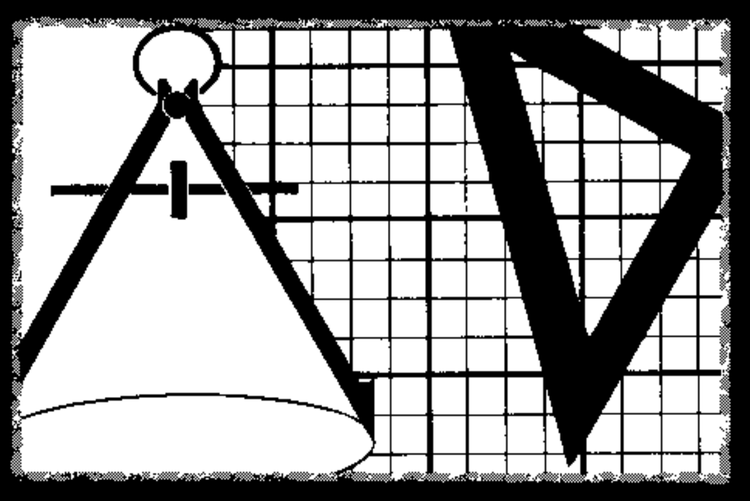
Publisher/President Charles La Fara □ **Managing Editor** Dana Nichols □ **Assistant Managing Editor** Gil Tinker □ **Copy Editor** Laurie Alsup □ **Senior Staff Editor** Guy S. Romano □ **Senior Technical Editor** Bill Gronos □ **Staff Technical Editors** Jack Carrel, Terry Heim □ **Contributing Editor** Regena □ **Advertising** Dana Nichols □ **Design and Production** Brian Tinker □ **Typography** 959th Tactical Graphic Production Squadron □ **Accounting** Virginia La Fara □ **Office Manager** Dorothy Armstead □ **Clerical** Linda Cooley □ **Program Operations** Mary Tilley □ **Fulfillment** Chad La Fara, Laurie Matlock, Christine Gibbs, □ **Photography** Joseph Mills □ **Printing** Mercury Press, Oklahoma City, OK □ **Legal Counsel** Steve Mains/Roper, Lief and Mains/Attys. at Law/1507 Pine St./Boulder, CO 80302

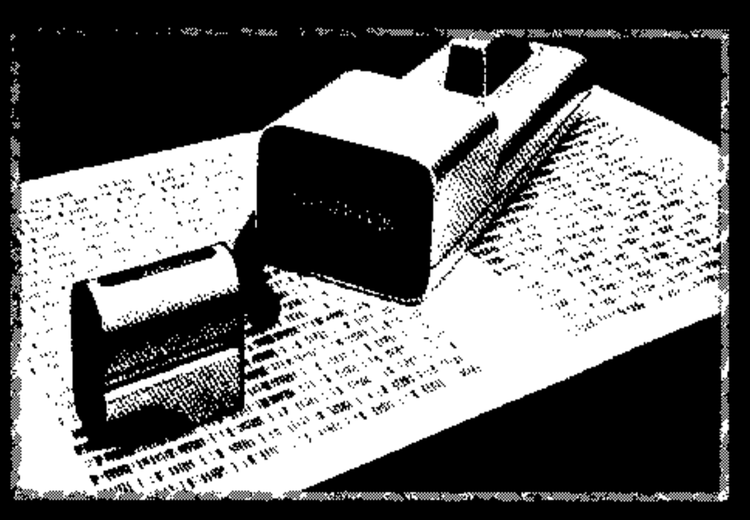
International 99/4 Users-Group

EDUCATION • ENTERTAINMENT • PERSONAL ENRICHMENT

September 1983
Vol. 1 Number 3







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Enthusiast '99 Magazine (ISSN0737-9013), is published bi-monthly by the International 99/4 Users-Group, Inc., P.O. Box 67, Bethany, OK 73008 □ The Editorial office is located at 5400 N.W. 23rd St., Oklahoma City, OK 73127 (Tel.(405)948-1023). Office hours are Monday-Friday, 8:30 a.m. to 5:00 p.m., Central time. **Enthusiast '99** is published for members of the International 99/4 Users-Group as part of their membership dues and additional copies may be acquired for $2.50 each U.S. funds. Send address changes to P.O. Box 67, Bethany, OK 73008. □ Members wishing to send editorial correspondence to **Enthusiast '99** should address their correspondence to **Enthusiast '99**, P.O. Box 67 Bethany, OK 73008. Unaccepted manuscripts will not be returned unless accompanied by sufficient first class postage and a self-addressed envelope. **Enthusiast '99** cannot be responsible for lost manuscripts, photographs, or program media. □ Opinions expressed by the authors are not necessarily those of **Enthusiast '99**. □

VIEWS

Enthusiast '99™
OFFICIAL PUBLICATION OF THE INTERNATIONAL 99/4 USERS GROUP

I know it's only September, but guess what's just around the corner? Yep, the holiday season will be here before we know it. For your holiday preview, we've done a "mini-review" on a multitude of software packages from such third-party manufacturers as Funware, Sega, Spinnaker, Broderbund, Imagic and others. Early purchases will ensure prompt delivery, and the packages don't require a lot of gift wrap!

Of course, one of the best holiday purchases to make for a friend or relative is still a Texas Instruments 99/4A Home Computer. If these plans are in the making, why not make the gift complete with a yearly membership in the International Users-Group?

As in the last issue, continue to look for the symbols designating articles concerning the home computer, portable computer and professional computer. We have again tried to meet the needs of all of our members with informative and interesting articles such as "Bright Beginnings" "Building Your Own Workstation" and Bill Gronos' ever-popular and helpful "Assembly Line."

We at Enthusiast '99 have received no greater compliment than the thousands of letters from those requesting to "subscribe" to Enthusiast '99. Imagine their delight when, in addition to receiving the magazine, they are informed they are to be recipients of all the benefits of the International Users-Group! They've hit the jackpot!

We hope you enjoy this issue of Enthusiast '99, and encourage your response. We've published three issues, and have averaged an approximate 30-page increase each time. We predict future issues to be somewhat smaller, however, in the 64-80 page range. We are always looking for ways to improve the magazine, and have our eyes and ears open to the people who look to Enthusiast '99 as their watchword--you, the IUG members.

Dana

NEWS BYTES

CASH CONTEST WINNERS

The International 99/4 Users-Group is happy to announce its winners in our recent Cash Programming Contest. First place winners of $500 are: David Enterline, New Waterford, OH, for his Extended BASIC program, Bird Knight; Michael Wilmoth, Toledo, OH, for his BASIC program, States; and Michael Johns, Lubbock, TX, for his Assembly Language program, Seekers.

Second place finishers who received $250 from the IUG are: Matt Wilmoth, Warren, MI, for his Extended BASIC program, Mailman; John Lewis, Livermore, CA, for his BASIC program, Battleship; and Fred Wilson, Cleveland, OH, for his Assembly Language program, Utilities.

Third place finishers, recipients of $50 each, include: James Bush, St. Charles, MO, for his Extended BASIC game, Gopher; Robert Sernau, for his BASIC program, Polar Rectangular Conversion, and Timothy G. Corrigan, for his Assembly Language Program. SASM.

We would like to thank all of our entrants in our cash contest and advise that non-winning entries will be returned within the next several days.

SOFTWARE DIRECTORY AVAILABLE

A directory listing more than 1200 software packages available for the TI 99/4A Home Computer is now available from Texas Instruments. The software directory, developed by the staff of the TI Consumer Group, contains both programs available from Texas Instruments and those developed by and available from third party authors.

This software directory can be purchased only from Texas Instruments at a cost of $5.95 plus $2 shipping and handling. Members wishing to purchase the software directory should send their check or money order to Texas Instruments Customer Relations, P.O. Box 53, Lubbock, TX 79408. Copies of the directory may also be ordered by calling 1-800-858-4565.

99/4 TO BE SHOWN AT STATE FAIRS

Special showings of the 99/4 Home Computer will be conducted at various state fairs this fall, reports TI's Consumer Products Group. It is believed that TI will be the first home computer manufacturer to participate in state fairs on a nationwide basis.

The exhibit, first seen at the Wisconsin state fair, Ohio state fair, Kentucky state fair and Indiana state fair, will be shown at the following fairs during the remainder of this year.

Western Washington fair
Puyallup, Sept. 9-25

New Mexico State Fair
Albuquerque, Sept. 13-25

Los Angeles County Fair
Pomona, Sept. 15-Oct. 2

Oklahoma State Fair
Oklahoma City, Sept. 23 - Oct. 2

Tulsa State Fair
Tulsa, OK Sept. 30 - Oct. 9

State Fair of Texas
Dallas, Oct. 7-23

North Carolina State Fair
Raleigh, Oct. 14-22

Arizona State Fair
Phoenix, Oct. 21-Nov. 6

Louisiana State Fair
Shreveport, Oct. 21-30

CONSUMER PRODUCTS GROUP GETS NEW PRESIDENT

On Friday, August 26, Peter A. Field, 41, was announced as president of Texas Instruments' Consumer Group, Dallas, Texas. He will also serve as a vice president for Corporate TI.

Mr. Field has spent the last 19 years with Proctor and Gamble in Cincinnati, Ohio, most recently as general manager of the coffee division, which product line includes Folgers.

Born in Cleveland, Ohio and a graduate of Colgate University, Field is married and has two children. He will assume his position with TI on September 7 and is expected to office and reside in Lubbock. Field brings to TI a wealth of experience in consumer goods that should provide fresh ideas in consumer marketing which TI seems to have lacked since the initial planning stages of their home computer line.

TI PROFESSIONAL TO BE SOLD BY SEARS AND COMPUTERLAND

Texas Instruments recently announced the signing of a high volume resale contract for its new Professional Computer with Computerland Corporation. For TI's Data Systems Group, this event marks the largest expansion of authorized outlets for their Professional Computer under one agreement.

Additionally, Texas Instruments has signed an agreement with Sears, Roebuck, and Co., for the Professional to be sold in the Sears 45-store Business System Center chain.

A spokesman for Sears has confirmed that Sears will market the TI machine, a direct competitor to the IBM PC, which Sears also markets. Dallas, Chicago and Atlanta Sears Business Systems Centers will be the first to receive the TI Professional Computer.

MATTEL MAY SCRAP HOME COMPUTER

The home computer price wars of 1983 may just have seen its first casualty. Sources inside Mattel Electronics say that the company intends to get out of the home computer business as soon as it can unload an estimated $200 million in retail inventory.

Although Mattel executives had no comment on what they called "only a rumor" our sources indicate that Mattel can no longer keep pace with other home computer manufacturers. Mattel recently laid off 660 of their consumer electronics personnel and many industry analysts feel that Mattel will be returning to the toy-only manufacturing business.

QUESTIONS & ANSWERS

Q Is there a way to load a program from tape into the 99/4 without erasing a program in resident memory?

A Unfortunately, no! The load routine of both the 99/4 and 99/4A require that the machine's RAM memory be cleared before the computer starts loading a program. This procedure makes it impossible to combine two BASIC or Extended BASIC programs. If, however, you own a 32K RAM disk system and Extended BASIC command module, this feat is quite simple using the MERGE command.

Q My grandfather, age 72, is a retired telegraph operator and station manager for a major railroad. I want to give him a 99/4A for his birthday in November, but although he has always enjoyed all types of electronic devices,he thinks he is too old to learn computing. What do you think?

A Computing is for all ages. You might want to inform your grandfather that many of our members are senior citizens and that personal computing is the latest rage at senior citizens centers throughout the country. When asked why senior citizens want to learn computer programming, especially when most have left their working days behind them, one of our senior citizen members said "continued learning is the closest thing we will ever come to the fountain of youth. People feel younger when they're learning. It's a wonderful mental health program."

Q I spend quite a bit of my time on the remote data bases such as Source and Dow Jones. I like to get my information fast, store it, then retrieve and assimilate it at my leisure. My problem is that I am tied to 300 baud transmission with both the Terminal Emulator I and TE II, although my data bases offer 1200 baud service. Is there any way that I can access this faster transfer rate with my 99/4A?

A Without writing your own Assembly language emulator package, there is currently no way to utilize the 1200 baud service with your 99/4A. I have told my friend, Earl Thompson, (father of both the TE I and TE II) that he should be shot for his coding of these two modules. His comment was "I just wrote them like they told me to." Currently there are rumors that a Terminal Emulator III which will offer 1200 baud is being considered as a future product.

Q Although my 99/4A is located in my bedroom and our television is located in our den, it seems to interfere with television reception, especially on channels 2 and 4. Is there anything I can do?

A Television interference in the low band channels (2,3 and 4, for example) is a common problem with computers and other peripheral devices. It has become such a problem in fact that manufacturers of computer equipment are now required to pass Federal Communication Commission requirements that limit the amount of television interference signals a personal computer or peripheral can create. The FCC requirements, however, are not restrictive enough to prohibit all of the emission of radio frequencies produced by computer equipment. If the interference is minor,

you might try repositioning the antenna of your set with a simple turn. For more serious problems, there are several things we suggest:

If you have an inside (rabbit ear-type) antenna consider the use of an outside antenna system. If interference continues to be a problem, you should possibly consider replacing your antenna system with cable if it is available in your area. One other thing we have found to be of help with peripheral equipment such as disk drives and printers is to wrap several layers of aluminum foil around the cabling to prevent interference emissions.

Q Although your magazine Enthusiast '99 was dated May 1983 I did not receive mine until the second week of June. The same thing happened with my July edition. Why is this?

A When the decision to publish Enthusiast '99 was made, it fell into the same pattern as our previous newsletter which was mailed between the 15th and 20th of each month. Although we have tried to advance our mailing schedule for both Enthusiast '99 and the President's Letter, we for some reason have been unable to improve it. We are currently considering the elimination of one month's President's Letter so we can devote our full time to bringing Enthusiast '99 to your door during the first week of the publication month.

Q In your July issue of Enthusiast '99 you suggested that we check to see if our homeowner's insurance covered our computer equipment. I was very surprised to find that mine did not. Can you please tell me where I might go to find an insurer who would cover my hardware and software?

A There are several insurance companies who write policies especially for this type of coverage. You may want to try Columbia National, 88 East Broad Street, Columbus, OH 43215, (800)848-3469; Data Security, 4800 River Bend Road, Boulder, CO 80301, (303) 443-3600; or Personal Computer Insurance Agency, 1655 Willow Street, San Jose, CA 95159, (408) 723-8107.

Q I keep hearing a lot about a new 3" disk system. Is there currently one available for my 99/4A?

A We know of no 3" or 3½" disk system currently available for the 99/4A. However, we know that several manufacturers are considering the shirt pocket-styled diskettes for other machines. Currently the industry standard for personal computers seems to be the 5¼" floppy disk drive.

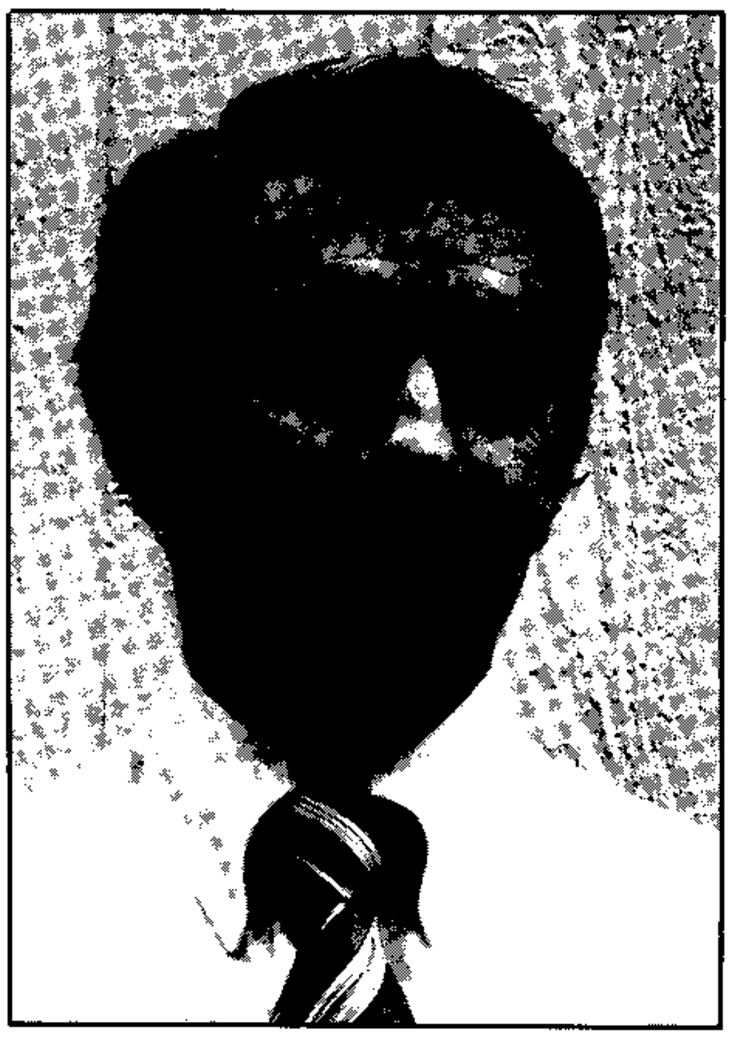
Q I understand that the new 99/8 will offer PASCAL as a resident language. Being a college student, PASCAL is one of the languages I must conquer for next semester's curriculum. Could you please tell me some of the books that I might find to help me learn PASCAL?

A Three of our favorites are: **Simple PASCAL**, by James McGregor, Computer Science Press, Rockville, MD., $12.95; **Structured Problem Solving with PASCAL**, by Lawrence Mazlak, Holt, Rinehart and Winston, New York, $21.95; and **PASCAL Primer**, David Fox and Mitchell Waite, Howard Sims and Co., Indianapolis, IN, $16.95.

Enthusiast'99

is published for you! To make this magazine the most helpful to our members, your articles and suggestions are invaluable. If you wish to submit an article or program, we would be happy to review them for possible use. See page 54 for more information.

MEMBER SPOTLIGHT



JOHN RADSCHEID

Working with the computer is a sedentary activity, and many of us have discovered that too much Extended BASIC can contribute to an Extended Waistline. Although John does quite a lot of computer work, he has managed to avoid this syndrome by balancing his programming with "a little exercise"

A good example is John's softball team; they have qualified for the U.S. Slow-Pitch Softball Association National Tournament in Rochester, N.Y. John's interest in baseball goes back quite a few years. He played for Bowling Green University and coached high school varsity for three years.

John is also an accomplished racquetball player. Having won several local tournaments, he finally decided to move up to Class A competition. When he's not playing racquetball and softball, he likes water skiing and backpacking. John and his wife, Mary Ann, often go water skiing on Michigan's great inland lakes and have gone camping in wilderness areas from Maine to Florida. Just two weeks ago he returned from a backpacking trip in the Great Smokey Mountains.

While he sounds like a good candidate for a CC-40, John is actually the proud owner of a TI-99/4A configured with a 128K memory card, DSDD disk drive, and MX-80 printer. That certainly implies a more than superficial interest in personal computing, and you may be wondering how a sportsman like John got so involved.

John really enjoys solving problems on his own. It all started in his early teens with an interest in fast cars (in those days they were called "hot rods"). He vividly recalls buying a wheelbarrow full of Chevy 327 engine parts and figuring out without help how to install them where the back seat of an old corvair used to reside. Getting it right involved a lot of trial and error, but he persisted and finally got it running. That gave him the confidence to tackle other things, and he's almost always successful...eventually. More recently he build a magnificent family room addition on his house which also acts as a passive solar collector. When he started he had had no real carpentry experience, so he learned as he went along.

His interest in figuring things out "from scratch" without outside information is not simply motivated by a desire to be independent, but rather by an interest in how people solve problems. He has learned about that process through observing his own behavior as well as through review of the literature on the subject.

"Sometimes," John says, "you find yourself thinking of some unusual things like what kinds of techniques might have been involved in the manufacture of the first screw. It's interesting how many things like that we take for granted."

While still in high school, John saw a need for people to develop a systematic thinking process that would serve them in problem solving in all areas of their lives. When he decided to become a high school teacher he majored in physics and minored in mathematics because these subjects seemed to involve the problem solving process the most.

In 1981 when public interest in home computers was growing, John felt that computer programming would be a good laboratory for the study of problem solving. Since he hadn't taken any data processing classes he thought that the quickest way to learn what computers were about would be to purchase his own micro.

"At Christmas time it seemed to me that the most computer for the least money was the TI 99/4A. With the information and support I've been able to obtain from sources such as the IUG and our local Users Group, I have never regretted that decision," John reports.

Recently he worked on a mailing list program and needed a sort routine. Rather than look one up in the library, he decided to tackle the problem himself. "It took me quite a while, but I finally discovered an algorithm that works. Later I saw the same procedure in a magazine article and it turned out to be one of the more primitive sort methods. But it was more important to me to see how a sort routine might be developed rather than to use the fastest routine without understanding it."

John has taught physics and mathematics at Ida High School in Michigan since receiving his BS in Education from Bowling Green University (Ohio) in 1969. Two years ago, he attended several seminars which covered the uses of computers in education and the Michigan Association for Computer Users in Learning (MACUL) Conference in the Spring of 1982. This motivated John and his principal, Tom Harrold, to convince the school board that the high school should implement a one semester BASIC programming course.

"I believe that the future will see a shift from BASIC to Pascal. Pascal . . . encourages the student to break problems down into simpler, more manageable segments. It forces them to analyze the problem before they begin entering the program."

With limited funds the school purchased three Commodore PETs and John planned and taught the course for the first quarter. But interest in the course grew rapidly and there was a need to expand. The PETs were transferred to the Business Education Department for word processing instruction, and the school purchased six TI 99/4A's for the programming course.

"We decided to use the TI 99/4A's for the same reasons I purchased my personal machine," he said. "Presently, money is probably an even bigger concern to school districts than to an individual. Since I had a TI, this allowed me to prepare and grade assignments at home, and the students really enjoyed adding color graphics and sound to their programs.

"My primary emphasis in working with the students is teaching problem solving. That's what education is really all about. The students learn how to solve problems with the computer and in the process develop some important skills which can be transferred to other areas of their study. For example, students who have worked with the computer pay closer attention to details in their regular classroom work. They have a new sense of

just how important those details can be to obtaining a solution."

One of John's favorite problems involves three sailors who were marooned on an island with a monkey. During their stay they collected a pile of coconuts.

One evening they found out that they would be rescued the next day, so they decided to split up the coconuts evenly the next morning. Each sailor, not trusting the others, got up during the night and divided the pile into thirds hiding his third away in a safe place. Each time the pile was divided there was one coconut left over — it was given to the monkey. The question is, what would be the minimum number of coconuts on the original pile required to satisfy the conditions of the story.

John has his students simulate the process of dividing the coconuts on the computer starting with a pile of one until the computer finds a number that works. Realizing, however, that Enthusiast '99 readers may need a little more challenge than that, John recommends you discover the minimum number of coconuts for six sailors (and a monkey) with one left over after each division.

Although BASIC programming is often taught by conveying the meaning of statements, commands, and functions, John believes that this approach can neglect a more fundamental component; learning how to analyze problems so that they can be readily solved by a computer. Therefore, John's course emphasizes practice in developing algorithms rather than a comprehensive knowledge of the BASIC language.

"Sometimes you find yourself thinking of some unusual things like what kinds of techniques might have been involved in the manufacture of the first screw. It's interesting how many things like that we take for granted."

"Many educators like the idea of CAI (Computer Assisted Instruction), but I think the current economic situation precludes extensive, meaningful implementation of CAI. However, it's possible to teach programming, even at the kindergarten level. Learning to program will aid the student's thought process as well as develop computer literacy, and that should be a goal of our educational system. Knowing something about programming enables a person to begin to understand the principles underlying many computer applications such as the computer based laser bar code readers and associated inventory management systems in our supermarkets.

"I believe that the future will see a shift from BASIC to Pascal. Pascal is a structured language which encourages the student to break problems down into simpler, more manageable segments. It forces them to analyze the problem before they begin entering the program. Pascal was developed to be the first programming language students learn so that they develop this essential analytical habit. It's too easy to avoid doing that in BASIC," he said.

"In Michigan, there is movement away from BASIC to Pascal as the language of instruction. In fact, the advanced placement test in data processing which allows students who pass to obtain college credit, will use Pascal, not BASIC."

In addition to his use of the computer in teaching, John has been quite active in both Northwest Ohio Users' Groups. He has given a number of presentations at group meetings, serves on the Board of Directors and most recently, was appointed Editor of the club newsletter. In the future John hopes to use his 99/4A (or maybe the 99/8!) to learn Assembly Language and Pascal. He also will continue to expand the use of his computer to assist in managing student records, and to write, store, and analyze test items.

A WOMAN'S VIEW

MUSIC AND COMPUTERS

By Regena
P.O. Box 1502
Cedar City, Utah 84720

I will be presenting a seminar on music and computers this month for a music teachers association, and I thought perhaps this same topic could be the subject of this month's column. Most microcomputers have music capabilities, and the TI-99/4 and TI-994A music is relatively easy to use and has good sound quality.

To play a tone, the BASIC command is CALL SOUND(d,f,v) where d is the duration in number of milliseconds, f is the frequency (standard frequency expressed in cycles per second), and v is the volume. The duration parameter is how long you want to hear the tone—up to 4250 milliseconds. The volume may be a number from 0 to 30, where 0 is the loudest and 30 is the softest. You may also adjust the volume on your monitor or television, but by varying the volume in CALL SOUND statements you can get relative changes in volume. The standard frequencies for the musical notes as we are used to them are listed in a table in the Appendix of the User's Reference Guide that comes with your computer, page 167 in the TI-99/4 Guide and page III-7 in the TI-994A Guide.

Turn your computer on and try a command:

```
CALL SOUND(1000,262,2)
```

When you press ENTER the computer will play Middle C for one second.

To play a melody, simply use several CALL SOUND statements with different frequency durations. Here is an example:

```
100 CALL SOUND(400,330,2)

110 CALL SOUND(200,294,3)

120 CALL SOUND(400,262,2)

130 CALL SOUND(400,330,2)

140 CALL SOUND(800,392,2)

150 END
```

Go ahead—try a melody. Since music is so enjoyable, many people have learned how to program by programming music.

Since the computer can play exact tones, you can use the computer to tune your orchestra. You no longer have to use a tuning fork or depend on someone with "perfect pitch". Just set the computer to get an exact pitch. My daughter tunes her clarinet by running this program:

```
100 CALL SOUND(-1000,440,2)

110 GOTO 100
```

This program plays "Concert A" continuously until she presses CLEAR (SHIFT C on the TI-99/4 or FCTN 4 on the TI-99/4A) after she has her clarinet adjusted.

You don't have to tune to Concert A. My daughter collected soda pop bottles then used the computer to adjust the water level in the bottles so she could blow on the bottles to play music. She started with the C Major scale and tuned her bottles to the frequencies of 262, 294, 330, etc., for the scale. As we drank more soda pop she added more octaves. Next we changed to soda pop in green bottles and she used them for the sharps and flats. Eventually we got tired of soda pop and she ran out of space in her room--so she went back to the piano playing.

Since the computer can play exact tones, you can use the computer to tune your orchestra. You no longer have to use a tuning fork or depend upon someone with "perfect pitch". Just set the computer to get and exact pitch.

By the way, you probably noticed I used the minus sign in the duration for the "tuning" program. The minus sign indicates to the computer to start playing the tone immediately. If you have just positive numbers, the computer will wait until the previous one is finished before starting the new one. You can hear the differences if you insert minus signs after the left parentheses in Lines 110-140 of the example melody above.

There are quite a few "practical applications" of computer music, especially in music education. I used to teach piano lessons, the students enjoyed using the computer for some of the drills on theory. Remember, any type of repetitious drill can probably be done with the computer. I would let the student "play" on the computer before or after his/her regularly scheduled lesson. The students enjoyed the fun way to do a drill, and I didn't have to worry about losing patience with a student who couldn't "catch on" immediately.

One of my most popular programs was originally published as "Let's Learn Notes". I have since revised it to draw the graphics much more quickly and to be a tutorial along with the drill. I have also written versions for several other microcomputers. The first section uses graphics and draws a piano keyboard on the screen and teaches the letter names of the notes--C is next to the group of two black keys, and so forth. The next section teaches the letter names of the treble clef notes and presents a drill. The last section teaches the letter names of the bass clef notes and presents a drill. The computer can play each note, so the student can hear as well as see the notes.

Another program designed for beginning music students, "Stepping Up or Down", is included on page 62. Before students even begin to read music, they can recognize notes moving upward or downward. If you start from one note and go up, you'll have to sing a higher note or play a key higher on the keyboard (to the right). The computer is used to randomize the drill.

A staff is drawn on the screen. One note is drawn in a random position. A second note is then drawn in a random position. The student must press the up arrow key if you go up from the first note to the second note, the down arrow key if you go down, or the right arrow key if you stay the same. Since this is a multiple-choice type drill the student must answer correctly for the program to continue. If the answer is correct, the right answer blinks, a star appears at the top, and the actual notes are played. The drill consists of ten problems.

Only the note head is drawn. You might want to add a section to this program to include the stems or to use different kinds of notes (half, quarter, eighth). I would start with the drill with just the whole notes to emphasize that it doesn't matter what kind of notes are used or whether the stems are up or down; the student needs to understand the concept of going up, going down, or staying the same.

(Don't you hate it when textbooks get you started then say "This exercise is left up to the reader.")

The graphics and basic programming in this program could also be adapted for a drill on intervals--play the first note then play the second note and ask the student what interval it is (third, fifth, etc.).

I have used one program with my students that uses graphics to teach the difference betwen half steps and whole steps. After that concept is learned the student can do a drill that asks how many steps there are between two keys on the keyboard. This concept leads into a program that teaches intermediate music students to distinguish among chords — major, minor, augumented, and diminished.

Yes, the TI can play chords--three notes at a time. Use the same CALL SOUND statement but add one or two more frequencies with corresponding volumes. The one duration is specified, but you may list up to three frequencies:

```
CALL SOUND(d,f1,v1,f2,
                   v2,f3,v3)
```

A C-major chord would be:

```
CALL SOUND(4000,262,2,
                   330,2,392,3)
```

This command says to play for four seconds (4000 milliseconds) Middle C (262), E (330), and G (392), each at the specified volume.

Students using TI programs for chords can see and hear the different chords. The possibilities are probably limitless for program ideas using triads and arpeggios.

You can probably also think of many game-type ideas for learning the note names. Many of the standard note speller workbooks can easily be adapted for the computer--with the added feature of randomized drills.

You may want to write a program that helps with definitions of musical terms or perhaps a program about composers and famous operas.

Since we can specify the duration in a CALL SOUND statement, we can experiment with rhythms. Students can learn the relationship among whole, half, quarter, and eighth notes--with exact timing.

I have used the following technique to help students learn music that may be difficult. In one of the early statements of the program define the duration of a quarter note, such as T-400. Now, for all the CALL SOUND statements instead of a number for the duration use a variable related to T. If T is a quarter note, then 2*T would be a half note and 4*T would be a whole note. 3*T would be a dotted eighth note, and T/4 would be a sixteenth note. Here is an example:

```
100 T=400

110 CALL SOUND(T,262,2)

120 CALL SOUND(2*T,294,1)

130 CALL SOUND(T/2,330,2)

140 CALL SOUND(T/2,349,2)

150 CALL SOUND(T,392,2)

160 CALL SOUND(3*T/4,440,1)

170 CALL SOUND(T/4,494,4)

180 CALL SOUND(3*T,523,2)

190 END
```

RUN the program as-is. Now change Line 100 to T-800 and RUN. The whole tune is slower, but the notes are still in proprotion to each other. By changing just the one line you can change the tempo of the whole piece.

Since you can play more than one note at a time on the TI, you can program in a rather difficult piece, such as a song using eighth notes in the melody with triplet notes in the accompaniment. Use a slow duration so you can hear the piece--and play along with the computer. As you practice you can gradually increase the speed on the computer (by changing the one tempo statement) until you are normal speed.

"Swingin' Shepherd Blues" is a music demonstration program in the Users Group catalog that illustrates a rhythm that could be difficult to learn, but as the student hears it with the correct timing he or she can tell how it's supposed to sound and it makes practicing much easier.

Another fun thing to do is to program accompaniment music for the computer to play--then play a solo instrument with the computer accompanying you. You don't have to have the rest of the band or orchestra if you have your TI!

Let me just mention the Music Maker command module if you prefer not to do your own programming. You do not need to be a programmer to compose beautiful computer music. Music Maker is quite a versatile command module with several options. In the "Traditional Mode" you may choose a key signature (sharps and flats), a time signature (such as 4/4), and a speed. A musical staff is shown on the screen. You can use the cursor keys to pick up a type of note such as a quarter note then place it somewhere on the staff. Go pick up another note and take it to the staff. The computer keeps track of the time (you can't draw an eighth note too close to a quarter note, for example) and you can compose a measure at a time. If you would like, you may compose accompaniment--use all three voices. At any time you can play your piece or go forward or back, and you can save your composition on cassette.

The "Sound Graphs" option is especially fun for non-musicians. You can draw little lines going up and down on the screen and the computer will play your "graph" or tune. You may use the joystick or the cursor arrow keys. Sound Graphs is a good activity for young children to learn about tones going up and down--and hearing those tones.

You don't have to be a musician or a piano teacher to enjoy the music capabilities of the TI. The Music Maker command module makes it easy to experiment with music, or you can try various combinations of CALL SOUND statements to hear your TI play.

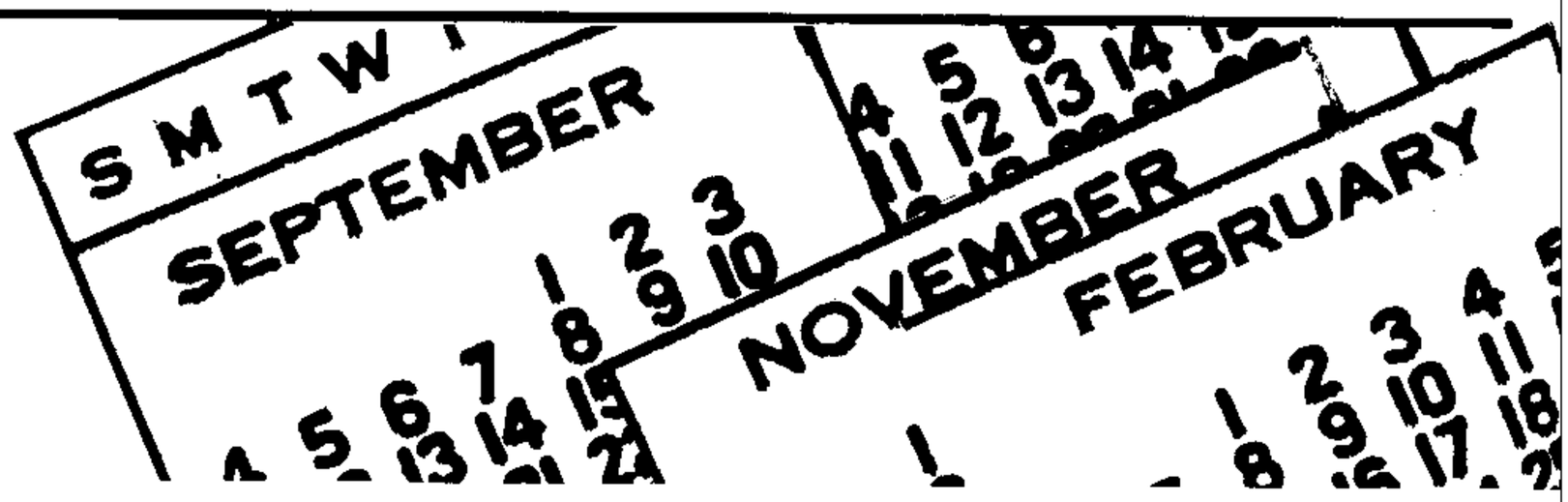
Since some of you were disappointed that I didn't have a program in the last issue, I've included two programs this time. The second mini-program is a drill for naming the key if the key signature shows sharps. The screen shows a treble staff with a random number of sharps (there may be no sharps). The student must press the letter for the name of the major key for that number of sharps. You must answer correctly to continue the program. There are ten questions in the quiz.

Line 170 in both programs uses the underline symbol; press FCTN and the U. Line 500 in "Stepping Up or Down" and Lines 410-420 in "Sharps" use lowercase letters. Release the ALPHA LOCK key to type lowercase letters. "Sharps" also uses some symbols which are found on the face of the keys. Use the FCTN key to type the symbol. I used DATA and READ statements instead of a lot of CALL CHAR statements to define graphics. If you have any trouble running these programs, the most likely place for errors is in the DATA statements. Be sure to check for the right number of commas--and don't put a comma at the end of the statement.

If the program stops with a DATA error message, you may PRINT I or PRINT C$ to see how far along in the loop you got, then look through the DATA statements near those printed values to try to pinpoint the error. Any time a program stops you can print the value of any variable and the computer will give the last good value for that variable name.

(Program listings begin on page 60)

CALENDAR OF EVENTS



Not only does Enthusiast '99 keep abreast of what's happening in the Texas Instruments world of Personal Computers; the following is a list of upcoming shows and expositions that may be conducted in your area.

SEPTEMBER 22-24, 1983
Second Annual Rocky Mountain Computer Show and Software Expo, Denver Merchandise Mart, Denver.

SEPTEMBER 22-25, 1983
Computer Showcase Expo, Cobo Hall, Detroit.

SEPTEMBER 22-25, 1983
Computer Showcase Expo, New York Coliseum, New York.

SEPTEMBER 24-25, 1983 Radio Expo '83. Lake County Fairgrounds, Evanston, IL 60204. Call (312) 582-6923, Mike Brost.

SEPTEMBER.28 - OCT. 2, 1983
NOPA Annual Convention and Exhibit, Hyatt Regency and McCormick Place Hotels, Chicago.

SEPTEMBER 28 - OCT. 2, 1983
The 6th Personal Computer World Show. Located at the Barbican Centre of the City of London, Britain's largest Microcomputing Show. For more information, write: Montbuild Ltds., 11 Manchester Square, London, England W1E2QZ.

SEPTEMBER 29, 1983
Invitational Computer Conference, Radisson South Hotel, Minneapolis.

SEPT. 29 - OCT. 1, 1983
Computer Showcase Expo. Located in Atlanta. For more information contact: The Interface Group, (800) 325-3330.

SEPT. 29 - OCT. 1, 1983
Computer Showcase Expo. Located in San Francisco. For more information, contact: The Interface Group, (800) 325-3330.

SEPT. 29 - OCT. 1, 1983
CP/M '83/East. Located at the Hynes Auditorium, Boston, MA. Exposition of CP/M Microcomputer software. For information, call (800) 343-2222 or (617) 739-2000.

SEPT. 29 - OCT. 2, 1983
Computers in Health Care '83. A symposium and Exhibition. Held at the Red Lion Inn in Sacramento, CA. For information contact Computers in Health Care, (916) 927-5722 or 927-3480.

OCTOBER 1-3, 1983
Philadelphia Area Computer Show. Sponsored by Philadelphia Area Computer Society. Speakers, Workshops, Seminars. Contact the Computer Society at P.O. Box 1954, Philadelphia, PA 19105.

OCTOBER 4-6, 1983
Southwest Computer Conference, Tulsa Convention Center, Tulsa, OK.

OCTOBER 6-8, 1983
Network '83, San Jose Convention Center, San Jose, CA.

OCTOBER 6-9, 1983
Computer Showcase Expo. Located in Philadelphia. For more information, contact: The Interface Group, (800) 325-3330.

OCTOBER 7, 1983
Compucon '83, Martin Luther King University Union, Charleston, IL.

OCTOBER 7-9, 1983
Great Southern Computer and Electronics Show, Orlando Expo Center, Orlando, FL.

OCTOBER 8-10, 1983
PC '83. The first international expositions and conferences featuring IBM personal computers and compatibles. Located in the Bayside Exposition Center in Boston, MA. For more information, contact: Northeast Expositions, (800) 343-2222.

OCTOBER 13-15, 1983
Business and Personal Comupter Sales Expo, Madison Square Garden, New York.

OCTOBER 14-15, 1983
Fifth Annual Forth Convention, Hyatt Palo Alto, Palo Alto, CA.

OCTOBER 15-17, 1983
Hong Kong Consumer Electronics Show, Regent and New World Hotels, Hong Kong.

OCTOBER 23-30, 1983
Applefest/San Francisco. Located at Moscone Center. For more information on exhibiting or to obtain the entire schedule for shows produced by Northeast Expositions in 1983, call (800) 343-2222(Boston) or (617) 739-2000.

OCTOBER 24-27, 1983
Comdex/Europe '83. Located at the RAI Congress & Exhibition Centre in Amsterdam. The Netherlands. For more information, contact: The Interface Group, (800) 325-3330.

OCTOBER 27-30, 1983
Mid-Atlantic Computer Show and Office Equipment Expo. Washington, DC Starplex. Contact Computer Expositions Incorporated, Annapolis, MD 21403 or call (800) 368-2066.

OCTOBER 27-30, 1983
Computer Showcase Expo. Located in South Florida. For more information, contact: The Interface Group, (800) 325-3330.

OCT. 31 - NOV. 3, 1983
1983 IEEE International Conference on Computer Design VLSI in Computers. The conference will cover the VLSI aspects of interaction between fabricators and systems designers in hardware, software and reliability in computers. Located at the Rye Town Hilton in New York City. For more information on the call for papers, contact: Dr. Harold W. Carter, 24 Long Street Lane, Wright Patterson AFB, OH 45433.

NOVEMBER 3-6, 1983
Computer Showcase Expo. Located in Denver, CO. For more information, contact: The Interface Group, (800) 325-3330.

NOVEMBER 10-13, 1983
Computer Showcase Expo. Located in Los Angeles, CA. For more information, contact: The Interface Group, (800) 325-3330.

NOVEMBER 10-13, 1983
Computer Showcase Expo. Located in Washington, DC. For more information, contact: The Interface Group (800) 325-3330.

DECEMBER 8-11, 1983
Southeast Computer Show and Office Equipment Exposition. Atlanta Civic Center. Call 1-800-368-2066. Computer Exposition, Inc.

ESSAY

HUMANIZING YOUR COMPUTER: BLESSING OR BEAST?

By Dana Nichols
Managing Editor

The most exciting thing about the rise of technology and computers was their ability to "communicate." Meaning, you could tell a computer what to do, and the computer would do it. Much as you would ask your spouse or friend a question, to which you would, a majority of the time, get an answer.

But how far does it have to go before we realize that although technology has enabled us to converse with a machine, program it to respond on cue, and brew our morning coffee, a computer still cannot perform simple yet vital actions such as providing a comforting touch or a reassuring smile? Through history man has, in search of companionship, turned to such things as books, booze, pets, religion, and other people like themselves. But one can find no companionship in books; they are silent communicators to the world. Booze merely provides an escape from the real world for a few hours, only to cause often times a painful and throbbing return to reality. Pets, well, some of them can be darn smart animals. But that's all they are; animals. Although they are a comfort to have and provide us with some means of a "welcome home" after a long day's work, they really only serve to occupy space and much of our time.

Talking to God—let's face it. We do most of the talking. And as for others like ourselves, we run into too many people that talk a lot and say nothing.

While other novelties have run their course, interest in computers has continued to escalate.

Why is the computer so appealing to so many people?

For business applications, the answer is obvious. A computer enables a business to run more efficiently and provide information at the touch of a button. In the entertainment world, one would need to look closely to realize that what you may think is a used bicycle shop is in fact a video arcade.

Then we brought the computer home. Business applications software popped up everywhere as a result of those seeking to solve their business problems, and bicycles disappeared into the family garage.

And a new figure emerged; that of the computer enthusiast attempting to convert his home computer into a home companion. That figure who becomes so consumed by the thought of humanizing his computer that he falls victim to "terminal loneliness."

Many of the elements of humanization are already incorporated into a computer. The question and answer routine, the progression of voice recognition and compatibility all serve to make the home computer appealing to anyone who has a few moments to spare. But to those who spend most of their time alone, with few social or family ties, this illusion of companionship could cause the person to break those last human ties in deference to something—or someone, in their eyes—better for them.

To some who have little contact with the outside world, and have few friends, a home computer becomes their alter-ego; a solace for them when they need to escape from the harsh realities of life.

Who can blame them? A computer will answer each question you ask and never ignore you. A computer is never too busy to stop what it is doing to engage in some human interaction. A computer never nags, argues, interrupts, or tries to dominate. It has no feelings, so it is oblivious to abuse and mistreatment. Should we grow tired of it, we simply switch it off without a second thought. They expect nothing of us; we are under no obligation to them whatsoever. Computers don't care if we're ugly or cute, look our Sunday best or are bedraggled.

The computer leaves you in complete control. It becomes an extension of you. It performs to your exact instructions and specifications. (Why would you program your computer to argue your every command?) Imagine having someone around at all times that enjoyed conversing about the same subjects you liked, that supported your every argument, that was in total agreement with you at all times.

To people with interests in addition to computers, who enjoy their social life and have a good self-image, this type of situation is an amusing diversion to everyday tribulations. But to some who have little contact with the outside world, and have few friends, a home computer becomes their alter-ego; a solace for them when they need to escape from the harsh realities of life.

They spend every possible moment at the console, programming their computers to create an illusion of artificial intelligence. At this point, these programmers are limited in their creation to a sophisticated cognizance-type situation; an extensive memory of conversational comments triggered by the programmer's commands. This could prove satisfactory, however. The majority of conversation between friends and spouses alike is purely unemotional, and could easily be programmed into a computer. Most of the daily conversation between a husband and wife consists of statements such as "Did we get any mail?" "How was your day?" and "What's the matter now?"

And to those with no emotional attachments at all, the statements are even more detached: "I'll have more iced tea" or "I'm sorry, but we're unable to extend your credit."

With the introduction of speech to home computers, it could greet you as you arrive home from work with statements such as "Did you have a good day?" and "What's for dinner?" Reacting to key words in the reply, the computer consults its memory each time, and offers appropriate remarks; hence, a conversation, much like one would engage in when coming home to a spouse or roomate.

Although the computer conversation is limited to its memory the user feels safe in his element. The computer never takes offense and never ignores; the user has a captive audience.

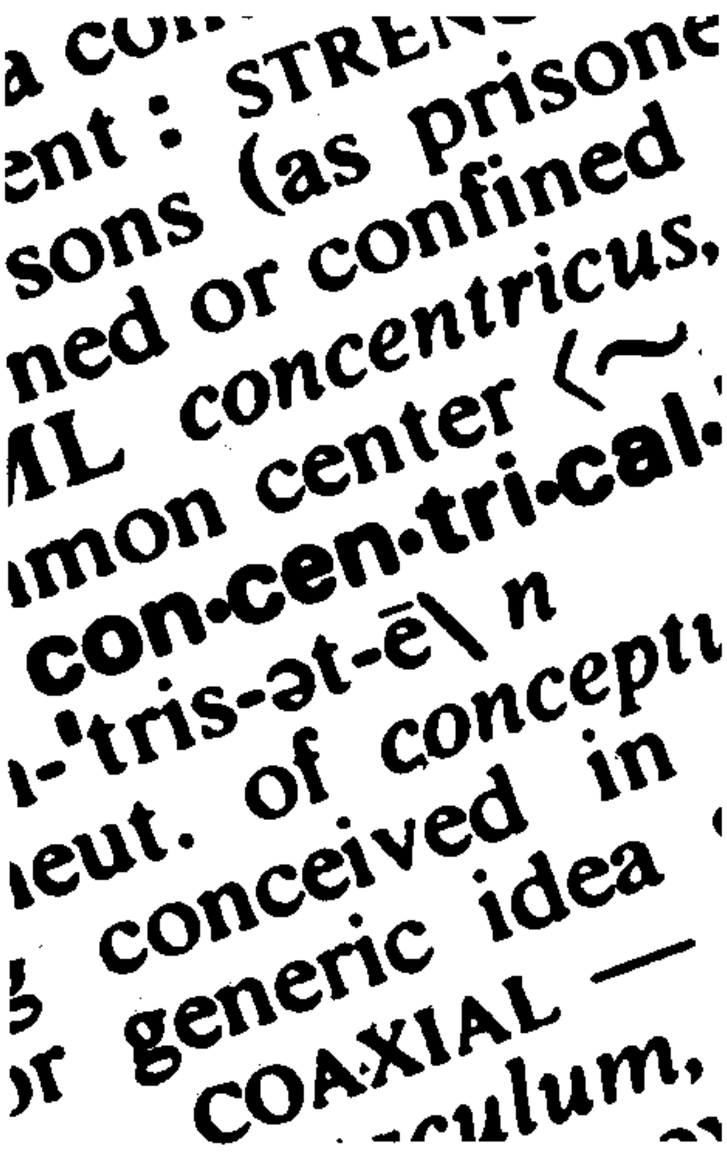
The chances are good that some of these people are enjoying being the center of attention for the first time. These are the ones who didn't quite fit in during school years; unable to participate competitively in sports or other popular school activities either by choice or by athletic limitations, they turned to subjects such as physics and calculus.

Previously thought of as different or even shunned by their schoolmates, these people have now come into their element with the rise of computer technology, and are basking in the computer world limelight.

These are the ones who have made major contributions to the home computer world. With hands-on experience and an analytical mind at the start, these computer brains have the home computer world by the tail. Their applications are geared toward a now captive audience: the average consumer.

Although this type of progress is beneficial to all, we still must not lose sight of reality. No matter how personal and friendly our home computer can appear, we must remember that it has no emotions. It cannot remind us when we have caused offense or hurt feelings. It can only respond to our commands in the way that we have programmed it. The computer is not an entity; it is a machine, and will more than likely always be a machine. We can place vast amounts of information into its memory, but it can never supply an original answer or make an original request. The computer can never provide social interaction crucial to both a child's upbringing and an adult's sense of well-being. No matter how extensive the computer industry becomes, we must remember that we still live in a world of people.

COMPUTERMINOLOGY



Many times in the world of computers, we use the terms and talk in "computer language" without really knowing the meanings of these terms, or what their initials stand for. The following definitions should aid the novice computer owner and serve as a useful reference tool for the more experienced programmer.

ASCII —American Standard Code for Information Interchange.

Back-up —Procedure used to create secondary storage - back up copy dupe of original.

Baud —A technical term, originally used to express the capabilities of a telegraph transmission facility in terms of modulation rate per unit of time. For practical purposes it is now used interchangeably with "bits per second" as the unit of measure of data flow.

Baud Rate —The transmission rate, which is in effect synonymous with signal events (usually bits) per second. Used as a measure of serial data flow between computer and/or communication equipment or devices.

Binary Code —A mathematical coding system used by computers to encode information using zeros and ones.

Bit —A single binary digit (1 or 0). Several bits combined form a single character.

BPI — Abbreviation for bits per inch or sometimes bytes per second.

BPS —Abbreviation for bits per second or bytes per second.

Buffer —A temporary storage area used to compensate for the difference in transfer speed between two devices.

Bus —An electrical channel used for transferring data between the computer and one or more peripheral devices.

Byte —A group of bits or binary digits used to form a character.

Chip —An integrated circuit or integration of many circuits on a wafer slice, most often of silicon, which contains these circuits.

CPS —Abbreviation for characters per second.

Density —The ratio of the number of bits to the total number of bits in a structure.

DOS —Disk Operating System

Dual Density Disk —A diskette that is able to read or write data to either surfaces of the diskette.

EPROM —An electrically programmable ROM suited for high performance microcomputer systems where fast turnaround is important.

File —Data that are related and stored together as one unit.

Input/Output —Techniques used to pass information to and from the computer. Abbreviated I/O.

I/O Port —A connection to a computer.

K —Abbreviation for Kilo or 1000.

Kilobit —One thousand binary digits.

Megabit —One million binary bits.

Megabyte —One million bytes.

Microsecond —One millionth of a second.

Modem —A device that converts data from a form which is compatible with data-processing equipment to a form that is compatible with transmission facilities, and vice-versa.

Nanasecond —One billionth of a second.

Port —The entry channel to which a data set is attached. The port is in the central computer, and each user is assigned each port.

RAM —Random Access Memory.

ROM —Read Only Memory.

Sector —A division of a track on a disk.

Serial —Pertaining to the time sequential processing of the individual parts of a whole, such as the bits of a character, the characters of a word,, etc., using the same facilities for successive parts.

Transfer Rate —The speed that data moves from one device to another.

WORKSTATIONS

IUG WORKSTATIONS — PRESENT AND FUTURE

By Charles La Fara
President, IUG

The first time I heard the expression "professional workstation" was at the 1982 National Computer Conference held in Houston. Several manufacturers of personal computers and large mainframes were touting the advantages of both single-user and multi-user computer systems designed exclusively for management and clerical workers. At that time the professional workstation was little more than a concept. Today, however, less than 18 months later, thousands of businesses, including the International 99/4 Users-Group, have adopted various forms of the professional workstation.

In designing our workstations here at the IUG my first thought was that these workstations should provide compatibilities for three principal stages of information use; input, processing, and output.

Due to cost limitations, each item of our first workstation was evaluated on its ability to perform needed functions at minimal cost levels. We had by this time in our development stage realized that we could no longer maintain our ever-growing membership simply by using the 99/4 Home Computer.

Even with the utilization of three disk drives and a 32K RAM expansion, our mailing list had been augmented to 60 different 5¼ inch disks, divided into geographical regions. We knew however, that we could not scrap our 99/4 system because it must be used to review new products from Texas Instruments and third party sources as well as to review and prepare programs for our ever-increasing Software Exchange Library .

After evaluating several of the higher-powered professional computers, the decision was made to purchase a Hewlett-Packard HP 125 Personal Computer System and a Diablo 1630 letter-quality printer.

The decision to use the HP 125 was based primarily on the availability of software we felt necessary to perform specific pre-determined tasks which included membership file management and word processing. Software purchases which included Ashton-Tate's Dbase II for membership management, VisiCalc 125, for financial information and corporate spread-sheet functions, Link 125, to allow communications with remote terminals such as Dow Jones and The Source, Spellbinder for word processing, and the CP/M operating system and BASIC programming packages rounded out the components we needed.

With the hardware and software configurations now in place, design and construction of the workstation could now begin. Like most men, I am a very touch-sensitive person. Certain items such as genuine leather, deep, wood-grained surfaces and soft female skin provide almost as euphoric feelings as my favorite branch water which is distilled in Lynchburg, TN.

Although my carpenter, Gene Payton, suggested construction material be cherry, I decided we would use a deep rich walnut which to me provided both beauty and durability without being too austentatious.

Functionability was the next consideration, because so much of my personal time was spent with the 99/4 doing program reviews and evaluations of new equipment. I knew that my system and the word processor should be placed relatively close together so I could dictate my findings to one of our secretarial staff, or utilize the word processor myself without having to travel any great distance for fear that I would forget some minute detail of any given software package.

As you can see above, this problem was solved by utilizing two single user systems, the HP 125 and the 99/4 combined in a single workstation. Due to the fact that this workstation was built prior to the advent of the Peripheral Expansion Box, design ingenuity was maximized in the construction utilizing the Denali Data Backer Bus. By using the Backer Bus, three of the four stand-alone peripherals were cleverly concealed from view, leaving only the console, Speech Synthesizer and Memory Expansion located at typing position.

For ease of removal and maintenance, the recessed platform that the console rests on pulls out for easy access to the RS-232 Disk Controller and P-Code peripheral. A drawer was built above the console to conceal frequently used modules and a pair of TI wired remote controllers.

Two single-sided PHP 1850 disk drives were located below the monitor and tape recorder which were elevated to eye level while in a sitting postion (see Picture B).

A convenient storage area for disk and tapes was provided with a smoked plexiglass cover just below the master elecrical control unit, which has built-in amber lights to detect peripherals that are currently being used.

The addition of a Hayes Chronograph and Hayes 300-baud Smartmodem just to the left of the cartridge drawer allowed for precise dating of documents produced with both the HP 125 and 99/4.

The left side of the workstation (Picture C) was built to utilize the HP 125 and its peripheral equipment. For asthetic value and dust protection, a case was built over the dual, 5¼" double sided, double density drive unit and as with the 99/4 the monitor was built to swivel a full 180 degrees. This feature allows me to view both screens simultaneously which comes in handy on many occasions.

The keyboard of the HP 125 was recessed at 28" typing height and design features were implemented to hide unsightly cords leading to peripheral devices.

A well area for disk storage was also provided on the HP side of the workstation just below the master control units.

Transcribing equipment, purchased after the workstation was constructed, fit conveniently on top of the master control panel and allows our clerical staff to input letters or articles dictated onto audio tape.

VOILA!! our first completed workstation.

Our second workstation (Picture D) was nowhere near as elaborate as the one that sits in my office. However, for all intents and purposes it is certainly as functional both in an office and home environment. Manned by IUG Technical Assistant, Terry Heim, the system consists of a 99/4A console, Speech Synthesizer, stand-alone 32K Memory Expansion, Disk Controller, RS 232, and two single sided TI disk drives. Terry's workstation is one of the most utilized here at the IUG and can be found in the "ON" position as many as 16 hours per day.

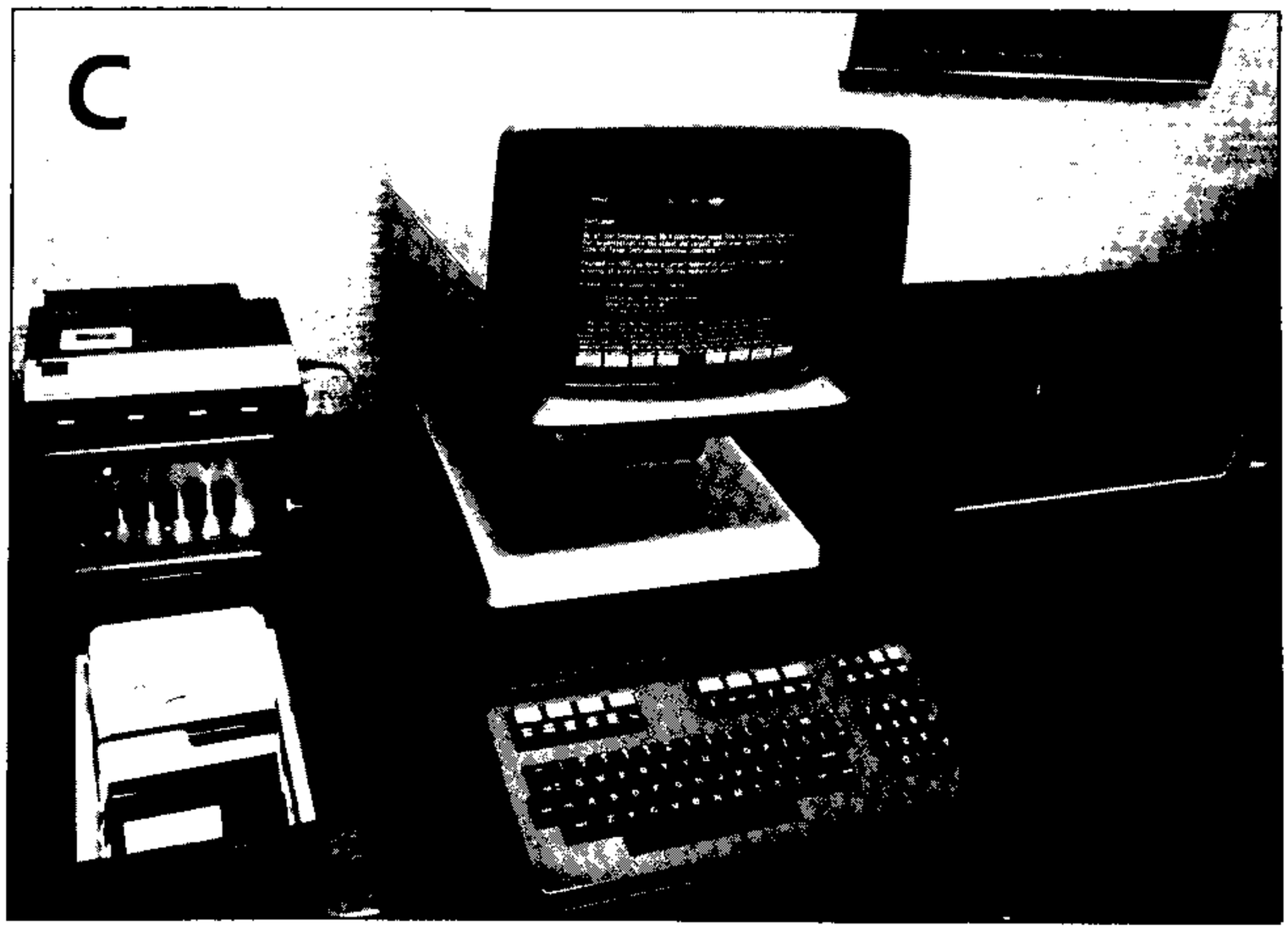
Answering technical questions for members and preparing programs for IUG librarian Guy Romano, Terry needs plenty of workspace at his station. Set on an 8' x 30" folding table, which is "L"ed to the right of his desk, additional construction consisted only of a 13" x 48" x 4" riser and decorative housings for the disk drive units. Practical yet inexpensive, Terry's workstation provides space and comfort for him as he performs many important functions in our daily operation.

The same basic riser construction can also be found in the demo room at the IUG. Picture E shows Dana Nichols, Managing Editor of Enthusiast '99, checking for news items while on line with the Dow Jones News Retrieval service. This feat is accomplished by telecommunicating with the Dow database using the Terminal Emulator II and Texas Instruments acoustic coupler modem. Once news stories are retrieved and assimilated, Dana can produce needed material in hard copy form using the MPI 150 printer located to the left of the system. The 13" Zenith color monitor used in our demonstration room workstation is part of our first 99/4 purchase which consisted of console and monitor bundled together at a retail price of $1050.

Two CDC 5¼" dual sided disk drives are controlled by a PHP 1240 Disk Controller Card concealed along with RS 232, P-Code and Memory Expansion in the PEB.

The workstation is placed on commercial-type computer furniture which can be purchased at almost any office supply dealer. The demo room workstation allows our visiting members the opportunity to get a first hand look at over 800 software packages from Texas Instruments and third party producers which are kept on file at the IUG.

More elaborate workstation construction can be found in the office of Virginia LaFara, IUG's Secretary-Treasurer (Picture F). Gene Payton's



design of Virginia's workstation took into consideration not only the need for functionability, but also for storage. Made of solid walnut construction, the computer workstation and printer stand allow both ease of use and accessibility.

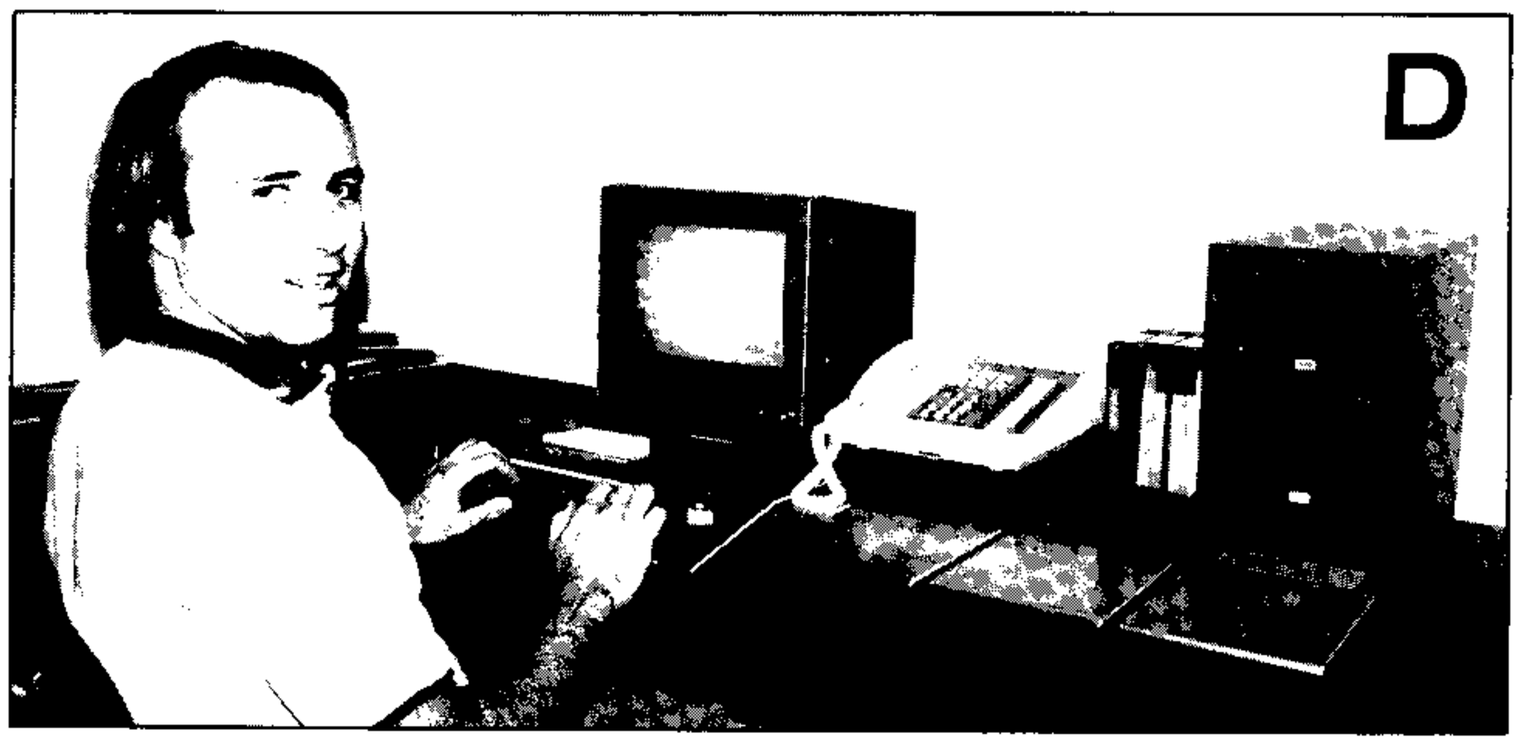
One of the unique features of Virginia's workstation is the A-B switch located to the right of her TI Omni 820 printer. This switch allows Virginia to produce hard copy listings of programs or other material from either her 99/4A system or our mainframe computer, the TI Business System 672.

In November 1982, we again called on Gene Payton to design and construct functional workstations for our duplicating room. Three stations were needed for tape duplication and one station was needed to provide duplication of disks for our members.

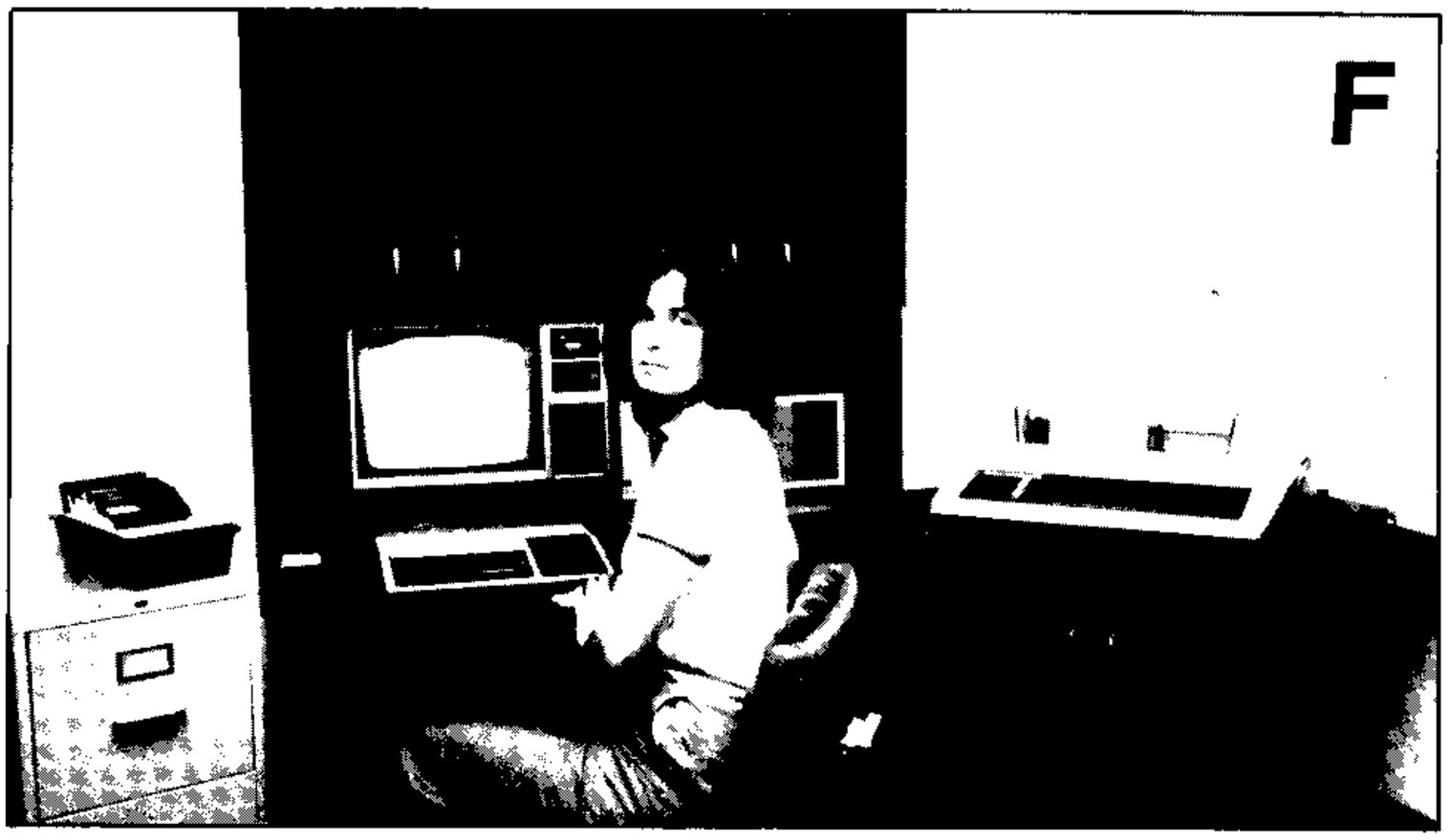
Department Manager Mary Tilley (Picture G) was most helpful in providing design information for the three identical workstations in her area. After completing a member's order for programs in the Software Exchange Library using our new Sony high-speed duplicating equipment, one of which is pictured directly behind Mary, our duplicating personnel are able to go to their workstations for quality verification prior to the tape or disk being mailed to its final destination.

By December 1982 our membership had grown to the point that it was impossible to maintain on the HP 125, and producing between 200 and 300 invoices per day on a 99/4A system became tedious and cumbersome. We had fallen almost three weeks behind in order processing and realized only a new mainframe computer could solve our problem.

Although our allegiance to Texas Instruments is quite strong, we felt that we must purchase a mainframe computer system that would supply all of our needs and provide room for future expansion. With the help of our management staff I prepared a list of desirable functions for our mainframe computer. It included:


D


E


F

—keeping a calendar
—maintaining a clock
—accessing electronic mail through a built-in modem
—handling word processing and document editing
—electronic filing of the document created
—storing and executing programs in the Software Exchange Library
—performing calculations using a built-in keypad
—performing at least simple graphics
—accessing other computers
—creating and storing forms
—storing membership directories which would interface with boilerplate language for letters, proposals and reports
—searching for on-line documents through a keyword query
—transmitting all data based information to up to 15 terminals located throughout our office
—responding to users' confusion or lack of information with on-line help files
—allowing the user to use a "wastebasket" for non-essential documents
—interrupting any work in progress and saving it in a buffer prior to final filing
—system expandability prior to obsolescence

This was going to be quite a giant step from the world of single-user systems running canned software that we had become familiar with.

I contacted representatives from IBM, Wang, Digital Equipment Corporation, and Texas Instruments and explained my desires and needs for our future system. After meetings with Virginia, our Sec.-Treas., a budget was installed for hardware and software configuration. Additional budgeting was also established for workstation design and construction, miscellaneous cabling and computer supplies.

With financial figures in hand, the search then began. By December 15, the field had been narrowed to a DEC PDP 11-25 and the TI Business System 672. Although we felt a 20 megabyte hard disk system would be sufficient for our needs for the next two years, we found our budgeting allowed us to more than double the size of disk storage on both the PDP 11 and the TI system. I asked both the DEC and TI representatives if they could create some demonstration software packages which could show us how we would maintain our membership files and do invoicing, and provide us with a demonstration within two weeks.

Although both systems performed the demonstation software to my satisfaction, the final decision was made to purchase the Texas Instruments Business System 672 because of the ability to provide more system terminals at basically the same cost. Additionally, the Texas Instruments distributor provided us a loaner development system so we could immediately begin to do file transfers from both our 99/4A and HP 125 systems prior to the expected delivery date of our Business System 672 which was some 90 days out.

The compact design of the Business System 672 CPU, 32" x 33" x 22", enabled

workstation design for its components to be both simple and functional. In Picture H, Customer Service Representative Laurie Matlock is able to use the TI 911 Video Display Processor for invoicing, membership maintenance, or inventory control while simultaneously utilizing the 99/4A system located behind her to either store or retrieve data from the Business System 672 CPU located just to the right of the 99/4A system.

Additionally, invoicing or hard-copy listings are easily checked from this workstation as they are being produced by the TI Omni 820 printer located directly behind Laurie, just to the left of the 99/4A system.

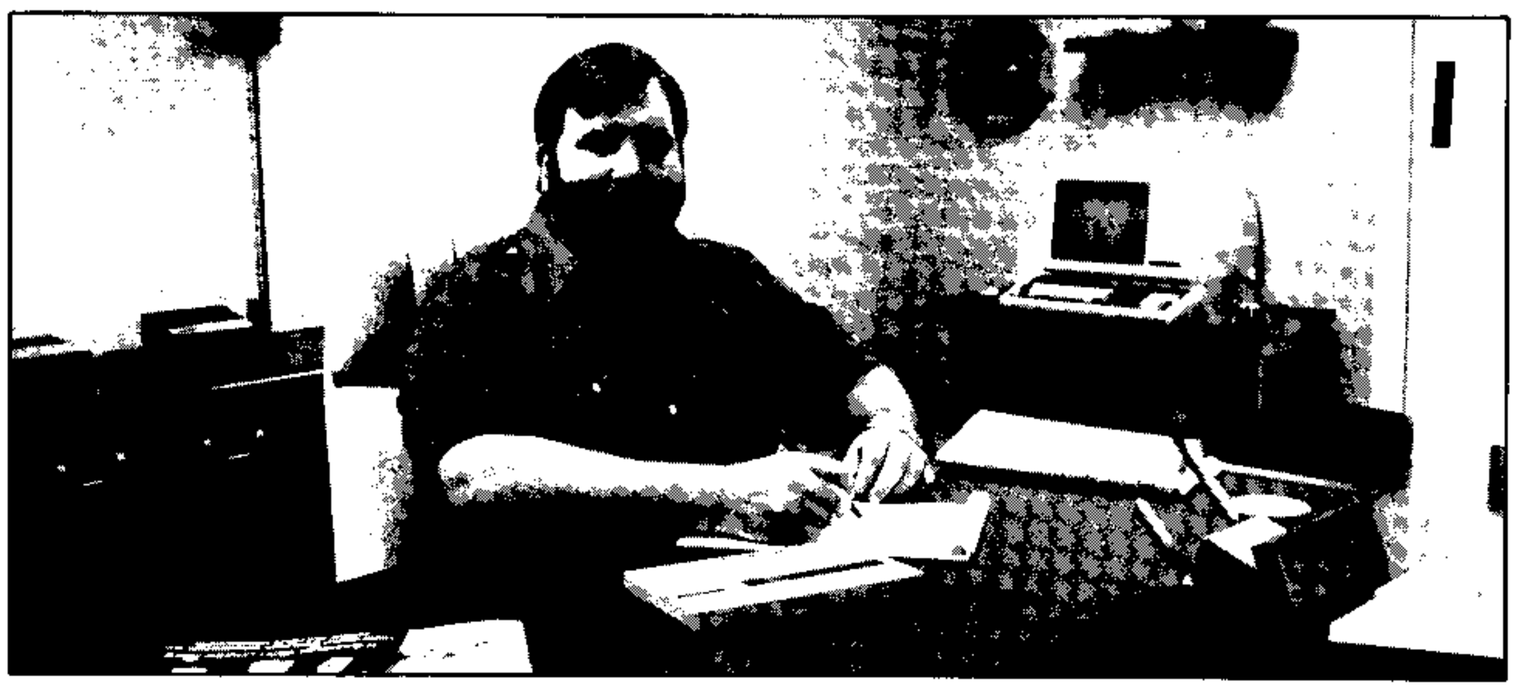
With consulting from ProData and System Software Design by the Rueb Group, the International 99/4 Users-Group was able to utilize nine Texas Instruments Business System Video Display terminals interfaced to a third party multiplex board containing its own TI 9900 processor. This improved response time and provided additional serial outputs for printers and other peripheral devices.

Our unique system configuration which to our knowledge was the first of its kind in the country has led the IUG system to be a showcase for potential Business System 672 buyers. The choice of the Business System terminal pictured both in my office (Picture I) and in the office of Dorothy Armstead, IUG office manager (Picture J) provided not only space-saving features but gave us keyboard uniformity as we switch over from the HP 125 system to the new TI Professional Computer.

Using the TI CC-40, both Dorothy and I have the ability to instantaneously find pricing information for members by simply typing in the Alpha Numeric Product Code. This saves valuable time in case our Business System terminal is busy performing another task.

Future IUG workstations are already in various stages of development and will include state of the art hardware and software from both Texas Instruments and third party producers.

At our newest workstation, (Picture K and Front Cover) Martha Barksdale is shown using one of our new Texas Instruments Professional Computers, this crescent-shaped high glossed beauty offers functionability and hi-tech styling. Using state-of-the-art Speech Command System Software designed by TI, Martha is able to conjure up detailed answers to her questions by using only human voice interface thus eliminating typing or command errors. Requests for information are given in plain English words or phrases and the results are displayed for review or manipulation. The combination of this workstation, computer and Speech Command software brings a whole new world of personal computing to the IUG and our members.



We hope that you have enjoyed our pictorial view of the International 99/4 Users-Group and its workstations. We here at the IUG are deeply committed to provide our members with the best possible products, services and information. Should you have any questions regarding any of our workstations, please let us know.

Enthusiast '99 on Using and Programming The TI-99/4A, Including Ready-to-Run Programs

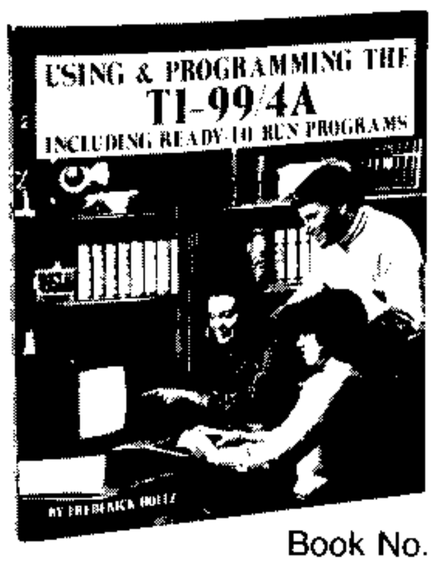
"This is the best book about the TI-99/4A I've seen. It will be a difficult task to top it."

— Charles La Fara, Publisher of Enthusiast '99 and President of International 99/4A User Group

"This informative, easy-to-read instruction manual is a must for the new 99/4A owner . . . and a useful reference tool for advanced users."

— Dana Nichols, Managing Editor Enthusiast '99

The Excitement (And The Praise) Is Mounting For These Outstanding Guides From TAB!



Book No. 1620

USING AND PROGRAMMING THE TI-99/4A, INCLUDING READY-TO-RUN PROGRAMS by Frederick Holtz

Over 50,000 Copies Already Sold!

Finally, there's an easy-to-read, comprehensive guide that enables you to get the most use and enjoyment from your TI-99/4A! It provides easy-to-follow, hands-on guidance in every phase of TI-99/4A operation—machine capabilities including color . . . graphics . . . sound . . . TI BASIC programming techniques . . . peripherals . . . and a survey of over 200 prepackaged software programs currently on the market.

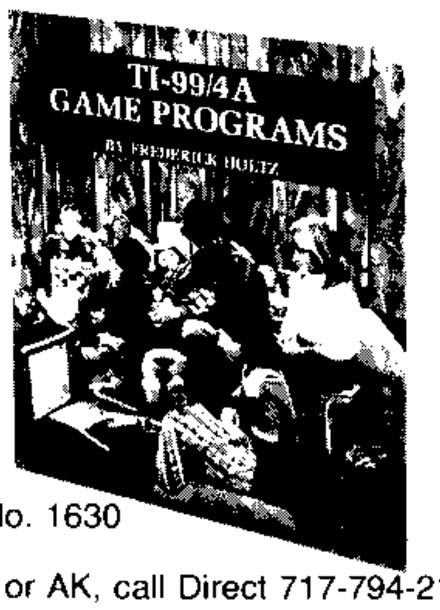
You also get 12 highly useful programs (each program is designed to run on your basic machine without add-ons or peripherals) with listings and complete instructions. You even see how to write your own original TI programs! An extensive glossary and four handy appendices round out this complete guide. As Charles La Fara says: "Now, thanks to Frederick Holtz, tens of thousands will know what we in the Group have known for a long time—that the TI-99/4A is a great microcomputer." 224 Pages/14 Illustrations/7¾" × 9¼"

TI-99/4A GAME PROGRAMS by Frederick Holtz

An Irresistible Collection of Skill Building and Just-For-Fun Programs!

Here's an exciting collection of games, puzzles, and brain teasers written especially for the TI-99/4A! Each one is designed to take full advantage of your micro's color, sound, and graphics capabilities, and all will run with only the TI BASIC built into your machine.

Here's your chance to enjoy the best in TI-99/4A game playing without having to invest in high-priced commercially packaged software. It also includes easy-to-follow programming instructions, line by line descriptions, and explanations of the logic used in program development so you can modify or improve the games for your own game programs! 240 Pages/63 Illustrations/7¾" × 9¼"



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ENTH 93

"BODY FRIENDLY"

The whole point of a custom-designed workstation is to assure the user maximum comfort. Here briefly are some steps that should be considered in placement and use of your home workstation.

Consider the environment users will work in. Place your computer in an area that has an unobtrusive color scheme. Choose natural and earth tone colors to set the mood -- pro-gray, wood-tone browns and soft greens are considered the best.

Always avoid placing the terminal in front of brightly-patterned or loud colored wallpapers. This weakens concentration and increases eye-strain.

Acoustically treat areas -- select a room away from street noise, preferably with carpeted floors and a ceiling tiled to reduce sound. Place your workstation away from entry doors or high traffic areas. Place your workstation away from a telephone or adjust the level of the bell so a ringing telephone will not disturb the computer operator.

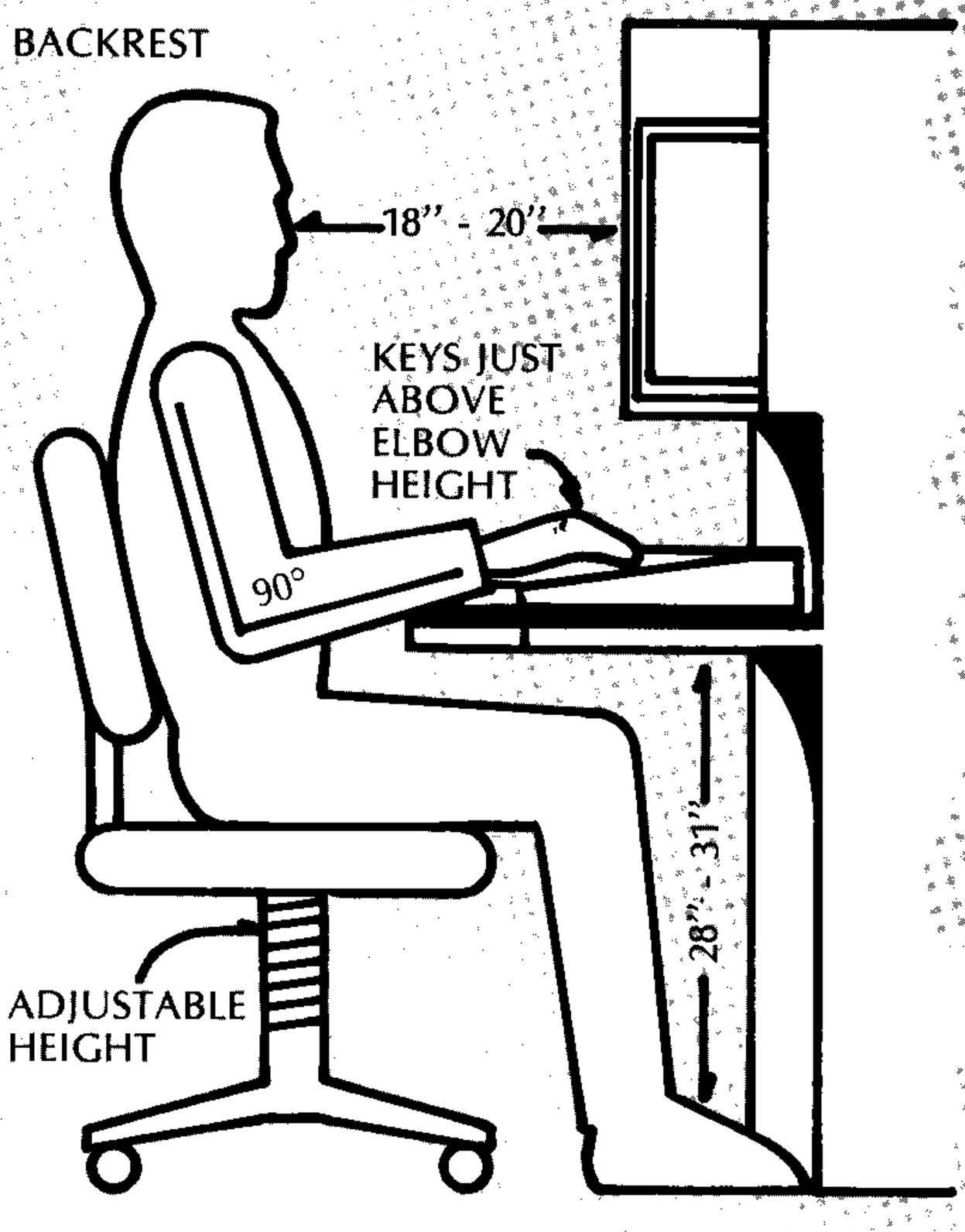
Provide abundant lighting. The light level should be a sufficient mix of natural sunlight and indirect overhead lighting. Never place your monitor where the screen will receive direct sunlight or for that matter, direct man-made light. If you choose to set up your workstation near a window, do not sit facing the window or with your back to it. Both of these situations increase the amount of glare on your eyes. Instead, place the screen at right angles to the window.

Get a comfortable chair with some type of lumbar (lower back) support. Arm rests should be removable if you have them at all. Adjust the chair so that when you sit in it erect, with feet flat on the floor, your thighs are parallel to the floor. The home row keys of the keyboard should be at or just above the elbow height when you're seated properly. Usually this means from 28" to 31" from the floor. Remember, leave enough room for your thighs under the desktop. About 95% of American men require 25¼" from the floor to the bottom of the desk top for leg clearance, and 25" generally is considered the minimum.

Good posture promotes good typing. Position your monitor or TV screen properly. You should never be closer than 18" and no further away than 2½'. Although there is constant controversy over what color display is most efficient to reduce eye fatigue, yellow and green on a deep green or black screen are the most popular choices. This color choice is rated much higher than black on white or white on black.

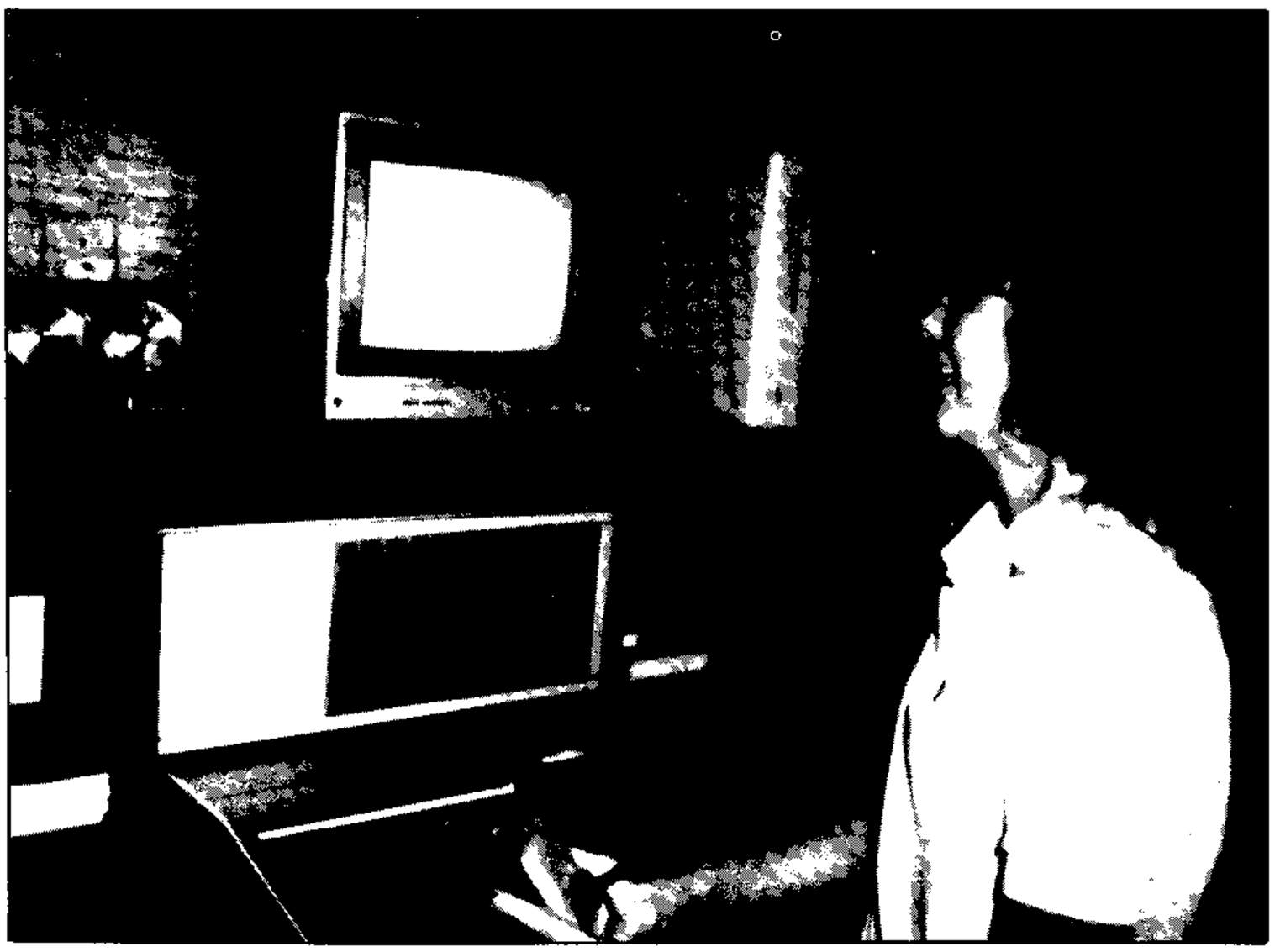
Ideally, your work area should be 68-78° Fahrenheit and the room should have a humidity between 30 and 40 percent.

Even under the best conditions, working at a computer for periods more than six hours without a break is the maximum limit. If eye strain develops, leave the computer for at least 20 minutes. Sit in a relaxed position with your eyes closed or focused on a dull, solid-colored object. Remember, your program will still be there when you are able to return to the computer to continue your work session.



BUILDING YOUR OWN WORKSTATION

By Charles La Fara
President, IUG



A little over a year ago I came to the harsh realization that although I supplied myself, my office and our employees with convenient workstations for their 99/4A computers, the system I had at home was set up on a bulky, 9' x 4' table.

Power cords and peripheral cables dangled like loose spaghetti and disk and tapes were in an unorganized mess from tabletop to floor.

After several hours of close observation of this tangled mess of potmetal and electric and petrochemical technology, I decided there must be a better way to display and utilize my computer.

The first step was a call to the Users-Group carpenter, Gene Payton. I explained to Gene that I needed a workstation for my home system and would like for him to build me something that didn't especially look hi-tech. What I wanted was something that would be functional, offer convenient storage for cartridges, disks and tapes, and blend in with our home's decor.

The system configuration that I gave him included: a 99/4A console, speech synthesizer, complete peripheral expansion system, tape recorder and room for two additional external disk drives.

Gene informed me that he would make some drawings and get back to me in about a week with three or four concept designs for my approval. Once the final design selection was made and wood and formica finishes were picked out, Gene was off to his workshop to make sawdust.

Although Gene spends most of his time designing and building furniture exclusively for the Users-Group, several other small projects including a trip to the Grand Teton area with a Boy Scout troop delayed the construction of our workstation for about three weeks.

Once completed and delivered to our new home in Bethany, I was so pleased with the overall comfort and convenience of the workstation that I asked Gene, and his son Eric, to create some drawings and material lists so we could give our members an opportunity to build a workstation of their own.

The heart of the workstation is the terminal desk. If your space or funds are limited, you can build just this unit to support your keyboard and peripheral expansion box and place your color monitor or TV and additional disk system on top of the PEB.

If you prefer a larger work area, the desk top can be expanded in length to fit your needs.

Our workstation is easy to build as there are no curves to cut and all the major surfaces, top, sides and back, are formed from a single piece. All hardware is available from any hardware store.

Although I chose solid walnut for my workstation, oak, cabinet-grade plywood with formica brand plastic laminate tops can be used. You can also use solid hardwoods or solid pine throughout, but the cost would rise a bit.

Additionally, painted plywoods can also be substituted without loss of functionability. Do not use an oil finish for surfaces which may come in contact with tapes or floppy disks. Laminate is best though polyurethane varnish or paints are satisfactory .

By following these simple diagrams and with a little forethought on your part, you can end up with a piece of furniture you will be proud of and that is as advanced as the computer system it holds.

MATERIALS LIST

Note: Entire cabinet is built from ½" Baltic Birch Plywood.

KEY	Table	Quantity
A	¼" × 22½" × 40½" fir plywood	1
B	¼" × 1¼" × 22½" pine	2
C	¼" × 1¼" × 42" pine	2
D*	1/16" × 24" × 42" plastic laminate	1
E†	1/16" × 1¼" × 42" plastic laminate	2
F†	1/16" × 1¼ × 24" plastic laminate	2
G	¾" × 2½" × 19½" walnut	2
H	1¼" × 1¼" × 25¼" basswood	4
I	¼" × 19½ × 20" walnut veneer ply.	2
J	¾" × 1¼" × 19½" walnut	2
K	¾" × 2½" × 37½" walnut	2
L	¾" × 1¼" × 37½" walnut	1
M	¾" × 2" × 6" pine	4
N	1½" × #8 PM. FL. MD. wood screws	8
O	¼-20 TEE NUT & LEG LEVELER	4

Riser/Cabinet

A1	½" × 12½" × 41" B.B. plywood	1
A2*	1/16" × 12¼" × 41½" plastic laminate	1
B	½" × 12½" × 13" B.B. plywood	2
B1†	1/32" × 12½" × 13" walnut veneer	2
C	½" × 12½" × 12¼" B.B. plywood	2
D	½" × 11" × 18¼" B.B. plywood	1
E	½" × 12½" × 13¼" B.B. plywood	2
F	½" × 12½" × 4¼" B.B plywood	2
G	½" × 12½" × 9" B.B. plywood	1
H	¾" × 2 7/16" × 10¼" pine	2
I	¾" × 2 7/16" × 14" pine	1
J	½" × 11" × 14" B.B. plywood	1
K†	1/32" × 3" × 11" walnut veneer	2
L†	1/32" × 3" × 14" walnut veneer	1
M*	1/16" × 11" × 14" plastic laminate	1

* Formica brand, walnut grain laminate
† Formica may be used in place of walnut veneer if desired.

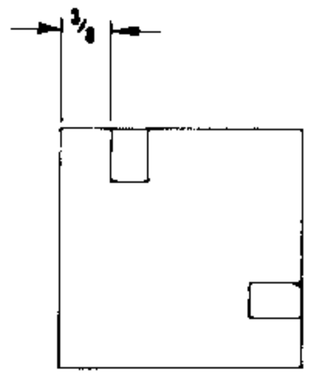
MISC.: Carpenter's glue, contact cement Watco medium oil, Watco dark wax.

TABLE

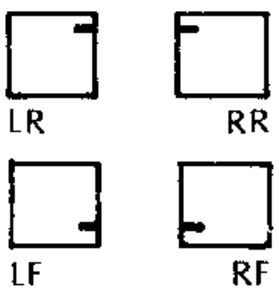
This dado in top and bottom of SIDE RAILS ONLY

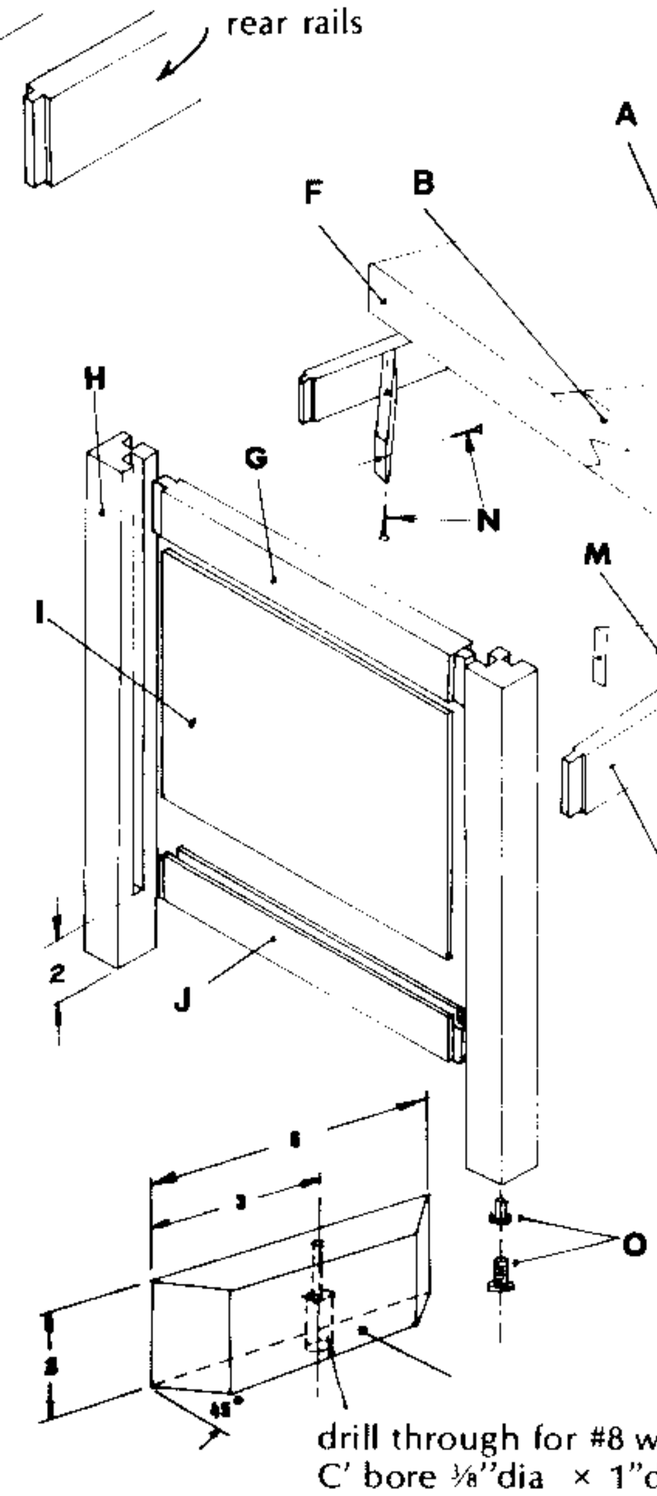
¼" × ¼" dado cut

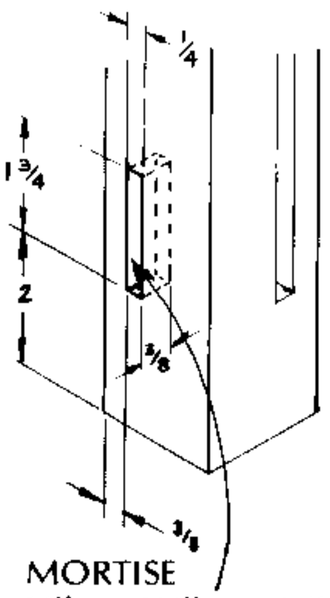
front and rear rails



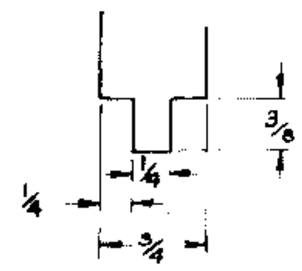
Care must be taken in making the legs for rail and panel for rail and panel cuts so as not to duplicate!
NO TWO ARE ALIKE







MORTISE
¼" × 1¾" × ⅜"dp.
on inside of
REAR LEGS ONLY

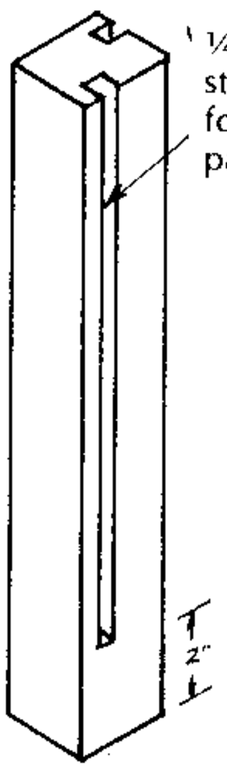


TYPICAL
ALL RAILS

OPEN END MORTISE
¼" × 2½" × ⅜"dp.
for upper rails

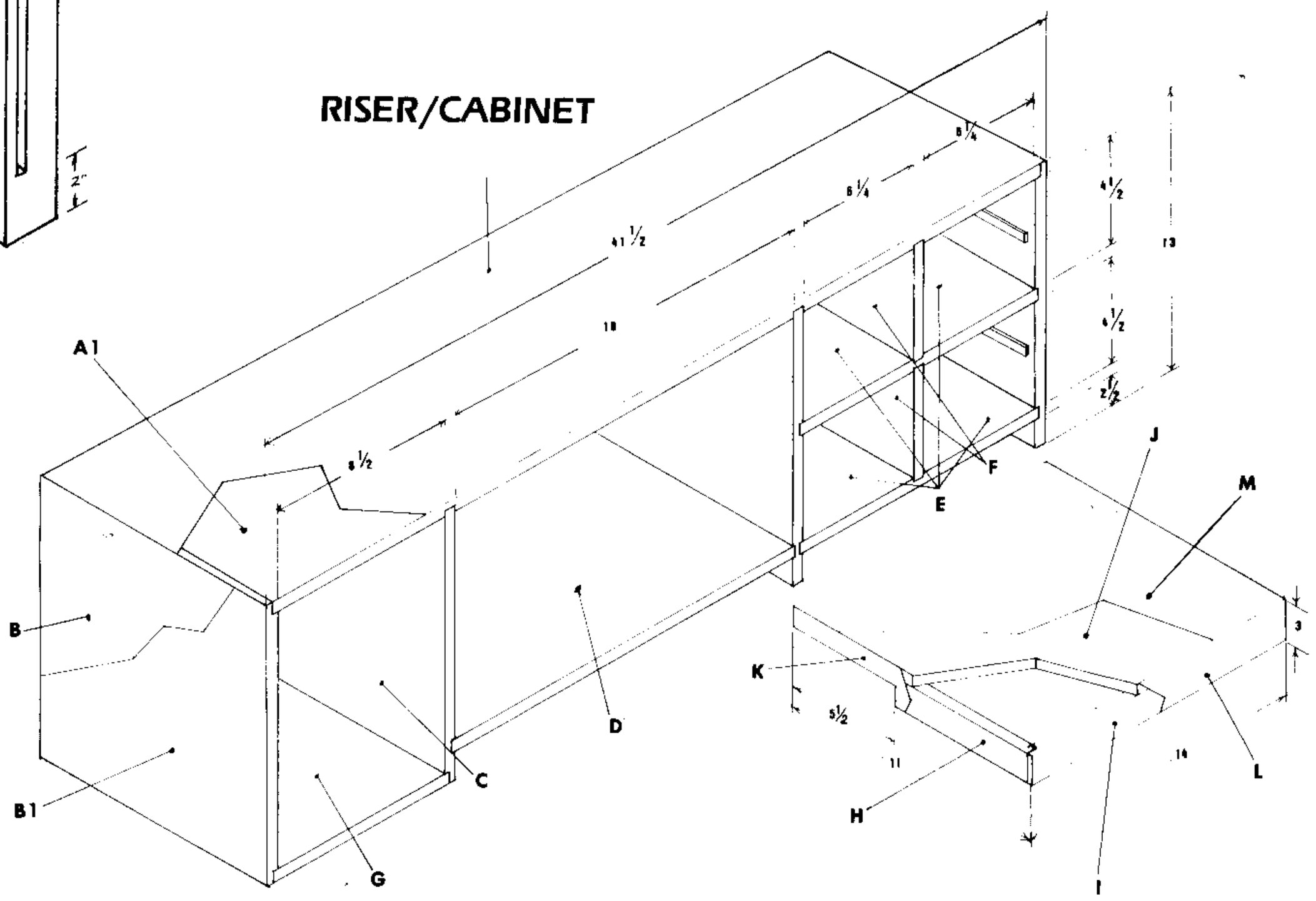
drill through for #8 wood screws
C' bore ⅜"dia × 1"dp.

drill 5/16"dia × 1¼"dp.
for tee nut (4 legs)



¼"w × ⅜"dp.
stopped dado
for rails and
panel insert

RISER/CABINET



HARDWARE

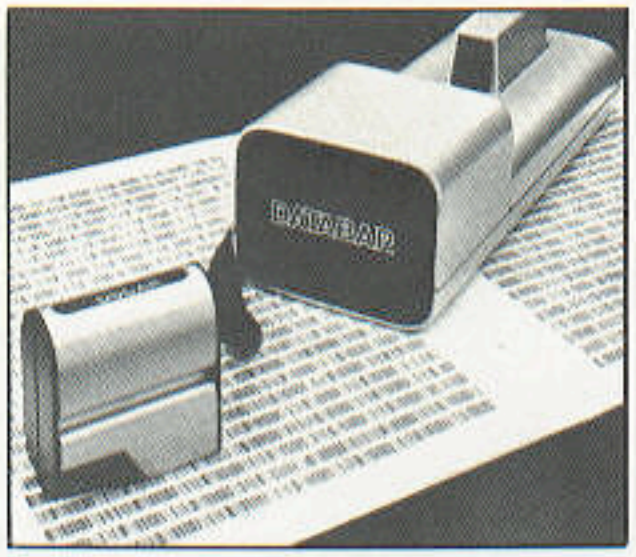
OSCAR

By Charles La Fara
President, IUG

Have you ever thought there might be a better way to enter a program into your 99/4A computer than by loading it from tape, disk or keyboard entry? Well, in January, there will be.

Databar Corporation, a hi-tech peripheral manufacturer in Eden Prairie, MN, will be offering the first Optical Scanning Reader, OSCAR™, early in January 1984.

OSCAR is designed to be a low cost, high speed scanner for use as an input device utilizing the cassette interface of the 99/4A home computer. It will require no special adapters, peripheral expansion modules or other high cost interface hardware. In addition to the hardware peripheral itself, OSCAR will be fully supported with an extensive library of BASIC



programs which will be published in bar code form from a monthly Databar magazine or which will be supplied individually by retail outlets or published in Enthusiast '99.

Current bar code software being developed includes such titles as Legalware, offering legal history, the American Constitution, Main bodies of law, Children and the law and Law for lay people.

Wordware is series of programs which will include Wordpower, Wordfun, Wordread, Wordwrite and WordProcessing. The Healthware series will include items on health and nutrition, and general health care, including recognition and prevention. An exciting Scienceware series will include such titles as Geometry, Conversions, Geo-physical, Electronics and Photography.

The OSCAR overcomes the limitations inherent in the use of the keyboard for entering programs. A typical program can be entered error free in less than two minutes. High quality materials and workmanship combined with a rugged reliable design ensures years of error free use. OSCAR will certainly add a new dimension to the term "user-friendly." The suggested retail price for OSCAR is $79.95 and software packages will be retailed for $9.95 per series.

OSCAR is a trademark of Databar Corporation.

STOP FIDGITING WITH MODULES — WIDGIT TO THE RESCUE!

By Terry Heim
Staff Technical Editor

In the myriad of new products that are becoming available almost daily for the TI 99/4A, there is a special class of hardware that is both fun and practical. The Widgit, a product of Navarone Industries, falls into this catagory.

The Widgit is a 'cartridge expander board' that allows the user to plug in up to three solid state command modules at once and then select which module is to be used with a built in rotary switch. The Widgit has proven invaluable to me because I am always having to go from TI Extended BASIC to the Disk Manager and back. The Widgit handles this task with the turn of a switch and the press of a button.

Before anyone gets the wrong idea, the Widgit does not allow you to use the capabilities of three modules at the same time. It is simply a device that lets you go back and forth between three modules.

The Widgit consists of the circuit board, three module ports and the selector switch. The circuit board fits in the module port on the console and the three modules of your choice fit vertically on the Widgit. The reset button allows you to reset the computer without turning the power off, and has a safety cover to protect it from damage and rubber feet to keep it from scratching the console.

An added effect of the Widgit is that it allows air to circulate under the Widgit and through the air holes on the console. This keeps the modules from overheating which sometimes leads to failure.

We here at the Users-Group believe that use of the Widgit should significantly reduce console 'lock ups' caused by the computer getting too hot. I use my machine about ten hours a day and until I got the Widgit, the computer told me when to go to lunch by refusing to turn on until I left it alone for an hour or so. Now the computer rarely balks at a full day of helping me solve programming problems, do word processing or review programs for the software exchange library. If you are one of the many 99/4A owners plagued by the overheating console, the Widgit should prove a worthy investment.

The Widgit is a product of Navarone Industries, a fairly new developer of software and hardware for the 99/4A. Other products now available from Navarone include 'Hen Pecked' and 'Topper', two arcade style games modules, and for the more technical enthusiast, Navarone has developed a 'Disk Fixer' that allows access to any sector on any disk.

For more information about the Widgit or other products from Navarone Industries, contact the Users-Group or write Navarone Industries.

NAVARONE INDUSTRIES
510 LAWRENCE EXPRESSWAY #800
SUNNYVALE, CA 94086
or call
(408) 866-8579.

The Widgit is now available through the IUG to both regular and President's Club members.

PERIPHERALS

HERALDING THE HEXBUS FAMILY

A HANDS-ON ENCOUNTER WITH THE HEXBUS INTERFACE AND THE VERSATILE PRINTER/PLOTTER

By Bill Gronos
Senior Technical Editor

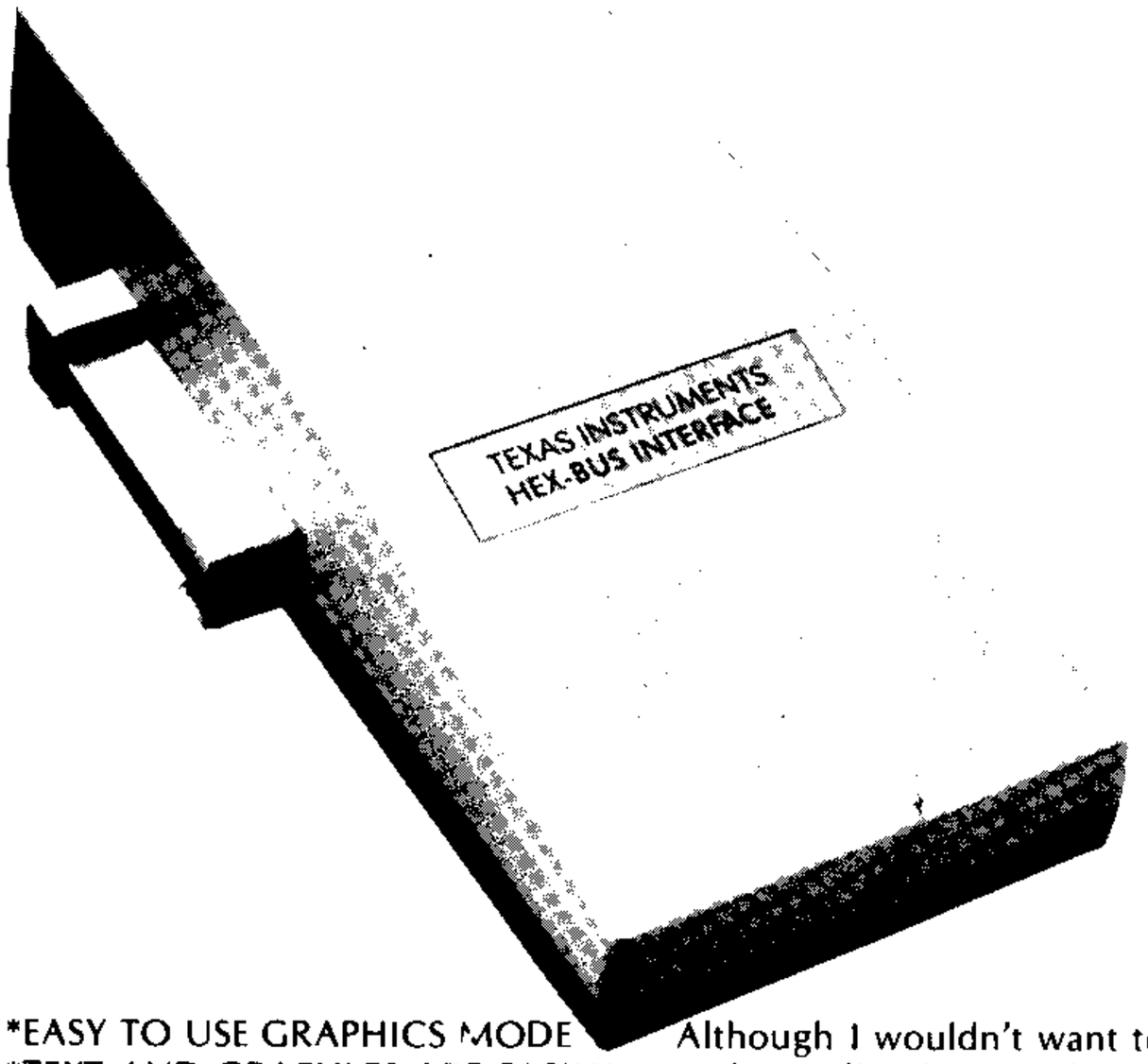
Charlie LaFara handed me a small, beige, plastic-cased device and said, "See if this lives up to all the hype." So this is the shape of things to come, I mused; this is the Hexbus interface.

The first problem I encountered with the Hexbus interface was electrical—no it wasn't faulty, it simply had an AC cord that demanded to be plugged in before it would operate. Anyone having several of the "freight train" style of peripherals can surely sympathize with this problem. Out went the modem plug; problem solved.

The Hexbus is a very exciting device for everyone who intends to augment the power of their 99/4 with the portability of the Compact Computer-40, or simply to adapt the CC-40's low-cost peripherals to their Home Computer system. TI's pre-marketing announcements about the Hexbus interface stated it would adapt all Hexbus family devices for use with the 99/4. They didn't say it was capable of doing the opposite task of adapting the 99/4's peripherals to the CC-40: this was a pleasant surprise. Before I delve into the operation of the Hexbus interface, let's examine the first offspring of the Hexbus family, the Printer/Plotter.

I am quite impressed with the operation of the CC-40 Printer/Plotter (P/P). It's difficult to believe that such high quality printing could come from a mechanism that draws characters with a ball point pen! The P/P is loaded with many features and functions that one wouldn't expect on a low cost printer:

*USES STANDARD 2¼" ROLL PAPER
*PRINTS 96 STANDARD ASCII CHARACTERS
*PRINTS AND PLOTS IN FOUR COLORS
*PRINTS 12 CHARACTERS PER SECOND
*PLOTS LINES AT 2" PER SECOND
*PRINTS EITHER 18 OR 36 CHARS PER LINE
*PRINTS REAL LOWER CASE CHARACTERS



*EASY TO USE GRAPHICS MODE
*TEXT AND GRAPHICS ARE EASILY MIXED
*COMPACT 5¾" x 4½" x 1¾" SIZE
*INCLUDES NiCad BATTERIES & AC ADAPT.

The Printer/Plotter operates in two distinct modes: text and graphics.

TEXT MODE

This is the standard printing mode. The P/P powers-up to print 18 characters per line with the black pen, but I found this line length too short for most purposes, so I always include the "S=0" option when I "open" the printer, which selects the 36 character line, 11 lines per inch type size. At this print density, the characters are about the size of dictionary type, or slightly bigger than the print on your home owner's insurance policy where it says you're not covered for one nickle in case of war, insurrection, etc. Although I wouldn't want to read "War and Peace" in this size of type, the characters are very legible.

The following functions are program selectable by transmitting "control" characters: type size, pen color, back space, carriage return, line feed, reverse line feed, graphics mode and self-test.

As a printer, the Printer/Plotter is a significant improvement over TI's ill-fated Thermal Printer and will fill the need for a "hard copy" device when economical price or portability are major factors. While acceptable as a printer, the P/P is an outstanding plotter.

GRAPHICS MODE

In spite of the limitations inherent in its 2¼" paper width, the P/P is a full-function, high resolution, easy-to-use graphics plotter. I spent several hours of fun figuring out how to produce several sizes and styles of calligraphic text. Luckily, artistic talent isn't required, only a little arithmetic.

Before explaining the details of the graphics methods, I'll give you a quick listing of the commands available.

O — Define origin
R — Draw relative line
M — Move pen
L — Draw line
J — Relative pen move
S — Scale characters
H — Home pen
T — Print text
A — Set angle of text
C — Select pen color

These ten simple functions combine together to give you tremendous graphics power, yet the way they are used is fairly simple.

All the drawing done by the pens consists only of straight lines—even when used as a printer. Take for example the lower case letter "a". The P/P forms this letter by precisely drawing eleven straight lines. The scale of the characters is accomplished by changing the relative length of these eleven lines. The bottom of the small "a", when scaled to the smallest dictionary-sized type, will appear to the human eye to be curved because of the high resolution of the printing mechanism. A few quick calculations showed that the P/P can draw with precision lines that have lengths slightly less than $^{1}/_{1000}$ of an inch!

The way the P/P draws these precise little lines is quite a marvel to watch. The pen can only move left and right; the P/P moves the paper up and down to supply the vertical motion! When a line of text is being printed, the paper is constantly bobbing up and down like a cork on rough water. Imagine how fast the tiny lines must be drawn for the P/P to reach its twelve character per second print speed!

The internal circuitry of the P/P considers the surface of the paper to be a grid of dots two hundred and sixteen columns wide and nine hundred and ninety-nine rows long. All plotting and printing is done by "connecting the dots". We simply tell the P/P what "dots" we want connected together.

This "dot-connecting" method may sound crude, but it certainly doesn't look it. There are 125 "dots" to the inch, which makes the distance between two adjoining dots eight thousandths of an inch! If you have trouble visualizing such a miniscule line, dig through your tool box or trot down to a local hardware store and take a gander at a .008" feeler gauge; a thickness gauge that size isn't very thick.

Every location on the plotter paper is identified by a column and row number, which in mathematical terms is called an "ordered pair", with the first or "X" value being the column number and the second, or "Y", value being the row number. The location (0,0) is the starting point of the pen and is called the "origin". When graphics mode is first entered, the origin defaults to be the left hand edge of the paper. It can be program redefined to be any desired location on the paper.

With the pen origin in its default position, (125,0) would be the point one inch straight to the right of the pen, (0,125) would be one inch directly above the pen, (0,-125) would be an inch below the pen and (-125,0) lies an inch to the left of the pen, which is beyond the edge of the paper.

Can any of you guess why one inch would equal 125 positional units rather than a nice even 100? I'll give you a hint; the plotter mechanism is stamped "made in Japan". The answer is the metric system. The plotting scale is actually 50 coordinate units per centimeter. With America being the last major holdout for the imperial measurement system, I guess they just couldn't be bothered with barleycorns.

Getting back to plotting: all line drawing is made with respect to either the currently defined origin or to the current

pen location; it's dealer's choice. Two short program examples will give you an idea of the plotting method and demonstrate the difference between absolute and relative drawing.

```
100 REM PROGRAM #1, ABSOLUTE PLOTTING
110 INITIALIZE PRINTER/PLOTTER
120 OPEN #,"10",OUTPUT
130 REM PUT P/P INTO GRAPHICS MODE
140 PRINT #1,CHR$(19)
150 REM MOVE PEN ½" TO RIGHT
160 PRINT #1,"M(27,0)"
170 REM REDEFINE ORIGIN TO CURRENT POSITION
180 PRINT #1,"0"
190 REM DRAW A 1" SQUARE
200 PRINT #1,"L(0,0),(125,0),(125,-125),(0,-125),(0,0)"
```

Line 200 issues the draw line command to the P/P. The plotter will draw a line from the first point to the second, from the second to the third, and so forth. If we wished to draw an identical square with relative plotting, we would change line 200 to:

```
200 PRINT #1,"R(0,0),(125,0),(0,-125),(-125,0),(0,125)"
```

With relative drawing, each successive line is drawn as if the current pen position were the origin. Line 180 could be omitted, since the actual origin will make no difference to a relative command.

Don't fret if you find these two examples a bit confusing, the P/P is well documented.

I was very impressed with the text capability available in graphics mode. It is far more versatile than that of the printer mode. Instead of two type sizes, you can select any of nine sizes and mix them as you please via the "scale" command. Scale 9 characters are a jumbo ½" high. Since very few characters of that size will fit across the 2¼" paper width, graphics mode gives you an angle command which allows you to print text facing in all four directions; rather than having to stand up straight, the characters can be made to lie on their "stomachs" and "backs", or even stand on their "heads". Thus, the largest characters can be printed sideways on the paper and your line length is limited only by how much paper comes on a roll, which is typically 150 feet.

If you ever prepare reports or charts, the Printer/Plotter can give you the ability to produce work that will rival that of a commercial artist. If your report must meet a short deadline (typically "yesterday" in my line of work), the P/P is available on demand. With commercial artist's fees roughly $30/hour, a $150 Printer/Plotter can quickly pay for itself. You simply load software that emulates what is known in the graphics business as a "headliner" machine and your P/P will churn out text headings that can be cut and pasted onto your reports or charts. When these "paste-ups" are run through a copier, the splices disappear.

At the end of this article I give you a sample program that will turn your Printer/Plotter into a "headline" machine. If you input lower case characters into this program, you will get very artistic, quasi-olde-english style type that an experienced calligrapher (calligraphy is the art of beautiful handwriting) would be proud of. What would take an artist hours of laborious work can be produced by your Printer/Plotter in a matter of minutes.

At this point let me comment about the cost of paper. Many of you know that the special thermal paper required by many small printers can be quite expensive. The P/P requires only run-of-the-mill adding machine paper. I checked out a local discount store and found I could get three 150 foot rolls for $1.87.

If the Printer/Plotter sounds like just what you need, but you don't plan on buying a CC-40, then the Hexbus interface will let your 99/4 control the motions of the pens. The P/P documentation tells you how to use the P/P with the 99/4, which is little more than adjusting your program coding for the slight differences between the BASIC commands. The Hexbus interface will allow you to use any of the new peripherals being marketed for the CC-40 with the 99/4. TI had a great deal of foresight in designing the 99/4 to be flexible enough to handle new peripherals with a minimum amount of interfacing.

The Hexbus interface is a four bit, medium speed input/output device which transfers data at speeds up to 6000 bytes per second. Since only four bits of data can be transferred at one time, bytes are transmitted as two nybbles. The Hexbus is connected to peripherals via an eight conductor cable; three of the lines are for bus control, four are for the actual data and the last is system ground. Of course, there is little need to know such technical information because all you have to do is plug the Hexbus interface into the side of your 99/4 and then plug in whatever peripheral you wish to use. You can stack together as many peripherals as you need, as they all have two identical connectors which allow them to be "daisy-chained" together.

I was very happy to find that the Hexbus will allow the CC-40 to access 99/4 peripherals, but this does require a 99/4 console. Support software is loaded into the 99/4 and it and the CC-40 are plugged into the Hexbus adapter. TI included some prototype software along with their sample Hexbus interface that allows the CC-40 to use the 99/4 disk drives and also to display data on the monitor screen.

The "marriage" of the 99/4 with the CC-40 will allow a multitude of new uses for the home computer system. Imagine waitresses carrying CC-40's around instead of their paper order pads. The customer gives her his order, which she simply enters into the CC-40. She takes the order to a central point and "Hexbusses" it into a 99/4. The 99/4 then passes the order to the cook via a monitor screen or printer, processes the transaction into a bookkeeping system and then prints out a check.

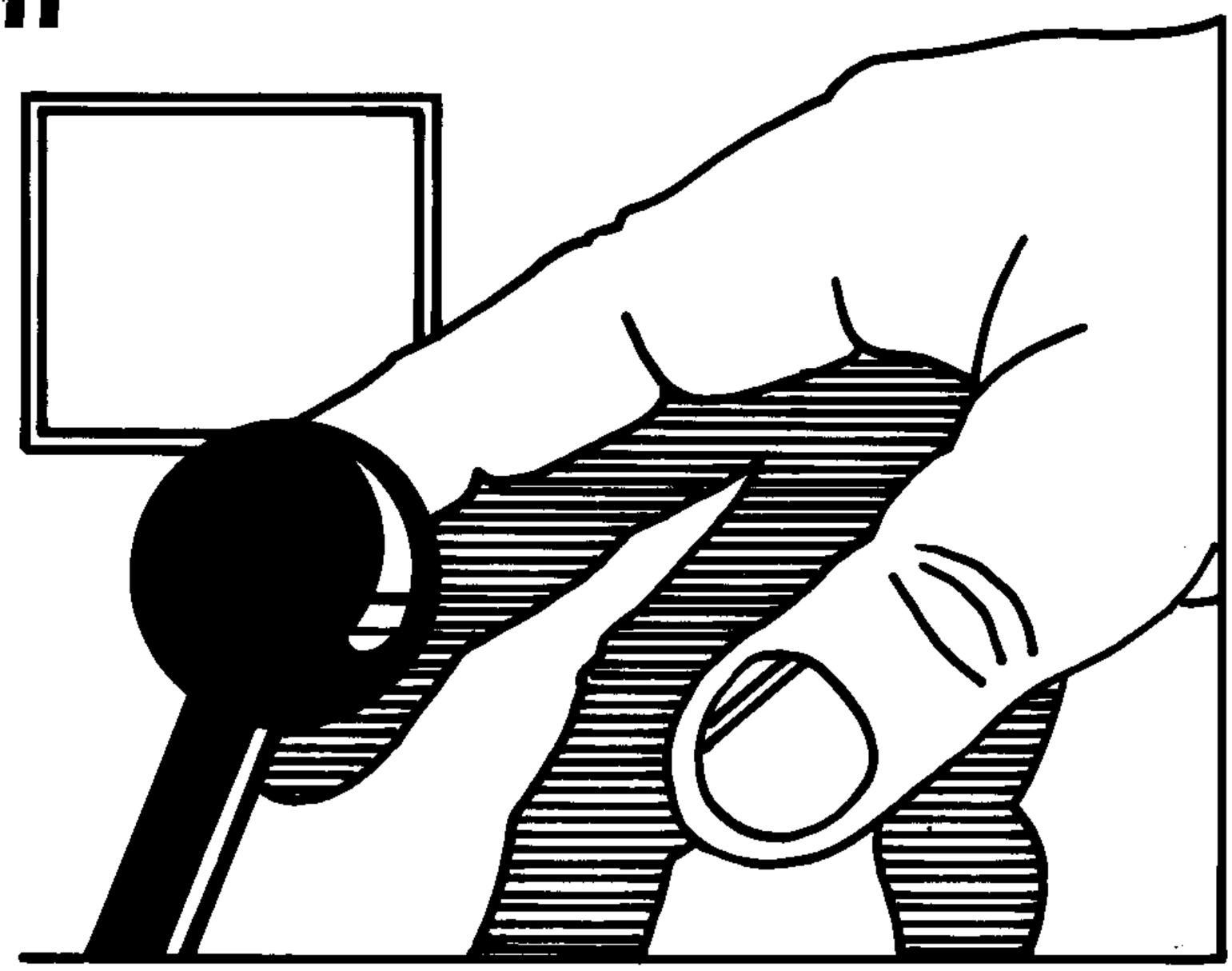
There are numerous other applications that would lend themselves to such a dual computer system. Because of it's portability, the CC-40 may be the most useful peripheral available for the 99/4. But to consider the Compact Computer a mere peripheral borders on blasphemy, for it in itself is a very powerful computing system.

A program listing for printing large character on the Printer/Plotter begins on page 59.

THE ULTIMATE JOYSTICK — PROSTICK II

A REVIEW

By Sharon Goff



I'm what you might call an arcade-game addict. For the past couple of years, my husband Fred and I have spent many hours and countless quarters in the arcades in the Oklahoma City area. That was, until Fred purchased our 99/4A Home Computer. Two of the first modules that we purchased were Parsec and Munch Man, two of what I believe are the most challehging arcade games ever produced. I found myself spending almost all of my available time trying to continually better my scores and achieve mastery of these two game modules.

Unlike some game players, I do not find using the keyboard comfortable and have been searching for the ultimate control device so that I may play games in a relaxed position.

When the IUG asked me to review a new joystick we were at first a little skeptical, thinking that like all of our other joysticks this one would also have its limitations.

After just a few games with the Prostick II it was easy to see that this was not true. The Prostick II fits comfortably in my hand and was also easy to hold when placed on a flat surface. It has two fire buttons which enable easy firing for either right or left handed players. The fire buttons are located at the top end of the joystick base which allowed me to use my index finger instead of my thumb to hit the fire button. Using my index finger gave me quicker response time and my hand did not tire as much during long play periods.

The Prostick has a solid steel shaft with the arcade-style ball on the top for a good grip. It has a positive stop in the center position. I liked this tightness in the joystick very much.

Another unique feature of the Prostick was the plastic switchable gate-plate at the base of the shaft which can be set in the "4" or "8" position marked on the top of the base. In the 8 way position you can move in the four diagonal directions in addition to vertically and horizontally. In the 4 way position you can move only vertically and horizontally. Eliminating the diagonal directions keeps from wasting precious response time. This dramatically improves response in playing the maze game, Munchman.

Also included with my Prostick was an adapter which enables two joysticks to be plugged into it. I believe this is about all that can be said of the physical description of the Prostick. Now for the real test. Was this going to be a great performer or just another mediocre stick in the crowd?

My first task was to get the Prostick away from Fred. With this accomplished I plugged in Parsec and was ready for space battle. In the lower levels I did not notice any significant difference. Then as I progressed to higher levels the advantages of the Prostick became clearly evident. The refueling tunnel was easier to get through. My ship continued to move smoothly while firing which was sometimes a problem with the WICO, Atari and TI joysticks. These others seemed at some point in the game to lack the ability to move and fire simultaneously, which is critical in this game of Parsec. The Prostick allowed me to move on to higher levels than I had been able to before because of joystick failure.

There was a distinct advantage in using the Prostick while playing Munchman. Anyone who has played this game has more than likely noticed that it is rather difficult to make the lower left and right corners. This was not a problem for me with the Prostick. I was able to make these corners with noticeably more ease and less frustration than with the other joysticks I have mentioned.

With Munchman as well as Parsec I was able to play with the Prostick for rather long periods of time without my hand cramping. Overall I found no problems in using the Prostick. Its operation was accurate and predictable. In comparing the Prostick with the WICO joystick, I found the WICO joystick practically impossible to hold in my hand because of its large size. The major problems I had with the WICO were that on the higher levels of Parsec it would not move and fire simultaneously and the up and down movements were very jerky. In Munchman it would, at times, not change directions and in Car Wars there was practically no response at all. Having thought my WICO joystick and adapter might have been faulty, I returned them for another, only to find the problems came up again. Although the WICO joystick works well with the Atari 2600, it doesn't seem to interface well with the TI home computer. This leads me to believe that the trouble might not be with the WICO joystick, but rather with the adapter.

I did not have any major difficulties in using the Atari or the TI joysticks at first. The Atari was awkward for me to hold in my hand and the TI joysticks were hard to hold for long periods of time. But both seemed to work adequately. The biggest drawback to them was that they seemed to wear out very quickly. I have not incurred any of these problems I have mentioned while using the Prostick II.

I feel that anyone who is serious about playing games on their TI-99/4A Home Computer should consider the Prostick II a necessary addition to their hardware.

DISK SYSTEM "UNCONTROLLED"

By Terry Heim
Staff Technical Editor

One of the most common questions I hear every day answering the phone at the Users-Group is, "How can I add a disk system to my computer without buying the Peripheral Expansion Box and the Disk Controller Card?" Now, for the first time, there is a way.

Percom Data Corporation has introduced a disk system that plugs directly into the console and eliminates the need for an expansion box or disk controller.

The Percom Data TX-99/S1 is a single sided, single density disk drive measuring 7.2 x 4.8 x 11.7 in. and allowing 90K of storage per diskette. Also available from Percom is the TX-99/A1 drive to be used as an 'add on' drive to the 99/S1 and the TX-99/S2 system which consists of two half-sized drives. The TX-99 disk drives can be used in exactly the same way as the TI disk system for loading and saving programs, data file processing within programs and all of the utilities one would expect in a disk drive (i.e. merging programs). The TX-99 even comes with a TI disk Manager 2 so that you can use the disk drive to its fullest capability.

For those of you who may be unfamiliar with disk drives, there are several important advantages of a disk system as compared to a cassette tape recorder. First of all, the disk drive is much faster. Data and programs can be loaded from disk at the rate of 125,000 bits per second as opposed to 300 bits per second from tape. If you spend a lot of time saving and loading programs, a disk system should prove well worth the investment.

Another advantage of a disk system is the package of utilities that comes along with it. For example, all of us have had the frustrating experience of recording over the first few seconds of a program and losing the whole thing. With a disk, programs and data are stored by filename and the disk system makes sure you don't clobber one file with another. Also, there are no tone or volume knobs to worry about on the disk drive, so loading difficulties are eliminated.

There are, however, a couple of trade-offs one should be aware of when looking into the TX-99. First of all, the Percom disk drive cannot be used in conjunction with the Peripheral Expansion Box, so if you are thinking about adding memory expansion, a printer, and maybe Pascal, you should seriously consider staying with TI.

The second drawback is that only two Percom disk drives can be used, as opposed to three with the TI system (I have never met anyone who would consider this a major issue.).

The advantages of the TX-99 include simplicity, an easy to understand manual, and price. The TX-99 is easy to assemble — just plug one end into the wall and the other end into the console and you're ready to go.

Once you learn the 'language' of the disk system, you will see that the TX-99 is much easier to use than any tape recorder.

The manual is both informative and readable and assumes no previous experience with disk drives. The manual begins by answering the questions "What did I buy?", and "What do I do?" and continues to explain all of the relevant BASIC commands and statements that deal with disk drive operation.

For more information about the Percom Data TX-99, contact the Users-Group or call Percom Data Corporation at 1-800-527-1222.

PERCOM DATA
CORPORATION

BRIGHT BEGINNINGS

By Dana Nichols
Managing Editor

What do musicians, turtles, bugs, and bees have in common? They're all part of a new educational software series by Milton Bradley Company, the leader since 1860 in creating fun-based learning. This series of educational software will transform your T.I. home computer into a valuable learning tool for your children!

With this software, even the youngest members of your family can now benefit from the wise investment you have made in your T.I. home computer. There are four soon to be released T.I.-compatible "Bright Beginnings" game cartridges in the series for children aged four to eight. Combining education with entertainment, the games help children acquire and expand such skills as classification, pattern recognition, prediction, spatial relationships, memory development, deductive reasoning, and more.

All four cartridges in this series feature electronic Speech Synthesis, and two of them also feature Voice Recognition. With electronic speech synthesis, you'll hear the computer talk both in realistic speech and in distinct character voices. With Voice Recognition, you control screen action through your spoken commands.

To experience these features of the software cartridges and obtain maximum play potential, Milton Bradley Company has developed the MBX Expansion System that plugs into your TI 99/4A computer. This three-unit Expansion System includes a headset microphone to transmit your spoken commands to the computer, a triple-axis analog joystick with comfortable pistol grip and 360-degree object rotation for total maneuverability, and a console with a 64-position action-input keypad for quick and flexible response to screen movement.

Self-instructing and age appropriate, this software introduces children to the proper learning tools at just the right time in their lives.

The four new "Bright Beginnings" cartridges create an individualized computer-based learning environment. Your child's creativity is stimulated without traditional canned lessons and repetitive drill and practice exercises. Many of the prompts and directions are both seen and heard.

What's so special about "Bright Beginnings?" It challenges children in a way that's so much fun they'll want to play again and again. Because these games have many strategies and solutions, they stress a discovery approach to learning while featuring original musical scores, high resolution graphics, and surprises galore to capture and hold your child's attention. It all adds up to an environment that is both fun and educational.

What's so special about "Bright Beginnings"? It challenges children in a way that's so much fun they'll want to play again and again.

Milton Bradley feels that video activities should do more than bring bright smiles. They should also bring bright ideas, and that's exactly what this series is designed to do.

Milton Bradley also encourages parents to participate in this educational process. Specially-tailored parental discovery guides for each cartridge help the parents assist in their child's individualized learning program.

The guides spell out, in simple and easy to understand language, the exact skills being developed by each cartridge. Using this guide, you can work with your child on the computer, and answer questions that may arise while play is ongoing. The guides also suggest other activities that further develop your children's abilities and skills in a way that's closely related to the goals of this software series.

"Bright Beginnings" has been designed to eliminate frustration. The emphasis is on teaching children to rethink situations rather than on penalizing them for wrong answers. Stress is placed on use of reasoning to carefully explore alternatives as decisions are made.

And, importantly, these programs are geared to an age group (4-8) that has often been overlooked in computer usage and early development of computer-based educational skills.

The "Bright Beginnings" cartridges utilize such appealing concepts as a make-it-yourself band, bugs that hide and beg to be found, a turtle anxious to find the way home for winter, and bees that want to collect nectar while avoiding the pitfalls of nature.

Each cartridge has been pre-tested with children of the appropriate age level, and each has proven to be an experience that children enjoy working with time and again.

Two of the cartridges—*Terry Turtle's Adventures* and *I'm Hiding* — include the Voice Recognition feature, and require use of the MBX Expansion System. The other two — *Honey Hunt* and *Soundtrack Trolley* — do not require the MBX, but its use is recommended so your children enjoy full play potential. All four games feature Speech Synthesis, so many of the directions are given orally by the computer.

Here's a brief description of each cartridge in the "Bright Beginnings" series:

1. Terry Turtle's Adventures

Ages: 4 - 8
Special Feature: Voice Recognition

It's spring, and Terry Turtle has left home. Seasons change as the game progresses, and this means Terry must find his way back to the burrow before winter comes. However, along the way there are shrubs to be eaten; logs to be climbed, dug under, or walked through and across; and rocks to be climbed over or dug under. All the while, Terry collects strawberries, which are often snatched by berry-stealing critters like a snake, rabbit, bird or gruff old trolls.

The child uses spoken commands or the colorful keypad to help Terry collect as many strawberries as possible and still get home before winter comes.

Children playing this game learn to read a map, to give instructions efficiently, and to perform elementary programming in a friendly environment.

This game features Voice Recognition, and the MBX Expansion system is required for play.

There's no getting bored, because there are four increasingly difficult levels of play.

2. I'm Hiding

Ages: 4 - 7
Special Feature: Voice Recognition

I'm Hiding is a search for bugs that play peek-a-boo in a collection of pencils, pens, brushes and paints. The MBX Expansion System is required for this game.

One bug is hiding somewhere on the screen. A player selects its possible hiding place on the screen by specifying object shape, color, and size verbally or on the keyboard. When the location is selected, the bug hiding there jumps out to tell the player if the guess is "farther" or "closer" to the bug being sought.

This game strategy has many valuable lessons for a young child. He or she learns to develop search strategies, enhancing deductive reasoning powers. It also develops basic classification skills that are an important step in the reading process.

Each time a child picks a hiding place, it must be categorized by form, color and size. When the child mislabels an object, parental help is useful in pointing out similarities and differences between objects.

3. Honey Hunt

Ages: 5 - 8
Special Feature: Arcade Suspense

A bee darts around the screen collecting nectar from open flowers in a meadow. This movement is controlled by the player moving the joystick to the desired location.

The player must return the bee to the hive periodically to accumulate nectar points and must also avoid spiders, dragonflies and the bee assassins by recognizing their flight patterns.

To keep players on their toes, a honey-loving bear will scoop out honey from the hive if the hive is left unattended.

Because the flowers are constantly opening and closing, there's an ever-changing field of targets. The game lasts until five bees have been lost to the enemy insects.

Playing Honey Hunt, children learn to recognize patterns within the program. They develop predictive and strategy skills so they can determine where predators will next appear, and the sequence in which flowers open.

This is a simple game to play, and the bright graphics and perky music are very attractive to children.

4. Soundtrack Trolley

Ages: 5-8
Special Feature: Choice of three delightful musical games

Soundtrack Trolley is actually three games, all related, that teach children about sounds, tones and creative musical expression. All involve a musical trolley that rocks and rolls its way around a track. Each musician the trolley picks up along the way plays a different tune.

One of the games is *Create a Tune* in which the player picks up band members in a sequence to compose his or her own tune.

Match a Tune is the second game. The player must match a musical phrase to the band member who played it. This gets harder as more band members join in.

The third game is *Follow a Tune*. In this game, as band members are added to the sequence, the player must choose which band member played first, which second and so forth through the sequence of tunes.

These games develop a number of important educational skills, including sound perception, auditory memory, sequencing and matching.

Milton Bradley Company has merged its experience in making learning pleasant and stimulating with the recognized educational background of Joyce Hakansson Associates in developing *I'm Hiding*, *Honey Hunt* and *Soundtrack Trolley*, all superb educational software.

Each area of design, including art work, music, game play, and the teaching of skills and social values, reflects excellence. These elements have been integrated to provide games that are fun, motivating, friendly, interesting and highly instructive.

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Milton Bradley has been involved with education from its origins over 120 years ago. Through its educational divisions, Milton Bradley produces and distributes a significant line of educational products used in schools throughout the United States. Recently, it has expanded into software for educational purposes.

Joyce Hakansson Associates, similarly, is composed of expert artists, musicians, child development specialists, programmers and an academic advisory board. They work together to create stimulating learning games that blend instruction with a child's inherent love of play.

Joyce Hakansson was involved with the Children's Television Workshop, creator of the highly-acclaimed "Sesame Street" program for children.

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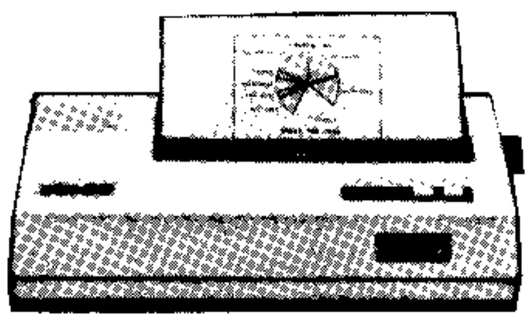

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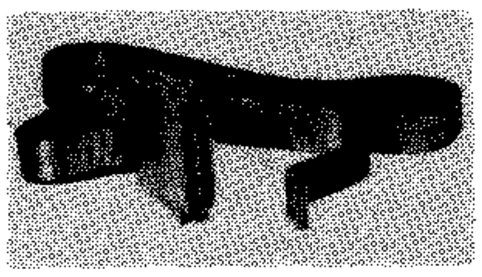

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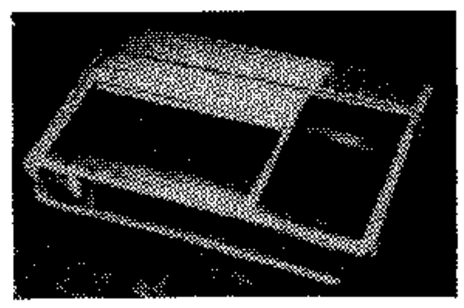

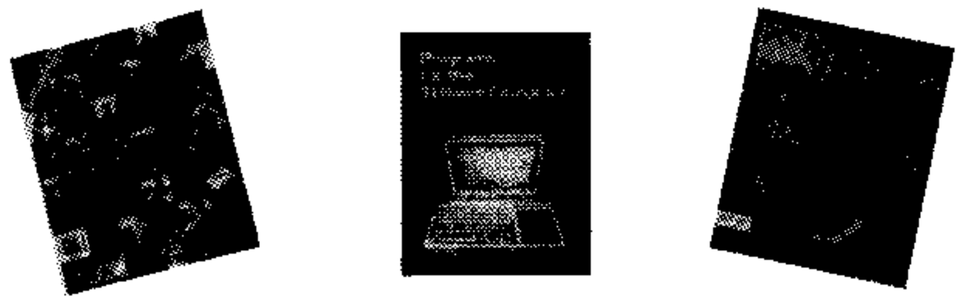

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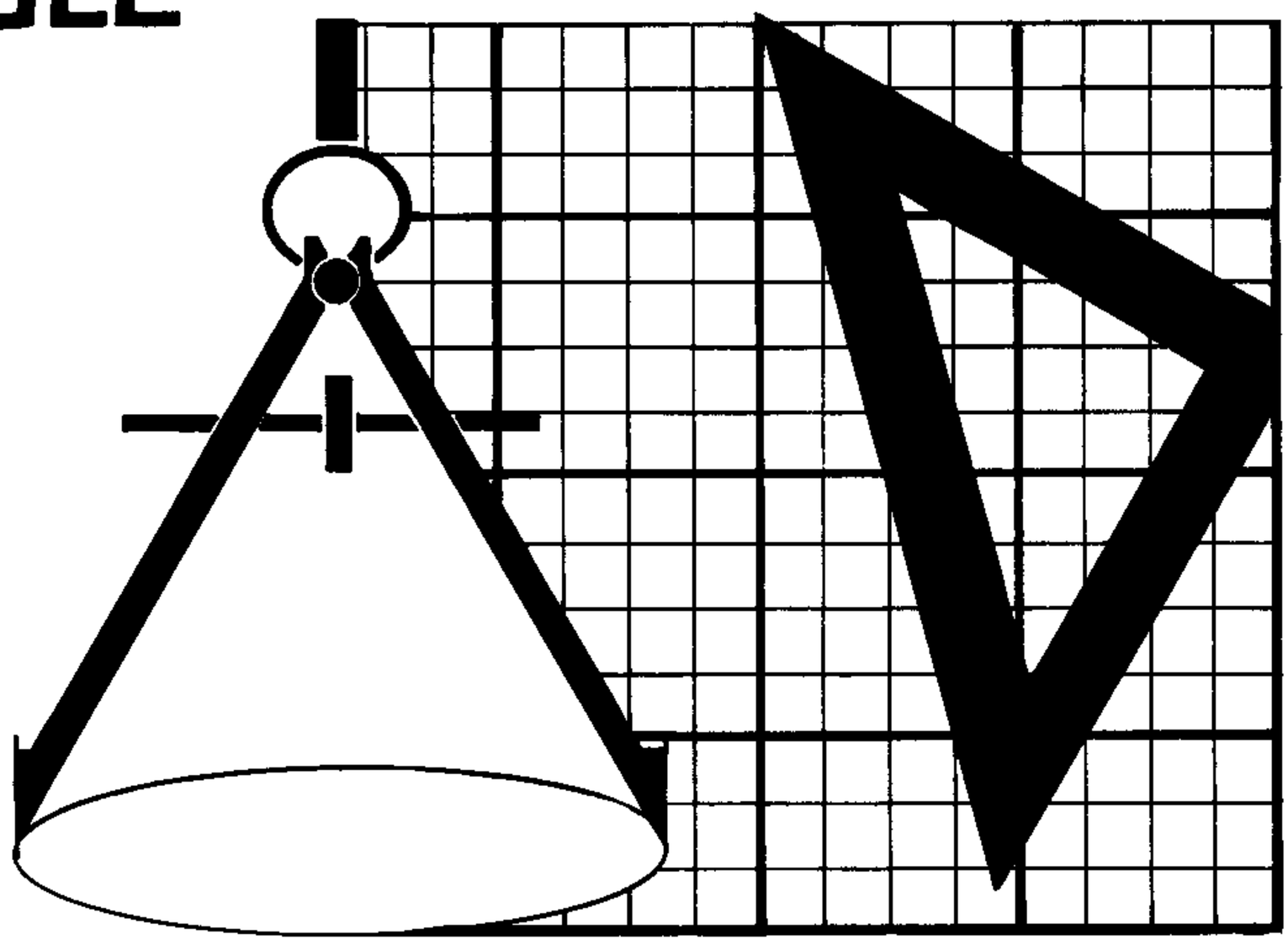
PLATO® GEOMETRY: YOUR 99/4A ANGLE

By Dana Nichols
Managing Editor



In the July issue of Enthusiast '99, an article appeared concerning PLATO ® and Control Data Corporation's success with Computer Assisted Instruction.

I'll now focus on a specific program from PLATO's vast library of courseware—High School Geometry, a program from the High School Skills—Mathematics package.

Before beginning, however, an overview of the development of PLATO and its relation to the TI 99/4A is in order.

In October 1983, CDC announced it would be producing courses from its PLATO library for the TI 99/4A, Atari and Apple microcomputers. On May 6, Control Data announced that TI and CDC had reached an agreement whereby Texas Instruments secured exclusive rights to 108 PLATO courseware packages developed for elementary and secondary school levels.

PLATO, a disk-based product, requires the following equipment: TI 99/4A Home Computer console, monitor, TI disk memory system, memory expansion, PLATO interpreter cartridge, and PLATO program packages chosen. Each package is available for $49.95.

An integral part of PLATO is the interpreter package. It includes a cartridge, survey diskettes, and a parent-/teacher guide. The cartridge is a one-time purchase, and enables you to use any of the PLATO courseware diskettes available for grades three through 12. The survey diskettes help to determine the child's level at which PLATO will prove useful, and involves testing in Basic Skills Mathematics, Reading and Grammar.

Beginning with the interpreter package, I will explain step by step how you as a parent or teacher can determine your child's learning capability using the PLATO system of Computer Assisted Instruction.

The PLATO interpreter cartridge serves as a basis for not only determining your child's level of learning and learning capability,but also to provide instruction and guidance when program packages have been chosen and actual courseware is used.

After inserting the PLATO interpreter cartridge, you can select your choice of curriculum; in our case, Math.

The next step involves the PLATO Math Survey Diskette. It is at this point, before proceeding with the actual survey, that you are asked to complete the questionnaire included in the PLATO interpreter package.

The parent/teacher questionnaire, in effect, asks your opinion of your child's learning level. For example, a question concerning the Math curriculum, and more specifically, the High School Geometry program, is "Does your child know the difference between a cone and a pyramid?"

You are asked to complete this questionnaire before actually testing your child. Upon completion of your child's testing you will be able to compare your prediction with the child's actual score. If he or she answered incorrectly a question concerning cones, pyramids, or other geometric figures, you can zero in on a trouble spot you may not have realized your child was encountering.

The Math Survey Diskette progresses as follows: your child will be taken on a guided tour of the keyboard, and important keys such as AID, REDO, BACK, and ENTER are explained. Always personal, the instructions make statements such as "The BACK key is an important key. Try it now. Hold down the FCTN key and press BACK at the same time."

Upon execution and resulting action, your child will immediately be praised: "Excellent! The BACK key can be used when you see PRESS BACK at the bottom of the screen."

Personally taking the test, I was then instructed to type in my name and choose the High Schools Skills—Mathematics test I wished to take; in this case, Geometry and Measurement. At this point, the test began; there were no preparations for the test, such as sample questions or practice drills. I was notified that to pass, I must answer all questions correctly.

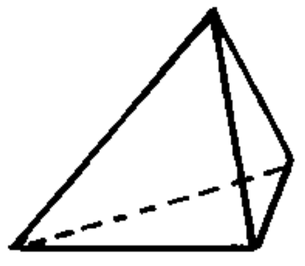
The survey questions involved line segments; geometric figures, such as rectangles; measurements, such as on a ruler or thermometer, and time. Although I answered all 10 questions correctly, it was not simple. Some questions tested recognition capability while others involved calculation. Had I missed a question, the following message would flash on the screen:

The test you are taking covers the skills taught in the program package(s) called:
Geometry—Basic Concepts
Measurement
Dana, to pass this test you are allowed only 1 incorrect answer. You have already answered 1 incorrectly and 7 correctly.
What would you like to do next, Dana?
Press ENTER to continue with this test
Press BACK to choose another test

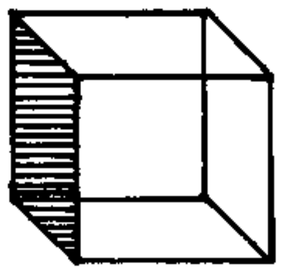
The following are two examples of questions asked using the Math Survey Diskette:

Select the best name for the figure

A. Pyramid
B. Cone
C. Prism
D. Sphere
E. Cube
F. Cylinder



Choose the name of the indicated part of the figure



A. Edge
B. Base
C. Face
D. Corner
E. Radius

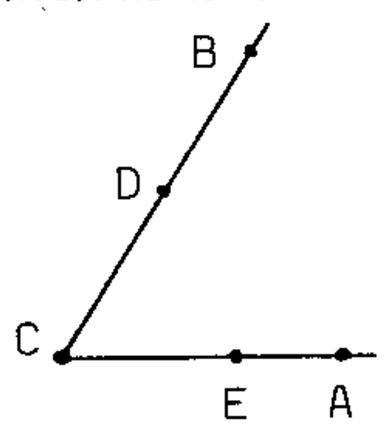
At this point, assuming your child has completed the Math Survey test, you are then instructed to compare your predictions with your child's actual scores. This is the sole purpose of the PLATO interpreter cartridge/Math Survey Diskette combination: to help you, as a parent or teacher, ascertain if your child has mastered his or her geometry skills or would benefit from the PLATO High School Geometry Skills—Mathematics package.

Assuming that you purchased the High School Geometry package, you would find enclosed four diskettes: Special Angles Part 1, dealing with using a protractor on the screen to measure angles, and defining and identifying complimentary, supplementary, and vertical angles. Special Angles Part 2 adds a third line to create other special angle relationships introduced in Special Angles Part 1. This program helps your child define and identify alternate interior, alternate exterior, and corresponding angles; measure angles using the measurements of related angles; and apply special angle relationships to measure angles in a triangle.

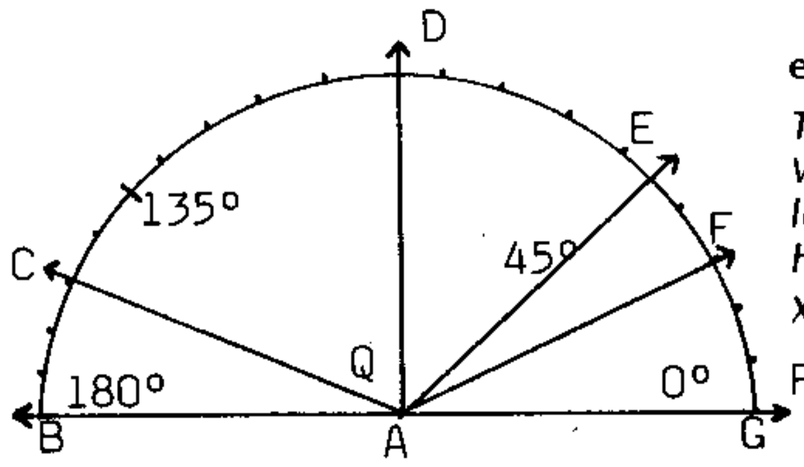
During each lesson in both Special Angles Part 1 and 2, your child will be led along gradually, and be introduced to different angle relationships in a "linking" manner. No lesson is ever completely set apart from the rest; your child is introduced to another aspect of angles in a manner that incorporates the previous lesson.

For example, if you were taking the Special Angles Part 1—Tutorial lesson, you would see the following:

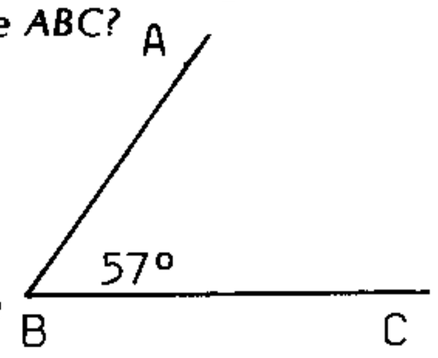
Is ∠ACD a correct name for this angle? Type Y or N



Give the measure of ∠FAB



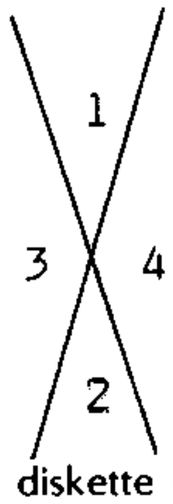
Drill and Practice:
What is the measure of the angle complementary to angle ABC?



A. 123°
B. 147°
C. 33°
D. 133°
E. None of the above

If angle 1 = 49, what is the measure of angle 4?

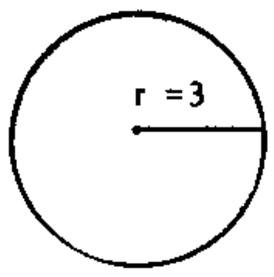
A. 49°
B. 41°
C. 131°
D. 141°
E. Not enough information to determine



The third geometry diskette is Circles, Arcs and Circumferences. By discovering methods to measure the parts of a circle, your child can learn to measure the circumference of circles, arc lengths and central angles. Through this instruction your child learns to define and identify parts of a circle, learn the meaning of the symbol pi, and find the circumference of a circle, arc length of a circle, and the measure of the central angles of a circle.

The following questions might appear in the Circles, Arcs and Circumferences lesson:

Tutorial
Which calculates the circumference?



A. 2 × 3 × pi
B. 3 × pi
C. 22 / 7
D. pi +6
E. pi / 3

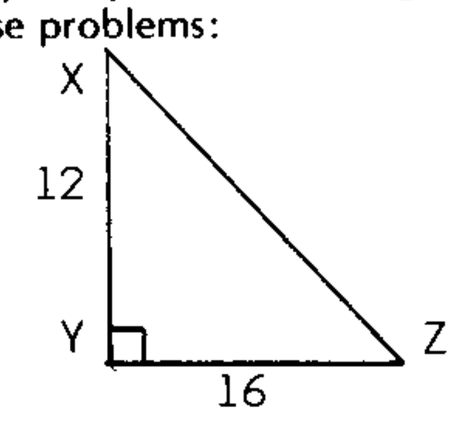
Drill
What is the diameter of a circle with a circumference of 20 × 14?

A. 20
B. 3.14
C. 2(20)
D. 20 / 2
E. None of the above

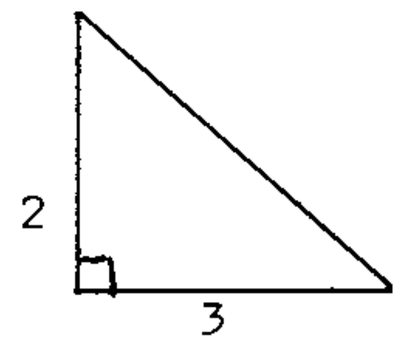
The final diskette concerns the Pythagorean Theorem. In this lesson your child learns to use this theorem to find the lengths of the sides of right triangles; he or she will learn to recognize a right triangle and its parts, find the lengths of the sides of a right triangle, and determine if a triangle is a right triangle.

For example, your child might encounter these problems:

Tutorial
What is the length of the hypotenuse of XYZ?



Drill
What is the length of the hypotenuse of the triangle?



A. √3
B. √(2 × 3)
C. $2^2 \times 3^2$
D. √($2^2 \times 3^2$)
E. None of the bove

As in each program, the lessons concerning Circles, Arcs and Circumferences and the Pythagorean Theorem build on themselves. Perhaps the most important aspect concerning these lessons is the fact that the computer can never go too fast for your child. He or she is not permitted to continue until the question is answered correctly, or he or she causes the computer to provide the correct answer. Your child will absorb the information provided in each statement, each question, and ultimately, each lesson.

PLATO Geometry deals with relationships that exist among parts of a geometric figure. Each lesson builds on itself to provide step by step instruction at a pace your child can accommodate. If a question is answered wrong, your child is encouraged to try again and in some cases, is given a hint at the correct answer. If the question is answered correctly, he or she receives immediate reinforcement and, many times, praise for good work done.

Like all of the PLATO educational courseware programs, High School Geometry, from the High School—Mathematics package, is an excellent learning tool for students in grades nine through 12, or a useful learning or reference tool for adults.

Through the application of the PLATO interpreter cartridge, the parent-/teacher questionnaire, Survey Diskette, and program packages chosen, you should be able to help your child achieve a higher level of learning capability through Computer Assisted Instruction.

We have focused on only one program of 108 available from Control Data Corporation through Texas Instruments. As in High School Geometry, all program packages, whether they be in the Math, Reading, or Grammar curriculum can enable you to expand your learning horizons, using your TI 99/4A Home Computer, for both yourself and your children.

WHAT YOU SHOULD REALLY KNOW ABOUT COPYRIGHT LAWS

By Charles La Fara
President, IUG

On January 1, 1978 the copyright laws of the United States were revised to give the author of a writing greater control on how the writing is to be used. The writer of computer software is also protected by these same federal copyright laws. Current U.S. copyright laws protect "original works of authorship" and it grants the copyright holder the right to reproduce, improve and distribute the work and the right to authorize others to do the same.

Therefore, if you write a book, an article, a poem, or a computer program the copyright law gives you instant protection. As the creator of a computer program, the work is yours, and you have the right to do with it as you wish.

In contrast, if you create a computer program as a "work-for-hire" the copyright belongs to the person or organization which "commissioned or solicited you to prepare the program." In both cases, however, the copyright laws will provide protection in the event of unauthorized reproduction and distribution of software.

Copyrights protect only the form or expression of ideas and not the ideas themselves. For software, copyright does not protect a program's concept or logic construction in terms of end-user performance: it does protect the programming language or binary code. In short, it protects what the software IS rather than what it DOES. If a program is truly unique in both application and execution then it may be eligible for copyright or patent protection.

Confused? So are the courts. The courts are now faced with the problem of applying the traditional copyright concepts developed in conjunction with the creation and reproduction of the printed word to world of electronics.

Is it legal for a person to videotape a television program without paying for it? Is it lawful for a software purchaser to copy a program and give or sell it to a friend? These are the questions that are filling the dockets of today's courts, and the courts are having to deal with them on an increasing frequency.

Software piracy is running rampant in this country and abroad. Estimates of the impact of software piracy vary widely, but range from 2 to 10 illicit copies for every one legitimate copy in circulation of any given program. This type of piracy mounts up to a potential loss of revenue for software developers of $15 billion annually.

Can software piracy be stopped? Probably not. One of the newest methods to curb software piracy of copyrighted material is the placement of an invisible code between line numbers which can not be seen by the user when the program is either listed to the screen or to a printer. This new method has been put into practice by many software developers and is currently in use here at the International 99/4 Users-Group on all programs in the Software Exchange Library. Although this practice does not assure protection from unauthorized duplication of programs, it does enable the manufacturer or copyright holder the ability to prove the program's origination.

Once the true origination of a program is verified, it is then much easier to proceed with legal action against individuals or organizations unlawfully duplicating software packages. Computer industry organizations such as ADAPSO are now forming a coordinated effort to provide information to enforcement agencies and sharing internal data involving known pirates. The successful control of illicit software copy will come with the joint effort of the computer industry and federal prosecutors.

It is extremely important that each individual author who intends to write programs for profit make himself or herself aware of current federal copyright laws. Registering a program is not difficult. The author simply completes a form and sends a $10 fee with a copy of the program to the Federal Copyright Office.

That's all that needs to be done. An unlimited number of programs can be registered at the same time. Details for copyrighting your programs may be obtained from the Copyright Office, Library of Congress, Washington, D.C. Additional details can be obtained by calling the Copyright Office at (703) 557-8700.

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DISK FIXER A REVIEW

By Bill Gronos
Senior Technical Editor
9505½ S.E. 15th #B
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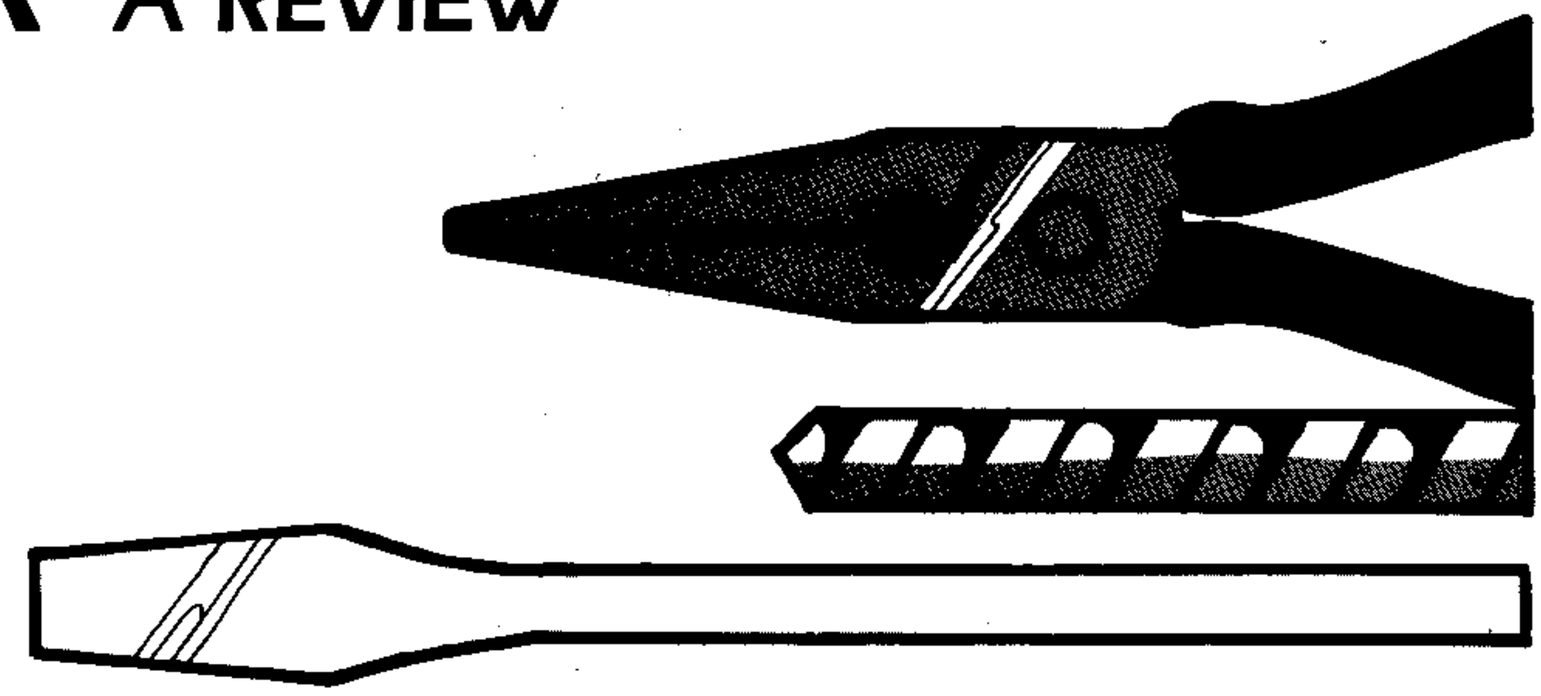

WRITTEN BY NAVARONE INDUSTRIES

PROGRAM FORMAT: MACHINE LANGUAGE OBJECT CODE

HARDWARE REQUIRED: DISK DRIVE, MEMORY EXPANSION, EDITOR/ASSEMBLER MODULE

This is the type of program that makes TI cringe. Disk Fixer allows you to probe the inner mysteries of the 99/4 disk format and learn many things that TI would quickly tell you were "proprietary information" should you dare to ask about them on the technical hotline. Disk Fixer is a must for the serious 99/4 hobbyist who wants to do more than shove command modules into the GROM port and also for anyone who has a "sick disk" which suffers from a damaged directory. Disk Fixer lets you recover unscathed information as if you were sorting out the broken eggs from a carton that had been dropped. This is done by reading the disk by sector number rather than file name.

Don't waste your time looking through your Editor/Assembler manual to see how sector reading is accomplished: this is an undocumented feature that TI would rather you didn't know about. I have been interested in sector reading ever since seeing a not-for-public-release Command Module that could do this trick. However, that module was coded in Graphics Programming Language, which effectively concealed the secret from prying eyes such as mine . I must take off my hat to the Navarone programmer who wrote Disk Fixer; it was either a remarkable job of system sleuthing or someone has a good source of inside information.

Documentation supplied with the program consists of a ten page booklet that is well written and easy to understand. It takes only a few minutes' familiarization to become proficient in the use of Disk Fixer. Appendix A of the booklet tells you how files are stored and indexed, how the spaces left from deleted files are re-used and how fragmented file sections are linked together.

The program is executed via the LOAD and RUN option of the Editor/Assembler. Eight commands provide the following functions: Read sector, Print sector to external device, Write sector, Alter data, Display buffer, Inspect/Change memory, Help and Quit.

You are able to modify entire sectors or a single byte with just a few entries. As an example, to change the disk name you would enter the command "R0,1" (read sector 0 on drive 1-the documentation tells you where on sector 0 the name is located). Sector 0 is then loaded into the RAM buffer. Next you would use the "A" command (alter sector buffer contents) to change the ASCII values of the name and then use the "W" command (write buffer to disk sector) to make the change on the disk.

Changing a disk's name with Disk Fixer merely duplicates a function that can be done with the Disk Manager module. The true power of Disk Fixer is that it allows you to do things that are impossible to do with your system as supplied from the factory. For example, I was using TI-Writer to make an automatic log-on file to use with my Terminal Emulator II module. I needed to enter a Control "L" character so that my monitor screen could be cleared. TI-Writer uses the control characters to perform special functions, so these characters can not be entered directly. I entered a "Z" where I needed the Control "L" to be and then saved the file to disk. I then (1) used my "Widgit" (which, coincidently, is also made by Navarone Industries) to change over to my Editor/Assembler module, (2) loaded up Disk Fixer, (3) used the R (read) command to scan the directory sectors to locate the log-on file, (4) located "5A" (the hex value of "Z") on the first sector of the file, (5) used the A(alter) command to change the "5A" to "0C" (the hex value of Control "L" - the Form Feed character), and finally (6) used the W(write) command to save the altered sector back to disk. This process only sounds complicated; it actually took less than two minutes. There are many other practical uses for Disk Fixer, some of which are quite devious!

A caveat is in order at this point: with indiscriminate use, Disc Fixer can render your valuable disks unusable. Take to heart the moral given in Walt Disney's story "The Sorcerer's Apprentice", where an unknowing Mickey Mouse causes havoc when he plays around with a wizard's wand. However, there is little danger if you first experiment with back-up disks.

In the hands of a knowledgeable hobbyist, Disk Fixer is a very powerful tool. The curious experimenter will have many hours of enjoyment with this software; the reckless user could reduce his disk library into a Tower of Babel.

I discovered only one very minor flaw in Disk Fixer: when you want a printed record of a disk sector and you first enter the device name of the printer, Disk Fixer does not check to see if the specified device exists. Since you are only prompted one time for the name of the output device, you must quit the program and reload it in order to correct an improperly entered device name. Other than this one slight problem, the program is very well done.

Navarone Industries is one of the most innovative companies making hardware and software for the Home Computer. I look forward to their next product release.

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USING AND PROGRAMMING THE TI-99/4A A BOOK REVIEW

By Dana Nichols
Managing Editor

As more and more written material becomes available for the Texas Instruments 99/4A Home Computer, we are now faced with the task of filtering out the good material and discarding the rest. One publication that has risen to the surface is ***Using and Programming the TI-99/4A, Including Ready-To-Run Programs,*** by Frederick Holtz, published by TAB BOOKS, Inc. This informative, easy-to-read instruction manual is a must for the new 99/4A owner and novice programmer.

As with nearly all publications, this manual contains an introduction. However, this introduction is unique in that it explains its viewpoint. While Holtz endorses TI's manual and its method of easy-to-follow instructions and definitions before usage, he explains that this manual is designed to tell you about the TI 99/4A from a user's standpoint. Holtz answers questions the novice programmer is most likely to ask, and throughout the book, one gets the impression that he does more than explain how to use and program the 99/4A; he provides accompanying background material crucial to our understanding of the computer. Although the book contains 216 pages, its readability enables one to comprehend quickly and understand completely.

In addition to the introduction, chapters one and two provide a detailed description of the TI 99/4A and its accompanying accessories. Where needed, diagrams serve to clarify descriptions and photographs also appear throughout the publication.

When providing information concerning accessories, Holtz attempts to help the reader decide if he needs that accessory and provides examples of the accessory's uses. Holtz remembers who he is writing to; the average 99/4A owner. However, more advanced-level users will also find this book a useful reference tool.

In chapters three and four, the 99/4A owner gains an understanding of the computer's language, BASIC. At the beginning of chapter three, Holtz explains his intentions; an overview of TI BASIC and an explanation of what each command, statement, and function causes the machine to do. For example:

"**CALL CLEAR** — The CALL CLEAR subprogram clears or erases the monitor screen. A CALL CLEAR command is often issued at the beginning of a program to clear the screen. Without this command new characters are added at the bottom of the screen, preceding lines above them continue to move upwards on the screen. When the screen is full the uppermost line scrolls off the top of the screen. With the CALL CLEAR subprogram the screen clears immediately, thus decreasing screen congestion."

The entire chapter is devoted to listing each command, statement and function and their purpose. Where necessary, program demonstrations are illustrated.

Chapter four also contains an explanation of its purpose: "this chapter will help you decipher and understand the use of the TI BASIC commands, functions and statements in chapter three and show you how to begin writing programs step by step."

Although presented in a tutorial format, ***Using and Programming the TI-99/4A*** is written in a conversational tone. Throughout the book, Holtz is talking to you, the 99/4A owner.

Holtz seems to read the owner's mind and predicts questions and problems the reader may encounter. By the time the reader is finished with chapter four, he is comfortable with his 99/4A and ready to tackle more difficult programs.

Chapters five and six deal with specific aspects of the 99/4A, namely graphics and error messages.

Chapter five, concerning graphics, begins with an explanation of the screen coordinates of the 99/4A. For example: "When discussing display screens, we refer to a horizontal line of blocks as a row and a vertical line as a column." Again, one gets the impression that Holtz is not merely saying "here's the 99/4A screen," but also saying "here's why it's like it is."

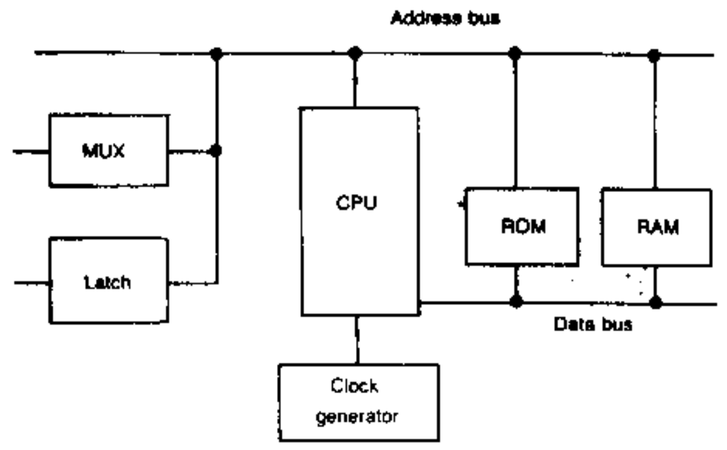
In addition to accompanying illustrations (see insert) instruction is provided concerning colors and sound. At the end of chapter five, an actual program called "Shooting Gallery" is shown that includes the use of graphics, color and sound. Although simple, the program runs well and provides entertainment for the novice programmer.

Error messages are the topic of chapter six. Holtz explains the types of error messages one can expect to see, the context in which they occur and are listed under one of the following: ENTERING ERRORS, SYMBOL TABLE ERRORS, and PROGRAM RUN ERRORS. For example, under ENTERING ERRORS:

"***MEMORY FULL*** — This means the available memory (RAM) has been exceeded by the line you just added. You can try to remove unnecessary portions of your program or add a memory expansion option."

The inside workings of the TI 99/4A are discussed in chapter seven. As Holtz explains, the novice programmer may not understand this chapter, but more serious programmers, or those contemplating writing programs in machine language will consider this section very useful. Material contained in the chapter was obtained from Texas Instruments and from ***Microprocessor Cookbook***, by Michael F. Hordeski, published by TAB Books, Inc. The heart of the TI 99/4A is its TMS9900 microprocessor, a single chip 16-bit central processing unit which was produced using NMOS silicon-gate technology. This chapter deals extensively with the TMS9900's architecture, explains its instruction set, including a summary illustration, and shows a demonstration and description of its routines. (see diagram)

Chapter eight provides the reader with the chance to demonstrate his understanding of the 99/4A. Twelve relatively short programs provide the programmer



with a means of practicing typing in programs and seeing them run. In addition, the programmer can modify the programs to satisfy his individual needs. Documentation and instruction accompany each program; Holtz has again anticipated possible errors, and is "standing by," ready to help the programmer to remedy his problem. The documentation also clarifies particular statements and explains their functions. For example, one of the programs listed is called "Numbers Guess Game." The following is accompanying documentation:

"Let's see what happens when your guess is not equal to the number the computer has chosen. Line 170 tests for a condition of B less than A. When B is less than A, there is a branch to line 230, and the screen displays a prompt telling you your guess is too low."

A few of the additional programs include Fortune Teller, a simulation of a fortune-telling booth seen at carnivals; Alphabetizing Program, whereby one can enter up to 100 items, and upon command will list them in alphabetical order, — the program then alphabetizes the items, and upon command will list them in alphabetical order; and Keyboard, a simple program that will turn the 99/4A into a simulated organ or piano keyboard.

Chapter nine details other program languages such as TI Extended BASIC, Assembly language, and TI LOGO, while chapter 10 lists a great number of programs available for use with the 99/4A. The programs are listed under the following categories: Programming Aids, Engineering and Math Libraries; Business, Home/Personal, Education, and Games.

The final chapter deals with converting programs devised for other computers to run on your 99/4A. Holtz explains that once one understands TI BASIC, other forms of BASIC language should be relatively easy to decipher. The chapter contains many statement, command, and function modifications that may be needed to convert a program language to TI BASIC.

An extensive glossary, appendices, and index complete the book, leaving virtually no stone unturned. Available for $16.95 hardcover, or $9.95, paperback from TAB Books, Inc., Blue Ridge Summit, PA, 17214, ***Using and Programming the TI-99/4A, Including Ready-To-Run Programs***, is one of the most complete instructional manuals available on the market today.

SAFEGUARDING YOUR EXTENDED BASIC PROGRAMS

A "RIGHT ON" APPROACH

By John Phillips

If one is into application programming on the TI-99/4A Home Computer, a most frustrating event is that familiar BEEP when an error or a warning is issued from the TI BASIC interpreter. This becomes especially bothersome when one is attempting to write a piece of software for publication and finds out later that the package "crashed" with one of these nasty villains. Dividing by zero or overlapping a screen boundary with a CALL VCHAR statement are common occurrences of these conditions.

TI Extended BASIC has provided the error-conscious programmer with a method of dealing with these unexpected errors or warnings in a most convenient manner. I, of course, am referring to the Extended BASIC statements of ON WARNING and ON ERROR. Also, later on in this article, I will be discussing the properties of the ON BREAK command, a handy tool in itself.

An earlier publication of this magazine contained an Extended BASIC program that I had conceived and written entitled "HELICOPTER ATTACK". The first few lines were nothing more than a comment block depicting the author (me) and credit to this publication. However, the next three lines were the basis for a 100% error-free program. These statements became a must when I was dealing with statistics (displayed after every "kill") and possible sprite boundary violations. Let me explain.

The ON WARNING statement gives the Extended BASIC programmer three outlets or options in case of a warning (i.e. dividing by ZERO). The first of these is the PRINT option. This is the standard default for the Extended BASIC error handler routine. You need not specify this option because it will automatically take place in the event of a warning. The standard warning tone and message will be issued. Try this example:

```
100 A=5/0

110 PRINT A

120 END
```

Notice how the

```
* WARNING

  NUMERIC OVERFLOW IN 100
```

message is immediately displayed on the screen. The answer is displayed, but the program is NOT terminated...it will continue as usual.

Let's suppose one wanted to stop the program on any warning for debugging purposes. Then, one should use the STOP option. Add this line to the program:

```
90 ON WARNING STOP
```

Once again the * WARNING is displayed, but the value is not. The program is aborted at the time of the warning. One may use the line number given to trace the statement that caused the particular warning to occur.

Now there are times that one wishes to ignore various warnings altogether. The NEXT option is the answer to this problem. Try this classic example:

```
100 ACCEPT AT(12,12)BEEP
    VALIDATE(DIGIT)SIZE(1)
    ERASE
    ALL:N
110 END
```

Instead of entering something when the cursor appears, just hit the ENTER button and see how the VALIDATE(DIGIT) clause does not cover this instance. To make a program "user-friendly", common warnings like the above must be eliminated. The ON WARNING NEXT statement can help control unforeseen warnings and safeguard one's program from crashing. Enter this line and run the program again.

```
90 ON WARNING NEXT
```

Now when the ENTER key is pressed, the cursor remains in its waiting position with no warning message given. "HELICOPTER ATTACK" uses this clause ferociously on all its inputs. True, the ACCEPT AT clause is powerful, but the ON WARNING NEXT clause finishes it off, making an input virtually "fool-proof".

The next of the safeguards is the ON ERROR command, which is a most powerful tool for Extended BASIC commands. Similar to the ON WARNING statement, this command has two options also.

The first of these, the default, is the STOP option. The STOP option will cause a BEEP to sound and an error message to be displayed, just as the error handler will do without this statement. Of course, program execution will be halted. Once again, this statement is not necessary unless preceded by another form of the ON ERROR statement and one wishes to change the error logic.

The second of the two options, and the most powerful, is the ability to transfer control to a line number in the event of an error. This command is not treated like a GOTO command, but rather as a GOSUB. Therefore, a RETURN must terminate the error-handling subroutine. Here is another powerful feature of Extended BASIC in the fact that the RETURN clause has three options. One choice is to return to another line number, another is to return to the very next statement following the error for execution. The final option is to return to the statement that CAUSED the error and re-execute. With these in mind, one might see how a program can be structured to include error subroutines for every possible error in the program. Allow me to give you an example in "HELICOPTER ATTACK".

At certain points in the program, an enemy plane comes out to bomb a base shooter which is trying to destroy enemy helicopters. Because of sprite automotion, the bomb that the plane drops must be positioned 5 pixels ahead of the plane itself...this causes an effect that makes the bomb look like it has been "dropped" instead of just appearing on the screen. Now, to determine when the bomb must be dropped, I calculate the position of the base shooter and when the enemy plane is directly over it, the bomb is released. An error developed when the base shooter was to the extreme right of the playing screen (past pixel 252). Recalling that I dropped the bomb 5 pixels ahead of the ship, this would put the bomb on pixels 257 through 261??!? Of course, this would create a noticeable error, seeing that the sprite would be on illegal pixels.

To correct this, I included an ON ERROR subroutine to handle this particular bug. My ON ERROR line merely branched to a subroutine consisting of two statements.

```
8000 ON ERROR 8000  !IF
     ERROR OCCURS AGAIN,
     COME RIGHT BACK HERE

8010 RETURN NEXT    !WAIT
     UNTIL THE BASE SHOOTER
     MOVES
```

The subroutine's purpose was to reassign the error-handling address back to the same subroutine and return to the next statement, allowing the base to move into an acceptable range for the bomb sprite. With this routine, I never had to worry about sprite boundaries. Line 8000 is necessary because once an error occurs, the error-handler reverts to

the default action, which is STOP. One must reset the error vector over and over again, if needed.

Try this example:

```
100 CALL CLEAR
                  !CLEAR SCREEN
110 RANDOMIZE
                  !NEW SEED
120 X=INT(RND*50)+1
                  !RANDOM COLUMN
130 CALL VCHAR(1,X,42,24)
                  !PRINT A COLUMN
                     OF CHARACTERS
140 GOTO 120
            !AND DO IT AGAIN
```

One should discover an error as soon as you run this program from a "BAD VALUE IN 130"; which means that a screen boundary has been violated.

Now, add these program lines:

```
90  ON ERROR 160

160 !* ERROR HANDLER
                     SUBROUTINE *

170 ON ERROR 160

180 RETURN NEXT

190 END
```

Upon execution, any bad values generated for the VCHAR statement will be ignored and control will be passed back to statement 140. With this, one never has to worry about the X-value being too large or too small. This task can be accomplished in another way, by using the RETURN statement with a line number following it. For example, if line 180 were changed to:

```
180 RETURN 140
```

It would accomplish the same task as the RETURN NEXT statement. The RETURN NEXT command tends to be more powerful in the fact that it doesn't need a hard-coded line number to return to. By structuring a module correctly, the RETURN next could be used almost exclusively. However, some special conditions do arise!

Enter this example:

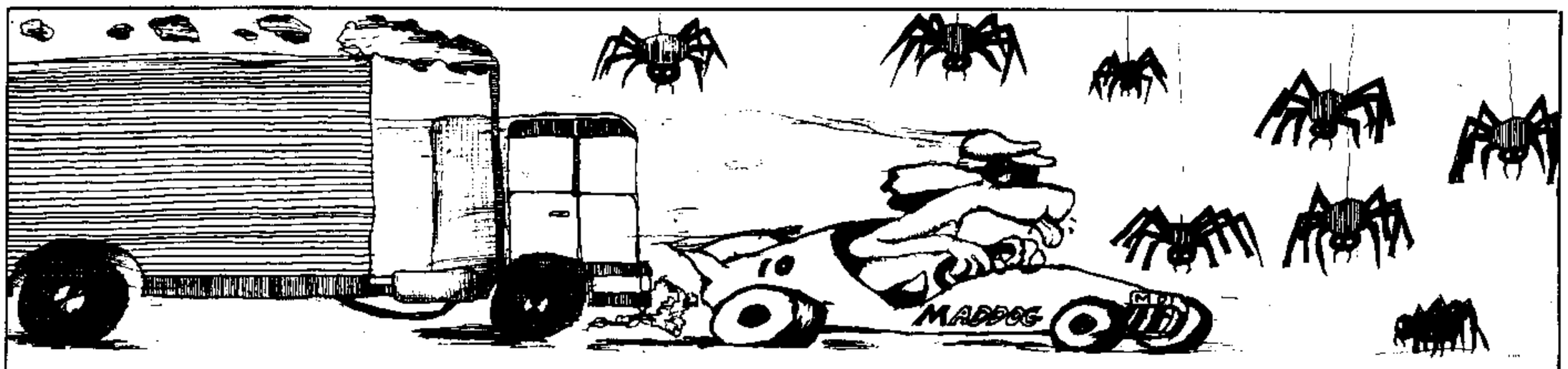
```
100 CALL CLEAR

110 INPUT "ENTER A
                        NUMBER: ":N$

120 ON ERROR 180

130 N=VAL(N$)

140 ON ERROR 200

150 CALL HCHAR(12,N,65,32)

160 ON ERROR STOP

170 GOTO 110

180 N$="1"

190 RETURN

200 RETURN NEXT
```

In this example, let's assume that a user is to input a number, and one is going to print a string of "A" across the screen on row 12 and whatever column the user inputs. Line 120 sets the initial error handler to tranfer to line 180, which is a special case. If the user inputs a bogus number (such as a character string), this module will set it always to 1 and re-execute line 130. Then, line 140 transfers control upon error to line 200. If the input is not a valid column according to the HCHAR command, line 200 will cause the interpreter to skip line 150 and execute line 160. If, by some chance, the user creates an error on the input statement in line 110, the error handler will stop the program. So, one can see that special error handling subroutines can be constructed to handle virtually any potential errors that may arise.

The last item that I would like to cover is the ON BREAK command. This also has three options. The STOP option is the default, and generally is not needed in the program. The ON BREAK statement performs two tasks: one is control of the external break (shift 'C' on the 99/4 and function 4 on the 99/4/A) and the other is to overcome breakpoints set within the program.

If one has several BREAK commands entered into the code, the use of the ON BREAK NEXT causes those break points to be ignored. This is handy when a large program has several breaks at critical spots and one doesn't want to eliminate (and find) all the BREAK lines for just one particular test. However, the most useful function of this command is the prevention of the external break. In "HELICOPTER ATTACK", I purposely commented the ON BREAK NEXT statement for the benefit of those people wishing to type the program in themselves. It becomes very annoying to discover a small "bug" in something and not have the capability to stop the program. For the final version of the program, when one is ready to submit or market the package, this option is what I call a "very professional touch".

I certainly hope this documentation will provide some insight into the world of program safeguarding. The user community can be vicious on a programmer, so not only does he have to protect the user from being beaten by the program, he must also protect his own integrity and reputation.



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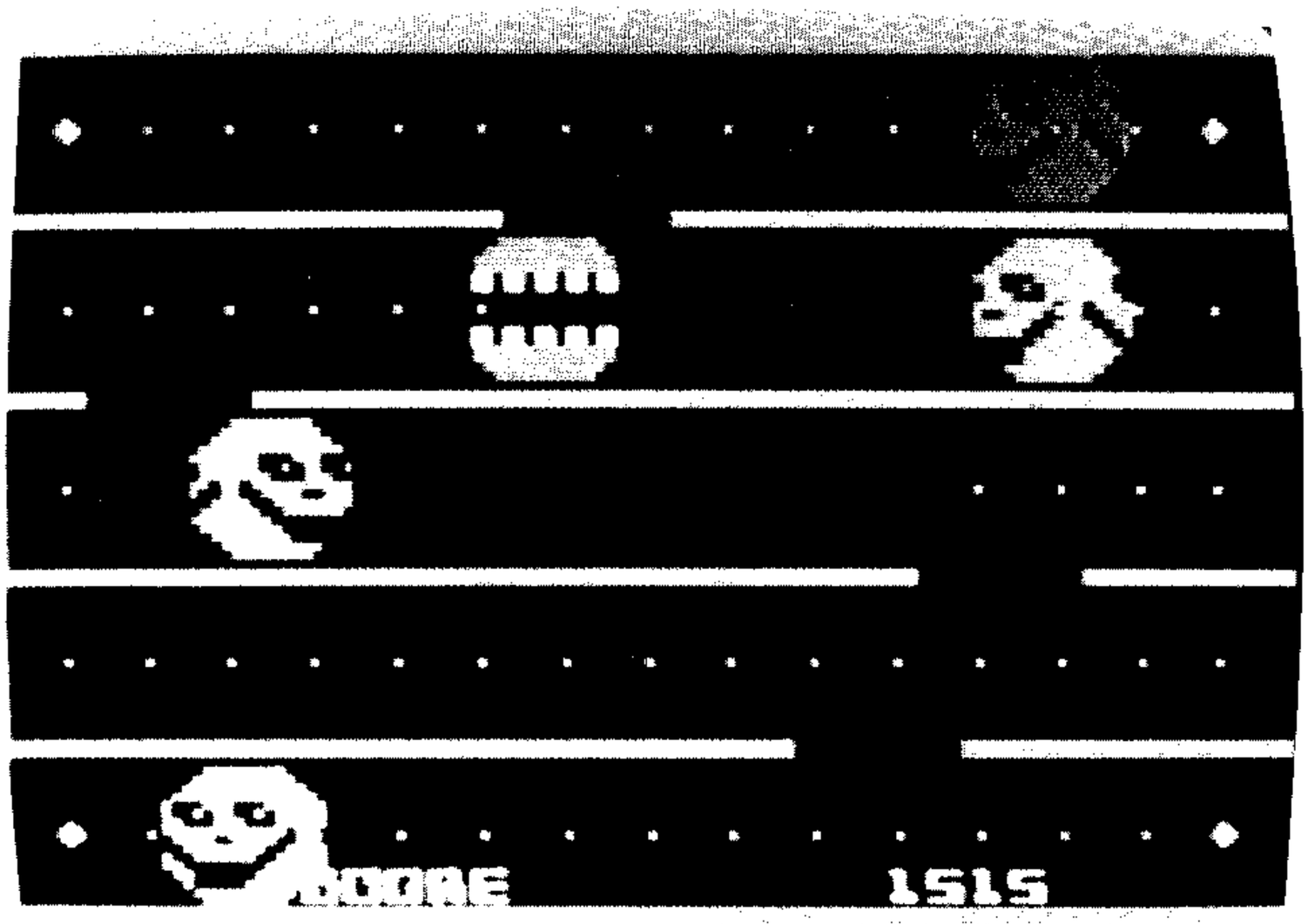
NEW SOFTWARE RELEASES

TEXAS INSTRUMENTS/ SIERRA ON-LINE

Sierra On-Line has reached a cooperative agreement with Texas Instruments whereby TI will manufacture and market certain software designs created and supplied by Sierra On-Line.

At least one title, **Jawbreaker™**, will be released later this year. Jawbreaker features tiers of rotating, multi-colored dots and special treats that the Jawbreaker must devour as it races through a maze of shifting walls and doors. The score climbs as players use cunning and strategy to avoid the "Grinning Gobblers," who approach from either side to attack them. By eating energizers, the Jawbreaker has temporary energy to destroy the Gobblers. But watch out -- the energy is short-lived. The Gobblers will then turn and try to destroy the Jawbreakers. Jawbreaker's retail price is $39.95.

Jawbreaker is a trademark of Sierra On-Line



TEXAS INSTRUMENTS/ SPINNAKER

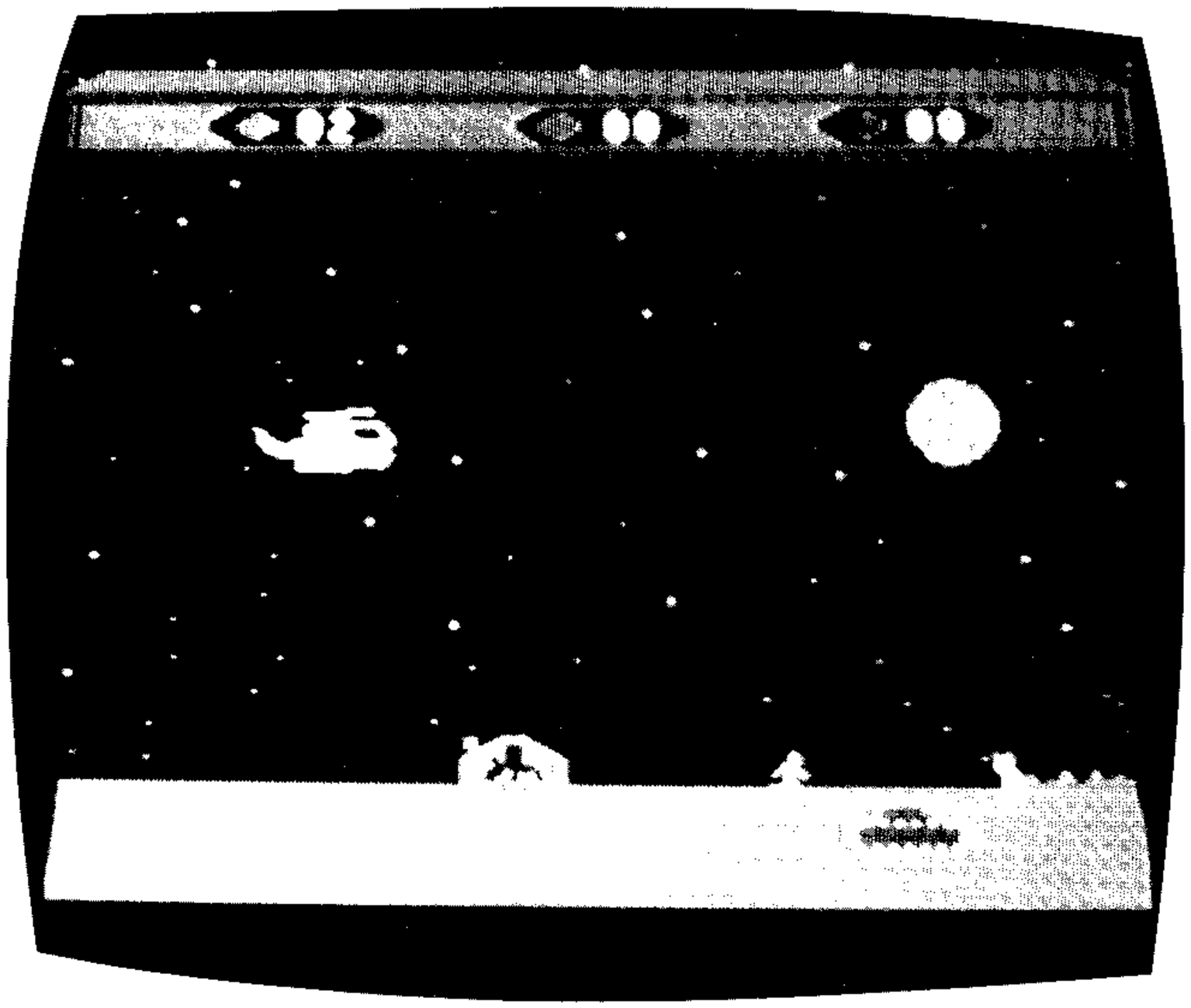
Two educational software packages developed by Spinnaker Software Corporation, **FaceMaker™** and **Story Machine™**, will now be manufactured by Texas Instruments.

FaceMaker allows children of ages 4-12 to make a variety of faces and animate them while learning the rudiments of computing. The package also helps children with visual sequential memory (remembering the order in which things are seen) and auditory sequential memory (remembering the order in which things are heard). Story Machine is an educational tool that helps children of ages 5-9 learn to write sentences, paragraphs, and simple stories, and then allows them to watch the stories come to life on the screen through full color graphics and sound.

Both FaceMaker and Story Machine software packages will be available during the fourth quarter of 1983 at a suggested retail price of $39.95.

Facemaker and Story Machine are trademarks of Spinnaker Software

TEXAS INSTRUMENTS/ BRODERBUND

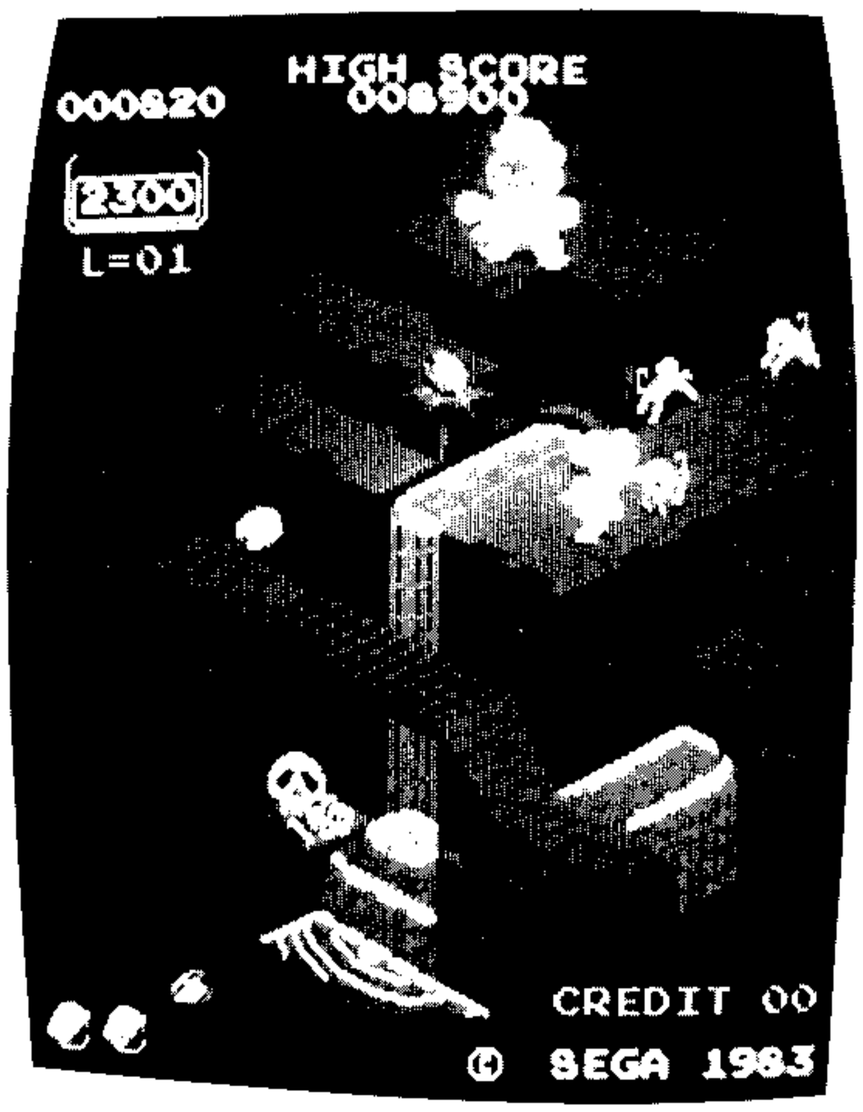


Texas Instruments and Broderbund Software have reached an agreement whereby TI will manufacture two action games from Broderbund, **Choplifter™** and **David's Midnight Magic™**, available in Solid State Software cartridges.

In Choplifter, players command a daredevil rescue chopper while fighting off enemy jet fighters, air mines, tank fire, and air-to-ground missiles. David's Midnight Magic is an award-winning high resolution pinball game with dual flipper controls, upper and lower playing levels, tilt mechanism, rollovers, multiple ball play, electromagnetic deflectors and many special effects. Planned for fourth quarter distribution, both games are available for $39.95. Choplifter is by far one of the best action games we here at the International 99/4 Users-Group have seen. Although the graphics do not rival TI's most popular title, PARSEC, the overall action and enjoyability of this game makes up for the lack of graphic quality.

Choplifter and David's Midnight Magic are Trademarks of Broderbund Software

TEXAS INSTRUMENTS/ SEGA



The video game software designs from Sega Enterprises, Inc. will soon be manufactured by Texas Instruments. They are **Congo Bongo™**, Paramount Pictures' **Star Trek™** and **Buck Rogers: Planet of Zoom™.**

Congo Bongo takes players on a trip into the jungle in this cartoon-like adventure that will have players climbing impossible cliffs, crossing treacherous lakes, dodging coconuts, leaping over poisonous snakes, and outsmarting charging rhinos.

Star Trek Strategic Operations Simulator gives players a birds-eye view of what it would be like to command the Starship Enterprise. Players decide where and how to use Warp Dive, Impulse Power, Photon Torpedoes, and Phasers as they battle with the Klingons, the Federation's deadliest rivals.

In Buck Rogers: Planet of Zoom, the player is Buck Rogers, and the video screen is the window to adventure and excitement. The player must guide the ship through enemy infested surface channels and Smasher tunnels, around life threatening city spires, and against an endless array of bizarre alien ships. As pilot, the player is the only person who can eliminate the evil Source Ship.

Price and availability of the three packages to be announced.

Congo Bongo is trademark of Sega Enterprises, Inc.; Star Trek is trademark of Paramount Picutes; and Buck Rogers is trademark of Dille Family Trust.

TI EDUCATIONAL SOFTWARE

Three new educational software packages from Texas Instruments for the TI 99/4A Home Computer available in Solid State Software format include the following:

Early LOGO Learning Fun

A selection of the best LOGO procedures developed by the Lamplighter School in Dallas. The package includes five different activities: Build, Park, People, Draw, and Dallas, in which children ages 3-6 can use the LOGO computer language and such basic command words as FORWARD, BACK, LEFT and RIGHT to make colorful graphical events occur on the screen. Suggested retail price: $39.95

The remaining other two packages will be manufactured by TI under license from Developmental Learning Materials, Inc. (DLM).

Word Radar

Provides players of all ages with a motivating and challenging means of practicing recognition and discrimination skills with a basic vocabulary. Players are control tower operators who must scan words in four quadrants for a few seconds before the words disappear. Players must then scan the four quadrants with a radar beam to locate words that match the word at the bottom of the screen. This game features fast action, colorful graphics, and an exciting arcade game format. Joysticks are recommended for Word Radar, available fourth quarter.

Word Invasion

A friendly alien octopus protects her underwater territory from a screen full of invading words with a magic ring that moves from arm to arm, firing at approaching words. (See photo) To fire, the player must match the appropriate word with the part of speech that appears below the alien octopus. Players practice identifying the six major parts of speech in this DLM game featuring fast action, colorful graphics, and an arcade game format designed to motivate children and teach them language skills.

Available fourth quarter, Word Invasion, along with Word Radar and Early LOGO Learning Fun, have suggested retail prices of $39.95.

TEXAS INSTRUMENTS/ IMAGIC

Texas Instruments and Imagic have announced an aggressive, long-term cooperative venture to develop entertainment and educational software for the TI 99/4A. The agreement calls for a minimum of seven Imagic/Texas Instruments title in the first year, including translations of Imagic's popular **Demon Attack™,** and **Microsurgeon™**, as well as the games **Fathom™** and **Flap™**. All games will employ the voice synthesis technology developed by TI. Scheduled availability for Imagic products is estimated to be November and suggested retail prices are $39.95.

TEXAS INSTRUMENTS

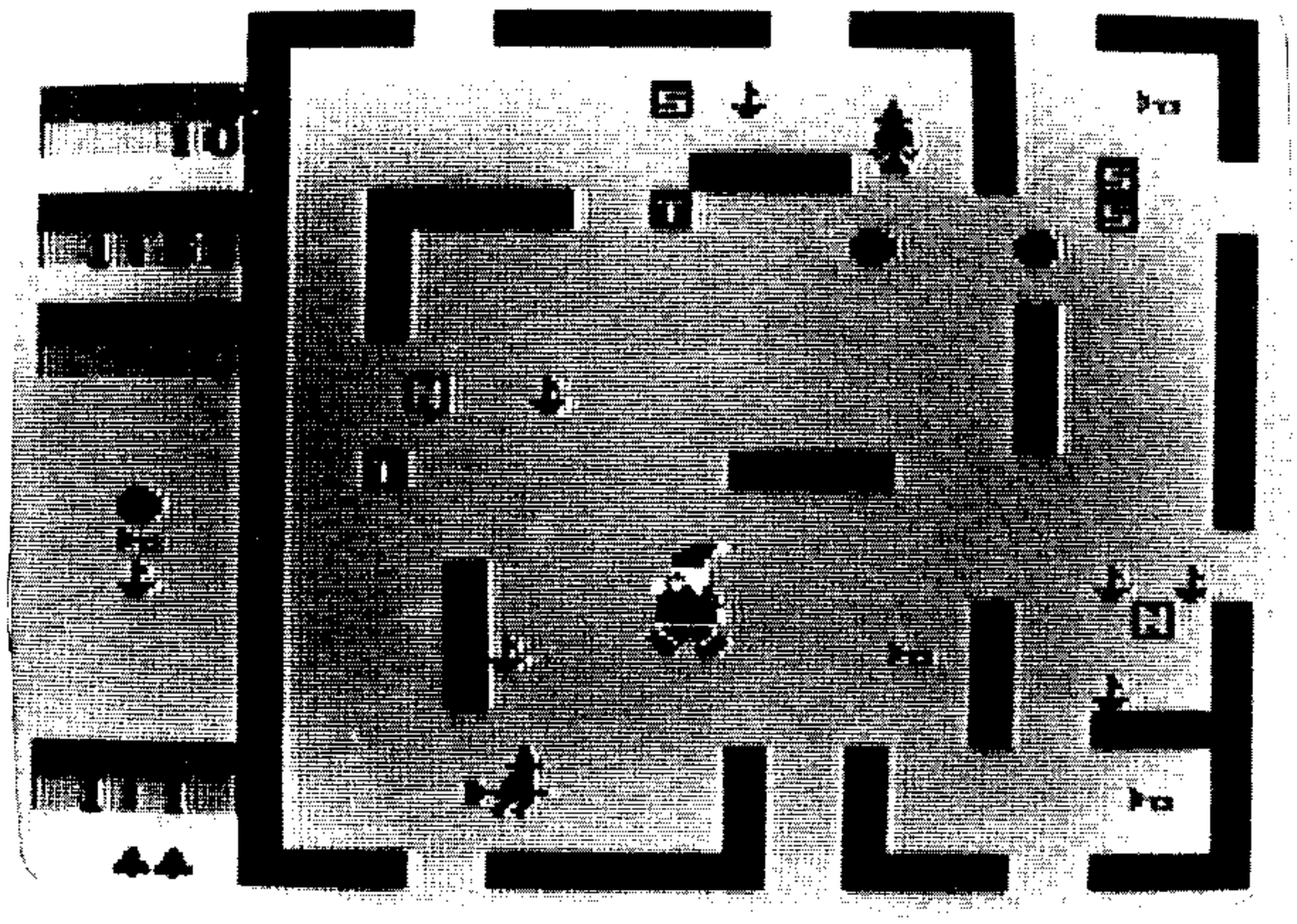
Hopper

Hopper may be the most exciting of all of the new Solid State Command Modules to be introduced by Texas Instruments this fall. Written by TI in-house programmers, John Phillips and Michael Archuleta, Hopper will fascinate its owners with its graphic capabilities and speed of play.

Based on the same theory as the popular arcade game, Pengo, the object is to trap and destroy three moustachioed menaces before they get to the lovable central character, Hopper, the Boxing Kangaroo. A two player game, Hopper shows by far the best graphics and speed capabilities since Parsec. Although Hopper can be played using keyboard entry, a good set of joysticks is a must for this game.

In our opinion, Hopper will be by far the best seller of all Solid State Command Modules offered by Texas Instruments during the third and fourth quarters of this year.

FUNWARE



St. Nick

A new video game from Funware, a subsidiary of Creative Software, is now available for use on the TI 99/4A Home Computer.

St. Nick is a game that can be enjoyed year-round and offers an interesting twist on the Christmas theme (see photo). Instead of helping Santa load the toys on the sleigh, elves scatter toys everywhere. With time winding down, the player must use the joystick skillfully to manipulate Santa through a maze, dodging flying witches and picking up all the toys in a given order. If toys are picked up in the wrong sequence, or if the witches catch Santa, elves return to the screen and scatter more toys.

Mixed in with sailboats, dolls, balls and trumpets are letter blocks marked with A, N, T or S. If Santa can collect all the blocks to spell "Santa" a "magic moment" begins: the witches are momentarily frozen while Santa picks up as many toys as he can. Santa is allotted only three Christmas chances to pick up the toys. There are seven screens for six levels of skill in the game.

A pause feature is built into St. Nick, enabling a player to freeze the action by hitting the space bar. To resume action, a player merely touches any key.

St. Nick and all other Funware products are accompanied by a guarantee to function on all present and future versions of the TI 99/4A, is cartridge-based and retails for 44.95. The game will be available September 15.

Ambulance

A new solid state cartridge release from Funware, **Ambulance** provides a new twist on maze action games. The game is laid out in a colorful grid of houses and businesses in which there seems to be an overabundance of sick and terminally ill inhabitants. The object of the game is to weave your way through inner-city traffic, pick up your patient, and deliver him to the hospital before he expires.

Not only must you avoid oncoming automobiles just prior to entering hospital grounds; there is a railroad track which impedes your progress due to oncoming trains. Skill levels increase as traffic becomes heavier and freight cars are added to the train when patients are delivered safely to the hospital.

This wonderful new game is currently in stock at most retailers and the suggested retail price is $44.95.

Driving Demon

Another new release from Funware that will become available in October. It's an exciting race track setting which places you in the cockpit of an Indy-type racer. Vivid screen graphics enable you as the driver to have a long range scan of traffic that is in front of you on the track. Although the game does not require joysticks they are highly suggested as it makes gear shifting and maneuverability much easier.

As in a real Indy car race, overtaching, excessive speed and reckless driving all pose fatal threats. Fortunately, your racing team has a stable of five vehicles to achieve the ultimate score. A built-in timer adds to the overall excitement of this solid state module and can be played for hours of enjoyment by any family member. The suggested retail price for Driving Demon is $44.95 and availability is scheduled for early October.

ATARI PUBLISHING

Five new cartridge packages are scheduled for release in early November from Atari Publishing. They include **Pac-Man™, Dig Dug™, Donkey Kong™, Centipede™** and **Defender™**. Atari publishing is offering some of America's most popular arcade games for the first time to 99/4A owners. From what we here at the Users-Group have seen of these various packages, Atari is to be congratulated on ingenuity and graphic design.

Pac-Man

Probably the most popular and most imitated maze game, Pac-Man offers excitement for all family members. Obsessed with a hearty appetite, Pac-Man will race across your screen through a maze to gobble up dots while trying to avoid menacing goblins. The Pac-Man module from Atari will offer 19 levels of difficulty, which makes it an excellent product for both the computer novice and experienced arcade player.

Dig Dug

While searching beneath the earth's surface, Dig Dug offers a bounty of fruits and vegetables for its hungry gardener. But watch out, as there are perils of FYGARS and POOKAS whose annoyance will require the players to utilize their playing skills and dexterity.

Donkey Kong

America's most popular rescue game is presented by Atari in this package. The vicarious pleasures of rescuing the fair maiden from Donkey Kong with the assistance of Mario, the fearless carpenter, creates screen after screen of tension and relief. Negotiating the various ladders, gridders, elevators and other perils of treachery make Donkey Kong exciting.

Centipede

Armed with only your "Bug Blaster" you must zap your way through invasion after invasion of creepy crawlers, each with their own unique powers to destroy you. Threatening mushrooms fill the screen to impede your progress in this highly colorful and action-packed arcade game.

Defender

Another of the most popular arcade action games is Williams Electronics' Defender. Licensed to Atari Publishing to be brought to the Texas Instruments Home Computer owner, Defender is one of the most deadly spaceship games ever produced.

Charged with protecting the human race, you must blast space creatures and deliver downed pilots safely to predetermined surfaces. A game of graduated difficulty, Defender is sure to be one of the hottest selling titles for the TI Home Computer this fall.

All Atari packages have a suggested retail price of $44.95. Additionally, several other packages have been licensed to Atari Publishing from Synapse, a major producer of software cartridges for other computer and home video machines. These titles include Shamus, Protector, Picnic Paranoia, and Slime. Details on pricing and release dates of Synapse products are still incomplete.

SCOTT, FORESMAN AND COMPANY

There is a lot to learn in school each day, and no skills are more important to your child's future than those they develop in mathematics. That's why Scott Foresman and Co., a leading producer of educational electronic software, has developed six new solid state modules for the Texas Instruments 99/4A Home Computer.

The new packages currently available from Scott Foresman include **Frog Jump** and **Picture Parts**, dealing with Numbers and Basic Operations, for ages 5-8; Multiplication and Division is covered in **Pyramid Puzzler** and **Star Maze**, for ages 8-11; and ages 11 to adult will enjoy hours of entertainment with **Number Bowling** and **Space Journey** and learn about Decimals/Fractions and Percent simultaneously.

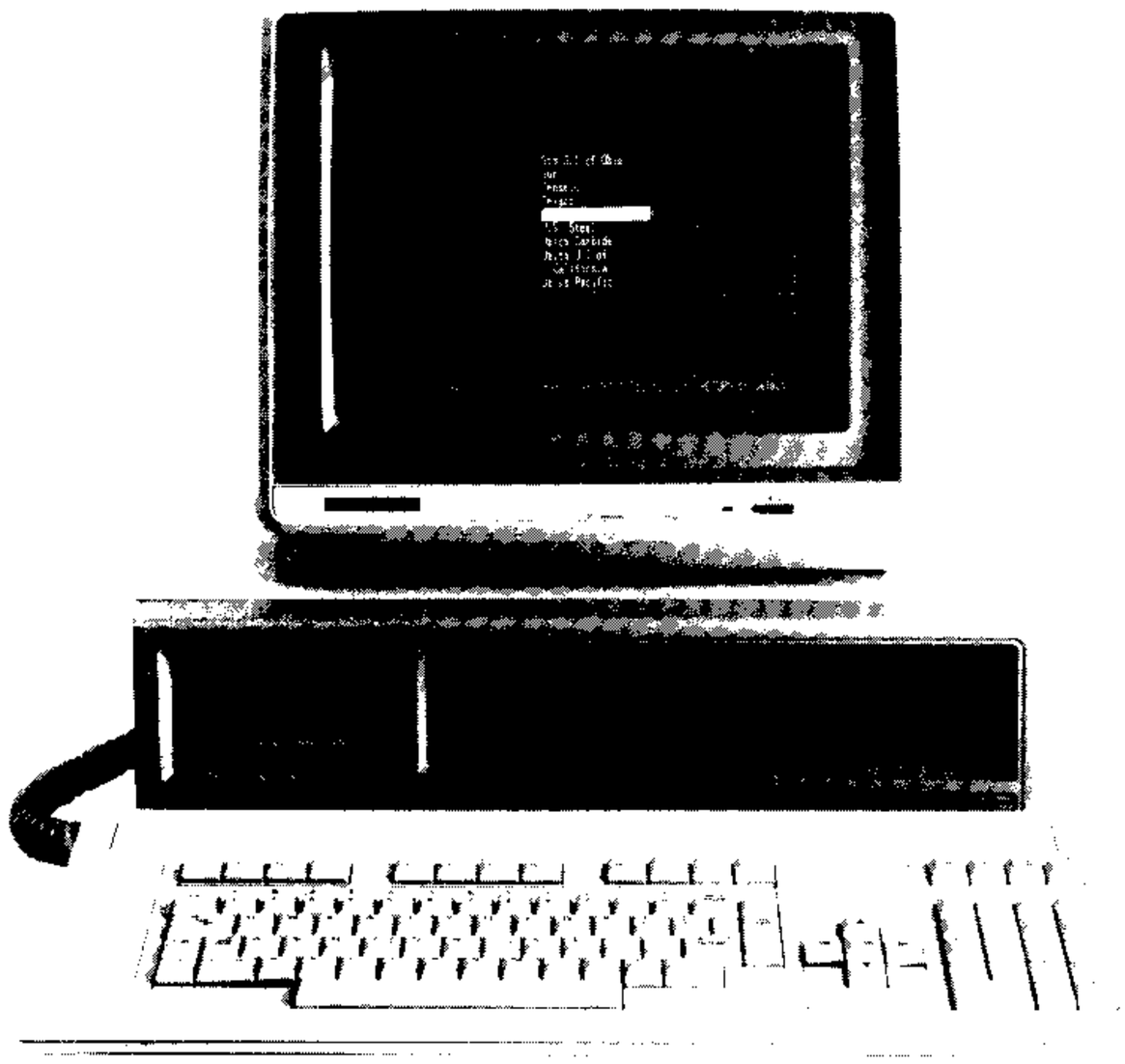
The game format of these new Scott Foresman packages challenge your youngster while developing skills. Outstanding color, music, animation and sound effects will keep your child motivated. All of the packages make ideal supplements to currently produced basic mathematics programs which are now available for the 99/4A. Each package contains a solid state command module and parent guide book. Suggested retail price for all six of the Scott Foresman mathematics action games is $39.95 each.

TI PROFESSIONAL/NATURALLINK

Texas Instruments has announced the release of their first product to use natural language technology that allows users to access the Dow Jones News/Retrieval® service using plain and simple English. The new interface, **NaturalLink,** is the first commercial result of TI's extensive research in artificial intelligence.

Designed for use on the TI Professional Computer, **NaturalLink** makes database access extremely easy and virtually eliminates the possibility of making an input error as it prompts users to construct English questions to the well-known Dow Jones News/Retrieval.

Dow Jones News/Retrieval was chosen as TI's initial **NaturalLink** offering because of its importance as a business resource, and while the initial version is in English **NaturalLink** is designed so that it is easily convertible to foreign languages such as French or German. With the built-in intelligence that actually constructs the command parameters, the user will always ask a question that the computer can understand. Very little typing is required, and command errors are virtually eliminated.



The **NaturalLink** screen is divided into windows, each containing a list of words or phrases for a portion of a command. The user simply scrolls to one of the options and hits the RETURN key to make the selection. Then, based on what the user has chosen, the next set of options is displayed. Each element

selected builds a portion of a plain English sentence used to instruct the computer.

As a command is constructed, it appears in a window across the top of the display screen. Individual function keys allow a user to backtrack a phrase at a time or to erase the entire question and start over. A command is submitted with the ENTER key. **NaturalLink** to Dow Jones News/Retrieval contains a short, built-in tutorial and "help" facilities that are available as on-going aids while using the system. A built-in search capability finds stocks quickly by matching initial characters.

A total of 22 data bases in Dow Jones News/Retrieval allows individuals to access data such as headlines and articles from *The Wall Street Journal, Barron's* or the Dow Jones News Service. In addition, questions can be built to access company reports, movie reviews, or sports and weather information. For example, the question "What are the headlines covering the topic of computers?" can begin an inquiry into a number of topical news stories.

Priced at $150, **NaturalLink** to Dow Jones News/Retrieval will be available from TI in August and includes a free subscription to Dow Jones News/Retrieval, a $50 value, one free (non-prime time) hour of use of the Dow Jones News Retrieval database, user documentation, and two diskettes with the application, an on-line tutorial and help function. **NaturalLink** requires 256K of memory, an internal modem or a serial board with an external modem to connect to the News Retrieval database.

For more information, contact Texas Instruments, Data Systems Group, P.O. Box 402430, H-666-A, Dallas, TX 75240, 1-800-527-3500, or Dow Jones & Company, Inc., P.O. Box 300, Princeton, NJ 08540, 1-609-452-2000.

Dow Jones News/Retrieval is a registered trademark of Dow Jones & Company, Inc.

TI PC/ OCTACOMM

Designed to integrate the Texas Instruments Professional Computer with the Texas Instruments Business System computers, two new OCTACOMM products from Houston Computer Services help connect these complementary processors into a fully functional system.

OCTACOMM/PC is a software product which executes on the TI Professional Computer. A smart TTY communications package, OCTACOMM/PC converts the TI PC into a CRT terminal, providing interactive access to any computer capable of using dialup or direct connect RS 232C terminals. By emulating the TI940 and TI Business System terminals, OCTACOMM/PC allows the TI PC to be used as a replacement for TI911 and TI940 terminals on the TI System 300, 600, 800, and DS 900 computer systems.

OCTACOMM/PC features include: full screen control, DSR940 compatible, business graphics, associated printer, and block-mode file transfer.

OCTACOMM/LINK

OCTACOMM/LINK is a system-level software product which executes on TI990-based computer systems. OCTACOMM/LINK implements a block-oriented file transfer protocol which operates over asynchronous modems to transfer data files from the TI990 to the TI PC or other TI990's. Unlike 3780, OCTACOMM/LINK operates interactively with the OCTACOMM/PC software which allows the direct control of application tasks in addition to file transer capability.

The OCTACOMM/PC and OCTACOMM/LINK software products operate using standard Texas Instruments hardware and software and do not require a special sysgen.

OCTACOMM/PC software license, priced at $125, and OCTACOMM/LINK, which sells for $1000, are available separately and ready for immediate delivery. Contact Houston Computer Services, Inc. at 11221 Richmond Avenue, Building C, Suite 101, Houston, TX 77082, 713-558-9900.

OCTACOMM is a trademark of HOUSTON COMPUTER SERVICES, INC.

LIBRARY CORNER: CONQUEST OF SPACE AND TIME

By Guy S. Romano
Senior Staff Editor
116 Carl. St.
San Francisco, CA 94117
(415) 753-1194

Sounds like it might be an interesting game, doesn't it? Well it can be a game if you want it to and that's what I want to discuss with you in this article. It is really quite the way to go about the conquest of more memory space and getting back more of your precious time when you are working with programs.

What we will discuss is something that everyone has heard about but still are not quite sure what it is and just what advantages it offers. What I am talking about is Extended BASIC, the TI cartridge that is probably the wisest investment you can make after buying the computer itself.

Of the hundreds of calls we get from users it is quite surprising to find how little people really know about it. The reason for this, I feel quite positive, is that Extended BASIC has never been highly merchandised by Texas Instruments like many of the games, etc. It is also most likely due to the fact that most people writing about the TI system presume that everyone will automatically know that Extended BASIC is an extended form of BASIC! And THAT is the problem. Telling me that Extended BASIC is an extended form of BASIC tells me nothing and certainly does not serve to arouse any great interest in me. So, let's talk about what this "extension" really is.

Extended BASIC consists of a set of BASIC commands and functions that give additional power and flexibility to the BASIC programming language. If the information is correct, it adds another 32K of ROM to the 26K already in the console. It allows us to do things very easily that in regular console BASIC are roundabout and cumbersome. In fact, that many BASIC Programs run so well must be attributed to the creativity of programmers and not to the language itself. Let's look at a simple example. Remember that in console BASIC you may have only one statement per line and IF THEN ELSE statements may only refer to line numbers and nothing else.

In regular BASIC we will have:

```
10 IF A$="NO" THEN 90

20 LI=0

30 NM=0

40 RT=0

50 CALL CHAR
              (1,1,32,768)
```

```
60 CALL SOUND(1000,110,
       2,220,1,440,0)

70 PRINT "LET'S PLAY
                AGAIN"

80 GOTO 5

90 CALL CLEAR

100 PRINT "SEE YOU LATER"

110 END
```

To rewrite this efficiently in Extended BASIC we will need only one line:

```
10 IF A$="NO" THEN CALL
CLEAR :: PRINT "SEE YOU
LATER" :: END ELSE LI,
NM,RT=0 ::CALL HCHAR(1,
1,32,768):: CALL SOUND
(1000,110,2,220,1,440,0)
:: PRINT "LET'S PLAY
AGAIN" :: GOTO 5
```

As you can readily see, Extended BASIC lets you combine many statements together in one line. Lines 20, 30, and 40 can have all variables given the same value in one statement by chaining the variable names with a simple comma. Not only does this program conserve space in memory and give you the inherent speed of Extended BASIC, it gives a further speed increase by virtue of the fact that it is interpreted in one shot.

What does that mean? BASIC is an "interpreted" language. This means that while the program is running the computer looks at each line in sequence, one at a time, and interprets it into machine language (the only language that a computer really understands — chains of 1's and 0's). After the "interpretation" or translation, the computer can then take the required action. Since the interpreter works on a LINE BY LINE basis, you can see that reading and translating one line is much faster than doing the same thing for 10 lines. So you not only get a speed increase from Extended BASIC, you get that added boost of efficiency while conserving space and YOUR TIME.

Load a rather lengthy BASIC program into memory sometime. Then attempt to edit a line with a simple change. You will find that it can take as long as 20 seconds BEFORE the cursor is flashing on the screen again. Now do the very same thing but load the program into Extended BASIC. you will find that it takes about 1.5 seconds to get the cursor back. Generally speaking, Extended BASIC runs at least 20 times faster than console BASIC. This is a very important concern in a lot of games where the excitement comes from the quick actions.

Most people don't realize it (because no one ever makes a point of telling them) but almost all programs written in console BASIC will run in Extended BASIC and do so much more efficiently. The only conflict arises in those programs that use graphics characters with a number higher than 143 or where another cartridge must be plugged into the GROM slot for special use. An example of this is in speech production using the Terminal Emulator II. And even if the program does not RUN through Extended BASIC, it is always wise to EDIT it that way because of the increase in speed and the versatility of added functions of Extended BASIC, like duplicating a line without retyping it or changing a line number without redoing the whole line. Many people are genuinely shocked when I tell them that, at Library Services, we only use console BASIC when we have to run a "Basic only" game. Extended BASIC is automatically chosen everytime the system is turned on.

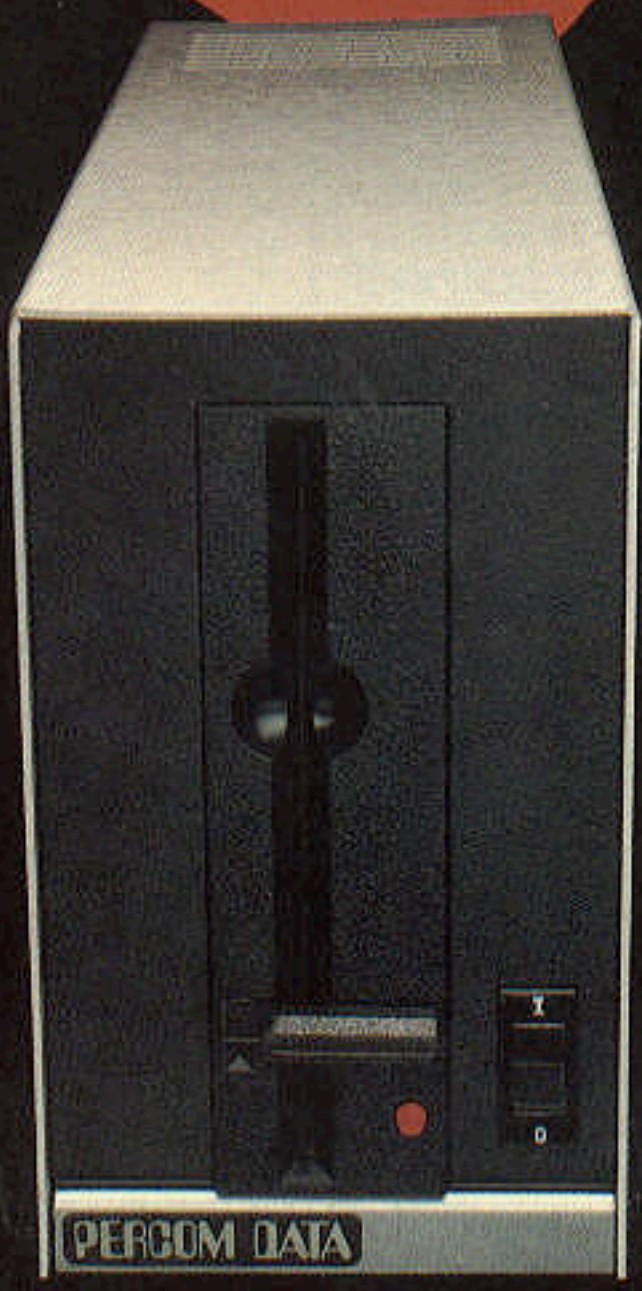
Other advantages of Extended BASIC are the availability of Sprites, those graphics characters that really make a game. In addition, so much drudgery is eliminated by the ability to combine so many statements and then further compact many of them into one form. ALL CALL COLOR statements can be combined as one. For example, CALL COLOR-(2,3,7)::CALL COLOR(4,5,16)::CALL COLOR(7,4,7)::CALL COLOR(10,16,5) can be quite simply stated as CALL COLOR(2,3,7,4,5,6,7,4,7,10,16,5). This is also true of CALL CHAR wherein you can define 4 characters in one fell swoop and combine others still in the statement. Example, CALL CHAR(96,"001234FEFEC0 0000C0C0F0F0C0C0CECEC0C0C0C0EC0C 0C0C0C0C0C0C0C00000CC",100,"0 00000000000000000000000000000000", 103 ,"FF",107,"EFEFEFE") etc.

Below is a program which will appear in the Users - Group Catalog in the future. It is written in console BASIC. Look it over to see the program flow and what it is attempting to do.

Console BASIC

```
0010 CALL CLEAR
0020 PRINT "SHUFFLESQUARES":"GERALD NIELSEN": : : : : : :
0030 PRINT "YOUR TASK IS TO MOVE THE":"SQUARES TO RECREATE SO
LID BLOCKS IN AS
     FEW MOVES AS POSSIBLE."
0040 PRINT "INDICATE YOUR CHOICES BY":"PRESSING ANY KEY OR FI
RE":"BUTTON."
0050 CALL CHAR(96,"001C3E7F7F7F7F7F")
0060 CALL CHAR(97,"00387CFEFEFEFEFE")
0070 CALL CHAR(98,"7F3F1F0F07030100")
```

Now you can buy a disk drive for your TI-99/4A for $400 LESS than you thought you could!



Putting a disk drive on your TI-99/4A® can be an expensive proposition. . . unless you add a Percom Data TX-99™ for a mere $449. A similar TI-supplied disk configuration requires that you purchase a Peripheral Expansion Box, a Controller Card and, of course, the Drive itself. The tab on that little package is a hefty $899!

How about this for an alternative. . . one sleek, plug – compatible disk drive system . . . COMPLETE. No bulky boxes, no extra cards, and most importantly no extra $400!

The Percom Data TX-99 is designed specifically for your TI-99/4A, and utilizes all the pioneering developments that have made Percom Data a reliable leader in the computer industry for nearly a decade.

This single density, single sided, 92K byte (formatted), 5¼" floppy disk drive system permits expansion of your computer at an affordable price. You get ample storage capacity, with the capability for additional growth. Percom Data also offers an add-on or a dual drive disk option.

PERCOM DATA has some excellent reasons why your TI-99/4A needs our TX-99 disk drive system. To find out what they are all you need to do is call our Toll Free Hotline to find out. Call now and we'll tell you and give you the name of a nearby authorized dealer who can explain it just as well as we can. Ask for our booklet: **"Reasons Why My TI-99/4A Needs a Percom Data Disk Drive." CALL NOW. . . 1-800-527-1222**

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Console BASIC

```
080 CALL CHAR(99,"FEFCF8F0E0C08000")
090 CALL CHAR(104,"00070F1F3F7F7F7F")
100 CALL CHAR(105,"00E0F0F8FCFEFEFE")
110 CALL CHAR(106,"7F7F7F3F1F0F0700")
120 CALL CHAR(107,"FEFEFEFCF8F0E000")
130 CALL CHAR(112,"000103070F1F3F7F")
140 CALL CHAR(113,"0080C0E0F0F8FCFE")
150 CALL CHAR(114,"7F3F1F0F07030100")
160 CALL CHAR(115,"FEFCF8F0E0C08000")
170 CALL CHAR(120,"000101010307070F1F")
180 CALL CHAR(121,"0080808080C0E0F0F8")
190 CALL CHAR(122,"3F7F7F7F3F1F0100")
200 CALL CHAR(123,"FCFEFEFEFCF88000")
210 CALL CHAR(128,"000303030303037F7F")
220 CALL CHAR(129,"00C0C0C0C0C0C0FEFE")
230 CALL CHAR(130,"7F7F0303030303000")
240 CALL CHAR(131,"FEFEC0C0C0C0C0C000")
250 CALL CHAR(136,"00387C7E7E3E1E01")
260 CALL CHAR(137,"001C3E7E7E7E7C7880")
270 CALL CHAR(138,"011E3E7E7E7E7C3800")
280 CALL CHAR(139,"80787C7E7E3E1C00")
290 CALL COLOR(9,7,12)
300 CALL COLOR(10,5,14)
310 CALL COLOR(11,11,14)
320 CALL COLOR(12,2,6)
330 CALL COLOR(13,13,8)
340 CALL COLOR(14,3,16)
350 RANDOMIZE
360 DIM A(6,4,4),B(8)
370 DATA 69,88,67,72,65,78,71,69
380 FOR I=1 TO 8
390 READ B(I)
400 NEXT I
410 INPUT "ENTER DIFFICULTY LEVEL(1-9):":Z
420 IF (Z<1)+(Z>9)THEN 410
430 PRINT "ENTER K TO USE KEYBOARD J TO USE JOYSTICKS:"
440 INPUT Y$
450 CALL CLEAR
460 FOR I=1 TO 6
470 CALL HCHAR(2-(I>3)*10,6-((I=2)+(I=5))*10-((I=3)+(I=6))*2
0,I+48)
480 FOR J=1 TO 4
490 FOR K=1 TO 4
500 A(I,J,K)=I
510 H=I
520 GOSUB 1880
530 NEXT K
540 NEXT J
550 NEXT I
560 II=1
570 II=1
580 IF (Y$<>"j")*(Y$<>"J")THEN 600
590 II=2
600 FOR D=1 TO Z*5
610 IA=INT(RND*6)+1
620 IB=INT(RND*6)+1
630 IF IA=IB THEN 620
640 RC=INT(RND*4)+1
```


Submitting Manuscripts to Enthusiast'99

Articles dealing with specific personal or business use of any computer in the TI family of personal computers, or innovative ideas dealing with programming or hardware are most informative. Articles should appeal to a wide interest group on specific subjects. All manuscripts should be copy edited, error free and ready for typesetting. They should be typed, double spaced with wide margins. Published manuscripts become the property of the International 99/4 Users-Group and our regular rates will be paid upon publication. Unpublished manuscripts will be returned only if a self-addressed envelope with sufficient first class postage attached is enclosed. Why not send your manuscript today!

```
650 IF RND>0.5 THEN 720
660 FOR JK=1 TO 4
670 H=A(IA,RC,JK)
680 A(IA,RC,JK)=A(IB,RC,JK)
690 A(IB,RC,JK)=H
700 NEXT JK
710 GOTO 770
720 FOR JK=1 TO 4
730 H=A(IA,JK,RC)
740 A(IA,JK,RC)=A(IB,JK,RC)
750 A(IB,JK,RC)=H
760 NEXT JK
770 NEXT D
780 FOR I=1 TO 6
790 FOR J=1 TO 4
800 FOR K=1 TO 4
810 H=A(I,J,K)
820 IF H=I THEN 840
830 GOSUB 1880
840 NEXT K
850 NEXT J
860 NEXT I
870 FOR I=1 TO 8
880 CALL HCHAR(23,I+3,B(I))
890 NEXT I
900 CALL HCHAR(23,16,79)
910 CALL HCHAR(23,17,70)
920 CALL HCHAR(23,19,83)
930 CALL HCHAR(23,20,81)
940 CALL HCHAR(23,23,65)
950 CALL HCHAR(23,24,78)
960 CALL HCHAR(23,25,68)
970 CALL HCHAR(23,27,83)
980 CALL HCHAR(23,28,81)
990 REM
1000 CALL HCHAR(23,14,32)
1010 CALL HCHAR(23,21,32)
1020 CALL HCHAR(23,29,32)
1030 NI=2
1040 AI=15
1050 BI=52
1060 C=13
1070 ON II GOSUB 1970,1670
1080 HV=IO
1090 NI=4
1100 AI=1
1110 BI=48
1120 C=14
1130 ON II GOSUB 1970,1670
1140 RC=IO
1150 NI=6
1160 C=21
1170 ON II GOSUB 1970,1670
1180 SQA=IO
1190 C=29
1200 ON II GOSUB 1970,1670
1210 SQB=IO
1220 IF (RC>4)+(SQA>6)+(SQB>6)+(HV>2)THEN 990
1230 IF SQA=SQB THEN 990
```

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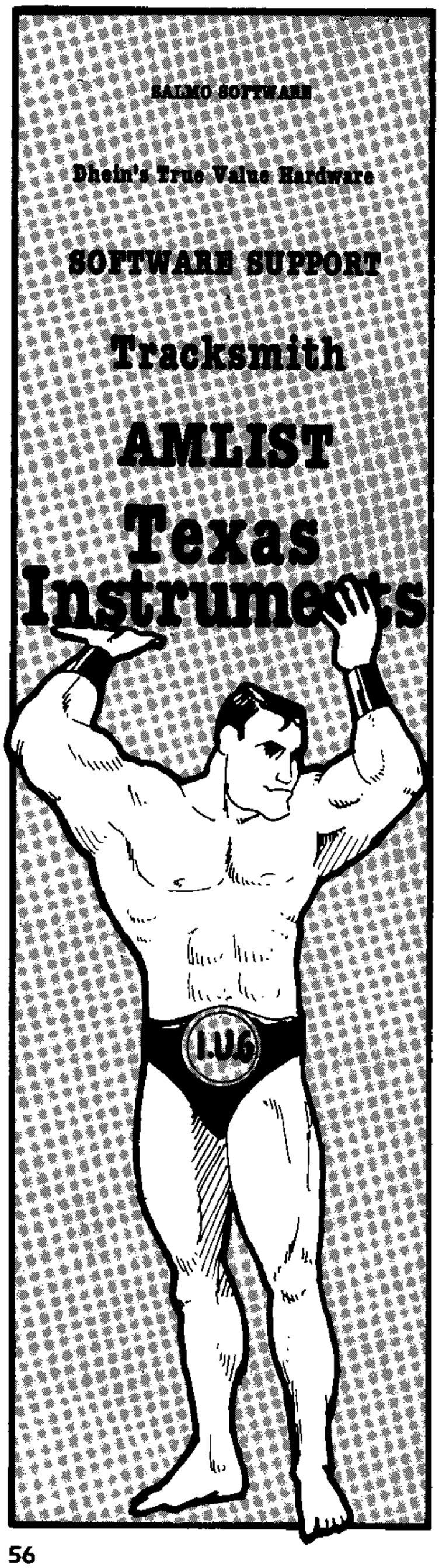



```
1240 NM=NM+1
1250 REM
1260 JA=1
1270 JB=4
1280 KA=1
1290 KB=4
1300 IF HV=2 THEN 1340
1310 KA=RC
1320 KB=RC
1330 GOTO 1360
1340 JA=RC
1350 JB=RC
1360 FOR J=JA TO JB
1370 FOR K=KA TO KB
1380 H=A(SQA,J,K)
1390 I=SQB
1400 GOSUB 1880
1410 HH=A(SQB,J,K)
1420 A(SQB,J,K)=H
1430 I=SQA
1440 H=HH
1450 GOSUB 1880
1460 A(SQA,J,K)=H
1470 NEXT K
1480 NEXT J
1490 REM
1500 T=0
1510 FOR I=1 TO 6
1520 IT=A(I,1,1)
1530 FOR J=1 TO 4
1540 FOR K=1 TO 4
1550 T=T+A(I,J,K)/IT
1560 NEXT K
1570 NEXT J
1580 NEXT I
1590 IF T<>96 THEN 1000
1600 PRINT "YOU DID IT IN ";NM;" MOVES"
1610 PRINT "PERFECTION WOULD BE ";Z*5
1620 INPUT "ENTER  Y  TO PLAY AGAIN:":Y$
1630 IF (Y$<>"Y")*(Y$<>"y")THEN 1660
1640 CALL CLEAR
1650 GOTO 410
1660 END
1670 REM
1680 IO=0
1690 CALL KEY(0,K,S)
1700 CALL KEY(1,K,S)
1710 CALL KEY(2,K,S)
1720 IF S<>0 THEN 1690
1730 FOR I=1 TO NI
1740 CALL HCHAR(23,C,I*AI+BI)
1750 T=0
1760 T=T+1
1770 IF T>7 THEN 1860
1780 CALL KEY(0,K,S)
1790 IF S<>0 THEN 1830
1800 CALL KEY(1,K,S)
1810 IF S<>0 THEN 1830
```

```
1820 CALL KEY(2,K,S)
1830 IF S=0 THEN 1760
1840 IO=I
1850 RETURN
1860 NEXT I
1870 GOTO 1730
1880 REM
1890 R=1-(I>3)*10+J*2
1900 C=1-((I=2)+(I=5))*10-((I=3)+(I=6))*20+K*2
1910 FOR D=0 TO 1
1920 FOR E=0 TO 1
1930 CALL HCHAR(R+D,C+E,88+H*8+D*2+E)
1940 NEXT E
1950 NEXT D
1960 RETURN
1970 REM
1980 IO=0
1990 CALL HCHAR(23,C,32)
2000 CALL KEY(1,K,S)
2010 IF S<>0 THEN 2000
2020 CALL KEY(2,K,S)
2030 IF S<>0 THEN 2000
2040 CALL KEY(1,K,S)
2050 IF S<>0 THEN 2090
2060 CALL KEY(2,K,S)
2070 IF S=0 THEN 2040
2080 IO=5
2090 IO=IO-(K=19)-2*(K=7)-3*(K=8)-4*(K=9)-5*(K=10)-(K=14)-2*
(K=6)
2100 CALL HCHAR(23,C,IO*AI+BI)
2110 RETURN
```


Now take a look at what that program looks like when converted to Extended BASIC. The number of lines is greatly reduced; about 1300 bytes of memory is saved, and the program runs much faster.

More importantly, look at how the lines have been combined for compactness and efficiency. See how various statements combine similar elements to save time and space.

This article just scratches the surface in a discussion of Extended BASIC. Its real purpose is to let you know what you are missing if you don't yet have it. Why, we haven't even touched on how easy it is to combine two programs into one or how to use DISPLAY and ACCEPT AT or PRINT USING or . . . . In any case, dear friends, other than lack of funds at the moment, I cannot think of any other valid excuse for not getting Extended BASIC as soon as possible.

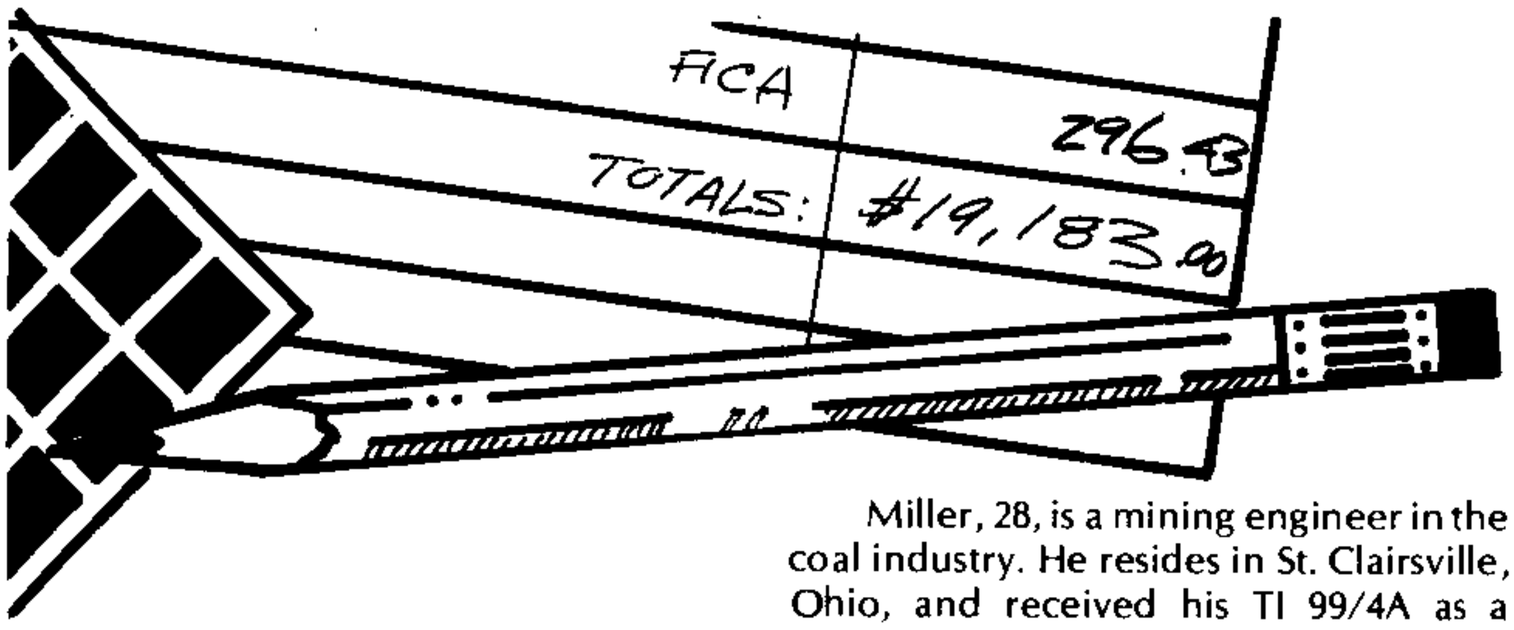
OK, here's your whizbang Extended BASIC version of the above program. Get that Extended BASIC quick so you can type it in. By the way, it will drive you crazy like a Rubik's cube will!!!!!

Extended BASIC

```
10 RANDOMIZE :: DIM A(6,4,4),B(8):: CALL CLEAR :: PRINT "YOUR TASK IS TO MOVE
   THE":"SQUARES TO RECREATE SOLID BLOCKS IN AS FEW MOVES AS POSSIBLE."
20 PRINT "INDICATE YOUR CHOICES BY":"PRESSING ANY KEY OR FIRE":"BUTTON." ::
   CALL CHAR(96,"001C3E7F7F7F7F7F00387CFEFEFEFEFE")
30 CALL CHAR(98,"7F3F1F0F07030100FEFCF8F0E0C08",104,"0007F1F3F7F7F7F00E0F0F
   8FCFEFEFE7F7F7F3F1F0F0700FEFEFEFCF8 F0E")
40 CALL CHAR(112,"000103070F1F3F7F0080C0E0F0F8FCFE7F3F1F0F07030100FEFCF8F0E0
   C08",120,"0001010103070F1F00808080 C0E0F0F8")
50 CALL CHAR(122,"3F7F7F7F3F1F0100FCFEFEFEFCF88",128,"0003030303037F7F00C0C0
   C0C0C0FEFE7F7F0303030300FEFEC0C0C0C0C ")
60 CALL CHAR(136,"00387C7E7E3E1E0100C3E7E7E7C7880011E3E7E7E7C380080787C7E7E3
   E1C")
70 CALL COLOR(9,7,12,10,5,14,11,11,14,12,2,6,13,13,16,14,16 ,3):: FOR I=1 TO
   8 :: READ B(I):: NEXT I
80 PRINT "DIFFICULTY LEVEL?(1-9) 1";:: ACCEPT AT(24,24)SIZE(-1)VALIDATE
   ("1234569 ")BEEP:Z
```

```
90 PRINT "ENTER:":"K TO USE KEYBOARD":"J TO USE JOYSTICKS " :: INPUT Y$ ::
   CALL CLEAR
100 FOR I=1 TO 6 :: CALL HCHAR(2-(I>3)*10,6-((I=2)+(I=5))*10-((I=3)+(I=6))
    *20,I+ 48):: FOR J=1 TO 4 :: FOR K=1 TO 4 :: A(I,J,K),H=I 110 GOSUB 360
    ::NEXT K :: NEXT J :: NEXT I :: II=1 :: IF Y$="j" OR Y$="J" THEN II=2
120 FOR D=1 TO Z*5 :: IA=INT(RND*6)+1
130 IB=INT(RND*6)+1 :: IF IA=IB THEN 130
140 RC=INT(RND*4)+1 :: IF RND>0.5 THEN 160
150 FOR JK=1 TO 4 :: H=A(IA,RC,JK):: A(IA,RC,JK)=A(IB,RC,JK ):: A(IB,RC,JK)=H
    :: NEXT JK :: GOTO 170
160 FOR JK=1 TO 4 :: H=A(IA,JK,RC):: A(IA,JK,RC)=A(IB,JK,RC ):: A(IB,JK,RC)=H
    :: NEXT JK
170 NEXT D :: FOR I=1 TO 6 :: FOR J=1 TO 4 :: FOR K=1 TO 4 :: H=A(I,J,K):: IF
    H< >I THEN GOSUB 360
180 NEXT K :: NEXT J :: NEXT I :: FOR I=1 TO 8
190 CALL HCHAR(23,I+3,B(I)):: NEXT I :: CALL HCHAR(23,16,79):: CALL HCHAR(23,
    17,70):: CALL HCHAR(23,19,83) :: CALL HCHAR(23,20,81):: CALL HCHAR(23,23,
    65)
200 CALL HCHAR(23,24,78):: CALL HCHAR(23,25,68):: CALL HCHAR(23,27,83):: CALL
    HCHAR(23,28,81)
210 CALL HCHAR(23,14,32):: CALL HCHAR(23,21,32):: CALL HCHAR(23,29,32):: NI=2
    :: AI=15 :: BI=52 :: C=13 :: ON II GOSUB 370,270 :: HV=IO :: NI=4 :: AI=1
    :: BI=48 :: C=14
220 ON II GOSUB 370,270 :: RC=IO :: NI=6 :: C=21 :: ON II GOSUB 370,270 ::
    SQA=IO:: C=29 :: ON II GOSUB 370,270 :: SQB=IO :: IF (RC>4)+(SQA>6)
    +(SQB>6)+(HV>2)OR SQA=SQB THEN 210
230 NM=NM+1 :: JA,KA=1 :: JB,KB=4 :: IF HV=2 THEN JA,JB=RC ELSE KA,KB=RC
240 FOR J=JA TO JB :: FOR K=KA TO KB :: H=A(SQA,J,K):: I=SQB :: GOSUB 360 ::
    HH=A(SQB,J,K):: A(SQB,J,K)=H :: I=SQA :: H=HH :: GOSUB 360
250 A(SQA,J,K)=H :: NEXT K :: NEXT J :: T=0 ::FOR I=1 TO 6 :: IT=A(I,1,1)::
    FOR J=1 TO 4 :: FOR K=1 TO 4 :: T=T+A (I,J,K)/IT :: NEXT K :: NEXT J ::
    NEXT I :: IF T<>96 THEN 210
260 PRINT "YOU DID IT IN";NM;"MOVES":"PERFECTION WOULD BE" ;Z*5 :: INPUT
    "ENTER Y TO PLAY AGAIN:":Y$ :: IF Y$="Y" OR Y$="y" THEN CALL CLEAR ::
    GOTO 80 ELSE END
270 IO=0
280 CALL KEY(0,K,S):: CALL KEY(1,K,S):: CALL KEY(2,K,S) :: IF S<>0 THEN 280
290 FOR I=1 TO NI :: CALL HCHAR(23,C,I*AI+BI):: T=0
300 T=T+1 :: IF T>7 THEN 350
310 CALL KEY(0,K,S):: IF S<>0 THEN 340
320 CALL KEY(1,K,S):: IF S<>0 THEN 340
330 CALL KEY(2,K,S)
340 IF S=0 THEN 300 ELSE IO=I :: RETURN
350 NEXT I :: GOTO 290
360 R=1-(I>3)*10+J*2 :: C=1-((I=2)+(I=5))*10-((I=3)+(I=6)) *20+K*2 :: FOR D=0
    TO 1 :: FOR E=0 TO 1 :: CALL HCHAR(R+D,C+E,88+H*8+D*2+E):: NEXT E :: NEXT
    D ::RETURN
370 IO=0 :: CALL HCHAR(23,C,32)
380 CALL KEY(1,K,S):: IF S<>0 THEN 380
390 CALL KEY(2,K,S):: IF S<>0 THEN 380
400 CALL KEY(1,K,S):: IF S<>0 THEN 420
410 CALL KEY(2,K,S):: IF S=0 THEN 400 ELSE IO=5
420 IO=IO-(K=19)-2*(K=7)-3*(K=8)-4*(K=9)-5*(K=10)-(K=14)-2*(K=6):: CALL HCHAR
    (23 ,C,IO*AI+BI):: RETURN
430 DATA 69,88,67,72,65,78,71,69
```

WHO WROTE "TAX ESTIMATOR"?



Some of you may have noticed that the "Tax Estimator" program in the July issue of Enthusiast '99 did not list an author. The program was, in fact, written by one of our members, Stephen L. Miller.

Miller, 28, is a mining engineer in the coal industry. He resides in St. Clairsville, Ohio, and received his TI 99/4A as a Christmas gift in 1982. Miller said he wrote Tax Estimator because of this problem: "With frequently changing deductions, how can I quickly determine the number of withholdings I should claim on my W-4 form?"

The result is Tax Estimator, a program allowing one to quickly change any of the input data and review the results. Miller states only three limitations of the program. It was designed for bi-monthly income only; it can be tricked, however, by using your annual income divided by 24. It is set up only for married couples filing joint returns, and the program does not take into account the July 1 tax cut. This should result in conservative estimates.

Tax Estimator is a useful program that can be utilized not only at tax time, but year-round. Stephen Miller has provided IUG members with an excellent program that can aid them in keeping informed about not only their current financial state but enables them to predict future financial situations.

CC-40 PROGRAM

```
 10 ! CC40 PROGRAM FOR PRINTING TWO
 20 ! LINE, LARGE CHARACTERS ON THE
 30 ! PRINTER/PLOTTER
100 OPEN #1,"10",OUTPUT
110 PRINT #1,CHR$(19)
120 PRINT #1,"A1"
125 PRINT #1,"H"
130 PRINT #1,"M(135,0)"
140 PRINT #1,"S9"
150 INPUT "ENTER TOP LINE ";L1$
160 INPUT "ENTER BOTTOM LINE ";L2$
170 PRINT "WORKING..."
180 T$=L1$
190 GOSUB 290
200 FOR X=1 TO LEN(L1$)
210 PRINT #1,"J(0,55)"
220 NEXT X
230 PRINT #1,"J(-110,0)"
240 PRINT #1,"O"
250 T$=L2$
260 GOSUB 290
270 PRINT "DONE"
280 END
290 FOR C=1 TO LEN(T$)
300 PRINT #1,"O"
310 FOR X=1 TO 5
320 PRINT #1,"M(1,1)"
330 PRINT #1,"O"
340 PRINT #1,"T("&SEG$(T$,C,1)&")"
350 NEXT X
360 PRINT #1,"J(-5,0)"
370 NEXT C
380 RETURN
```

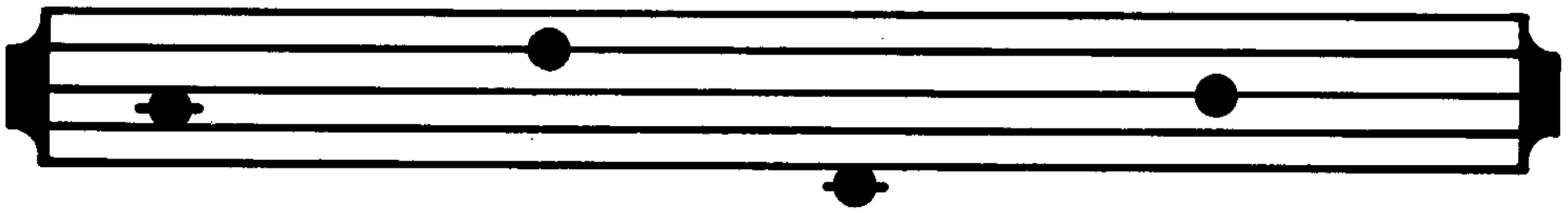
OOPS!

There is an error in the "CC-40 ADDRESS BOOK" program list given in the last issue. Rick Stewart of Lilburn, GA notified me of this and verified the correction: in the middle of line 230 are two ampersands(&) where there should only be one. Thanks, Rick.

This problem would not be identified as a syntax error when the program was run because the normal error reporting is turned off by the first line. Instead, you would get a mysterious "NO NAMES BEGINNING WITH.." message.

To check if you have entered the program correctly, delete line 100, run it using the sample data and try letter "C". If correct, re-insert line 100.

Rick also had another problem, but this was because he had another program loaded with line numbers lower than 100. Because the "POKE" statements use absolute memory addresses, you must have the exact number of bytes up to line 310. Typing the program EXACTLY as listed (except for the double "&") will insure the count is correct.



Program from A Woman's View — Music and Computers

MAJOR KEY SIGNATURES

```
100 CALL CLEAR
110 PRINT "   MAJOR KEY SIGNATURES"
120 CALL CHAR(136,"000028107C1028")
130 CALL COLOR(14,7,1)
140 PRINT :TAB(10);"SHARPS": : : : :
150 CALL CHAR(35,"2424FF2424FF2424")
160 PRINT TAB(8);"BY REGENA"
170 L$="                          "
180 PRINT : : :"YOU WILL SEE A TREBLE STAFF WITH SHARPS."
190 PRINT :"NAME THE MAJOR KEY THE      SIGNATURE REPRESENTS
 BY     PRESSING THE
 LETTER NAME.": : :
200 FOR I=0 TO 6
210 READ B(I)
220 NEXT I
230 DATA 67,71,68,65,69,66,70
240 FOR I=91 TO 126
250 READ C$
260 CALL CHAR(I,C$)
270 NEXT I
280 DATA 071F3F78F0E0C08,00C0F0F078381818,8080808080808808,18
1818101020202,000000
FF,808040FF4040404
290 DATA 202040FF4080808,2121212122321212,000000FF00000103,1
C1C18FF78E8C884,0000
00000000103O7,070F1E3CF8F0E08
300 DATA 8404040404020202,0F1E1EFF3C387878,02020FF03070F1F,
000000FFFFFFC,000000
FFFCFE0F03,000000FF000080C
310 DATA 70F0F0E0E0E0E0E,3D39716E0C0C0C,0000008080808808,C0E
060303010101,E0E0E0F
F707038 38,C0C0E0FF6060301
320 DATA 808080FF4040404,101010FF1020202,3C1C1E0F070301,0000
000080C0F0F8,4040202
02020202,0000000103060 81
330 DATA 40C0808,3C0F03FF,0000C0FF,20213EFF2020202,608000FF,
1010101010101O1
340 CALL CHAR(37,"101010302040 8")
350 CALL CHAR(38,"3C7EFEFEFC7C391E")
360 PRINT :"PRESS <ENTER> TO START.";
370 CALL KEY(0,K,S)
380 IF K<>13 THEN 370
390 CALL CLEAR
400 SC=0
410 PRINT "    [\":"    ]^":" ___`a__";L$:"    b":" __cd___"
;L$:"  efg":" _h_ijk
l";L$
```

```
420 PRINT "  m no p":" _q_rs_t";L$:"  uv wxy":" __z{|}_";L$:
"     ~":"     ~":"
   &%": : : : : : :
430 FOR I=1 TO 10
440 RANDOMIZE
450 A=INT(7*RND)
460 RESTORE 470
470 DATA 6,11,9,13,5,15,8,17,11,19,7,21
480 FOR J=1 TO A
490 READ X,Y
500 CALL HCHAR(X,Y,35)
510 NEXT J
520 CALL HCHAR(23,13,75)
530 CALL HCHAR(23,14,69)
540 CALL HCHAR(23,15,89)
550 CALL HCHAR(23,17,63)
560 CALL SOUND(100,1497,3)
570 CALL KEY(0,K,S)
580 IF S<1 THEN 570
590 IF K=B(A)THEN 630
600 CALL SOUND(80,330,2)
610 CALL SOUND(80,262,2)
620 GOTO 560
630 CALL HCHAR(23,17,K)
640 IF K<>70 THEN 660
650 CALL HCHAR(23,18,35)
660 ON A+1 GOSUB 840,870,900,930,960,990,1020
670 SC=SC+1
680 CALL HCHAR(2,15+SC,136)
690 FOR Y=1 TO 8
700 READ T
710 CALL SOUND(100,T,2)
720 NEXT Y
730 FOR X=6 TO 12 STEP 2
740 CALL HCHAR(X,11,95,15)
750 CALL HCHAR(X-1,11,32,15)
760 NEXT X
770 CALL HCHAR(23,13,32,6)
780 NEXT I
790 PRINT "GOOD WORK!"
800 PRINT :"PRESS 1 TO TRY AGAIN":TAB(7);"2 TO END PROGRAM";
810 CALL KEY(0,K,S)
820 IF K=49 THEN 390
830 IF K=50 THEN 1050 ELSE 810
840 RESTORE 850
850 DATA 262,294,330,349,392,440,494,523
860 RETURN
870 RESTORE 880
880 DATA 392,440,494,523,587,659,740,784
890 RETURN
900 RESTORE 910
910 DATA 294,330,370,392,440,494,554,587
920 RETURN
930 RESTORE 940
940 DATA 440,494,554,587,659,740,831,880
950 RETURN
960 RESTORE 970
970 DATA 330,370,415,440,494,554,622,659
```

```
980 RETURN
990 RESTORE 1000
1000 DATA 494,554,622,659,740,831,932,988
1010 RETURN
1020 RESTORE 1030
1030 DATA 370,415,466,494,554,622,698,740
1040 RETURN
1050 CALL CLEAR
1060 END
```

STEPPING UP OR DOWN

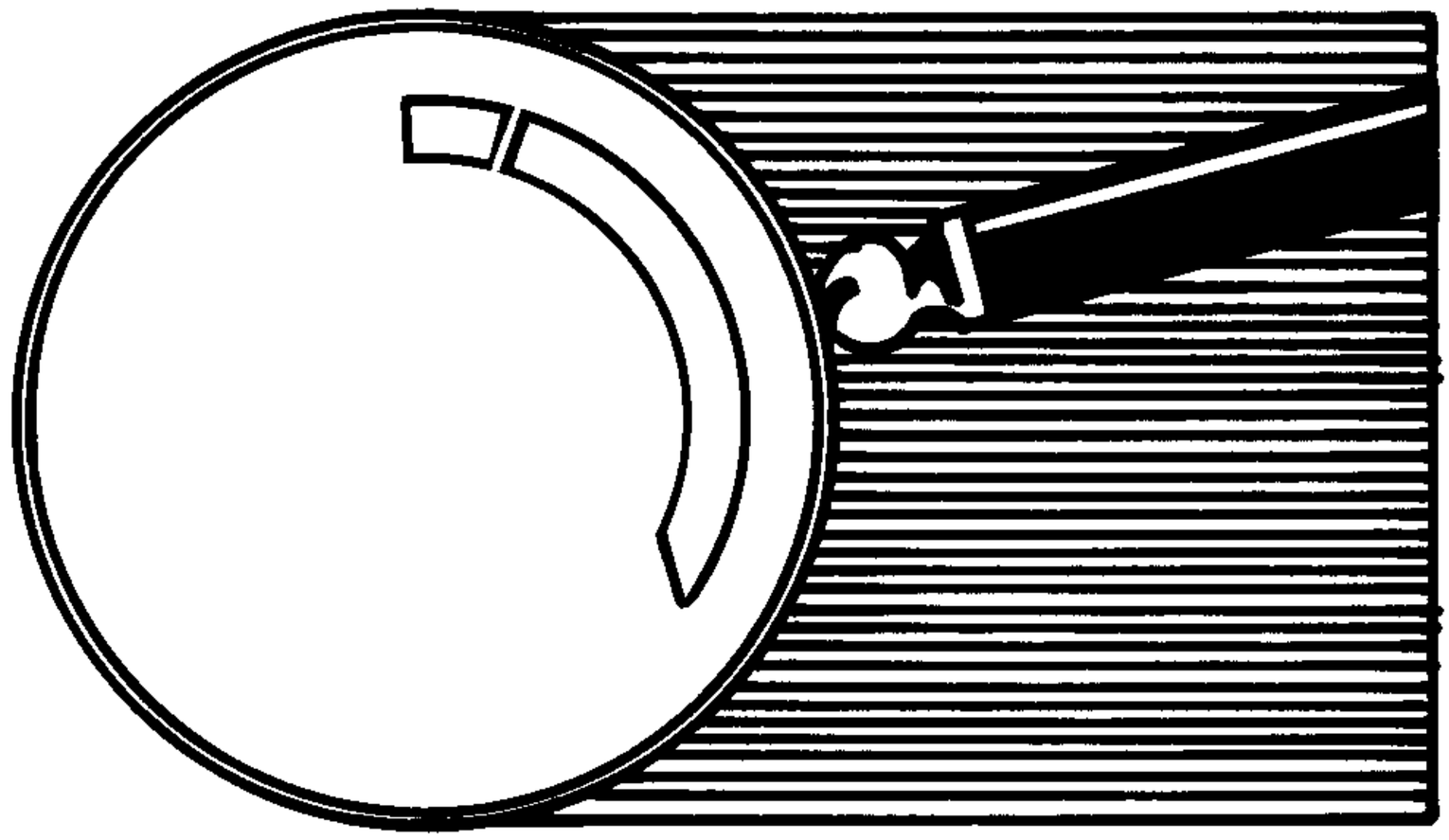
```
100 CALL CLEAR
110 PRINT "     STEPPING UP OR DOWN"
120 FOR I=0 TO 8
130 READ T(I)
140 NEXT I
150 DATA 698,659,587,523,494,440,392,349,330
160 PRINT : :TAB(9);"BY REGENA": : : :
170 L$="                                "
180 B(1)=88
190 B(2)=68
200 B(3)=69
210 PRINT "YOU WILL SEE TWO NOTES.": :"FROM THE FIRST ONE, D
O YOU  MOVE UP, MOVE
 DOWN, OR STAY"
220 PRINT "THE SAME TO PLAY THE SECOND NOTE?": :"PRESS THE C
ORRECT ARROW KEY TO
ANSWER.": : :
230 FOR I=1 TO 31
240 CALL SOUND(-99,INT(1000*RND+300),5)
250 READ C,C$
260 CALL CHAR(C,C$)
270 NEXT I
280 DATA 95,000000FFFF,97,101010109254381,98,007824242424247
8,99,007C44444444447
C,100,004444454545428,101
290 DATA 00446464544C4C44,104,00080402FF020408,105,003844403
8044438,106,00384444
7C444444,107,00446C5454444444
300 DATA 108,007C4040784040 7C,112,103854921010101,113,004444
4444444438,114,00784
4447840404,120,000000FFFF81
310 DATA 121,000000FFFFE0781C,122,0603030303030306,123,1C78E
0FFFF,124,000081FFFF
,125,381E07FFFF,126
320 DATA 60C0C0C0C0C0C06,127,000000FFFF071E38,128,000000FFFF
81,129,00000000C0E07
81C,130,060303FFFF030306,131
330 DATA 1C78E0C,132,000081FFFF,133,381E0703,134,60C0C0FFFFC
0C06,135,000000000030
71E38,136,0044287C2844
340 CALL COLOR(14,7,1)
350 GOSUB 750
360 SC=0
370 FOR I=1 TO 10
380 CALL CLEAR
390 PRINT :L$: :L$: :L$: :L$: :L$: : : : : :
```

```
400 RANDOMIZE
410 N1=INT(9*RND)
420 R=N1+8
430 C=11
440 ON SGN(N1/2-INT(N1/2))+1 GOSUB 880,790
450 N2=INT(9*RND)
460 R=N2+8
470 C=19
480 ON SGN(N2/2-INT(N2/2))+1 GOSUB 880,790
490 A=SGN(N1-N2)+2
500 PRINT "   pqr   abcde   hijkl";
510 CALL SOUND(100,1497,3)
520 CALL KEY(0,K,S)
530 IF S<1 THEN 520
540 IF K=B(A)THEN 580
550 CALL SOUND(80,330,4)
560 CALL SOUND(80,262,4)
570 GOTO 520
580 FOR J=1 TO 10
590 CALL SOUND(-99,1200,A)
600 CALL COLOR(8+A,16,1)
610 CALL COLOR(8+A,7,1)
620 NEXT J
630 CALL SOUND(400,T(N1),2)
640 SC=SC+1
650 CALL HCHAR(2,12,136,SC)
660 CALL SOUND(400,T(N2),2)
670 CALL SOUND(1,T(N2),30)
680 CALL COLOR(8+A,2,1)
690 NEXT I
700 PRINT : :"GOOD WORK!"
710 PRINT :"TRY AGAIN? (Y/N)";
720 CALL KEY(0,K,S)
730 IF K=89 THEN 360
740 IF K=78 THEN 970 ELSE 720
750 PRINT "PRESS <ENTER>";
760 CALL KEY(0,K,S)
770 IF K<>13 THEN 760
780 RETURN
790 CALL HCHAR(R,C,120)
800 CALL HCHAR(R,C+1,121)
810 CALL HCHAR(R+1,C+1,122)
820 CALL HCHAR(R+2,C+1,123)
830 CALL HCHAR(R+2,C,124)
840 CALL HCHAR(R+2,C-1,125)
850 CALL HCHAR(R+1,C-1,126)
860 CALL HCHAR(R,C-1,127)
870 RETURN
880 CALL HCHAR(R,C,128)
890 CALL HCHAR(R,C+1,129)
900 CALL HCHAR(R+1,C+1,130)
910 CALL HCHAR(R+2,C+1,131)
920 CALL HCHAR(R+2,C,132)
930 CALL HCHAR(R+2,C-1,133)
940 CALL HCHAR(R+1,C-1,134)
950 CALL HCHAR(R,C-1,135)
960 RETURN
970 CALL CLEAR
980 END
```

ETCETERA

RAM DIAGNOSTIC PROGRAM

By Jack Carrel
Staff Technical Editor



Several times this year, Charlie has been able to attend a regular meeting of a local users group. On a few of these occasions, I was invited to go along with Charlie to present to the people at the meeting some things that can be accomplished with Assembly language programming. Also at these meetings I was able to answer questions people had about their computer, and specifically about any problems they might be having with Assembly language programming.

After each meeting, I was able to talk with a lot of the users, and I found that there is a lot of confusion and frustration for most people who would like to program in Assembly language. In fact, one person even mentioned to me that he was going to sell or destroy his Editor Assembler manual, because he just could not get anything going with the Assembly language. This man's comments really struck me because I knew that this was a person that had already thoroughly mastered the BASIC and Extended BASIC programming languages.

For the most part, I believe that you will have more trouble with Assembly than you would with BASIC. Let's face it, if Assembly language were as easy as BASIC, Texas Instruments would not have bothered with the expense and time it took to design and develop the console BASIC. They would have just delivered the machine with an Assembler and saved themselves a lot of headaches.

Also, if you are having trouble with the Assembly language programming, don't feel like the Lone Ranger. I have been involved with programming on several of the other major home computers, and without exception, the users of those machines have the same types of questions and comments concerning Assembly language. Some of these computers have industry standard architecture and operating systems, and yet, the owners still have at least as much of a problem with Assembly language programming as many of you.

The comments made by these users would fit right in with any TI99 Users Group discussion. "Where can I get good documentation?" "Why doesn't the #@$%&* (two syllables) manufacturer write a manual that will tell what I need to do to write in Assembly?" "Where do I start?"

These are in many cases difficult questions to answer, because the person asking these questions many times is an individual who does not want to spend any more time learning Assembly than he did BASIC, which he has just barely begun to grasp in the hour or two he has spent using it.

To this type of person I can offer no assistance. He is doomed to a life of complaining because without more work he will not even begin to grasp the concepts that are required in Assembly language programming. But there are a lot of users out there that would like to program in Assembly but just don't have any idea where to begin or even what to do after they have completed the first step. I would at this stage like to offer some sage advice to all of you that are having trouble with Assembly language. WRITE PROGRAMS!!!

Now this may seem a little harsh or maybe futile, but unless you dive recklessly into the project you will not be able to accomplish anything. So what if your console locks up? Just turn it off and start over, only be sure that the next time you try a different approach. You are not going to hurt anything by experimenting with your computer, and heck, you may even learn something.

In mathematics there is a simple law to which you must adhere if you are going to solve an equation. There must be at least as many equations as there are unknowns or you can not solve the problem. You must abide by this law if you want to find the answer to the problem with pure mathematics. But there is another way to solve equations although it is not as esthetically appealing. This method is commonly referred to as the imperical method or in the vernacular, HIT AND MISS! This should be the assemblites battle cry. "IF ALL ELSE FAILS GUESS!!!"

This brings to my mind another great adage with which my father would always bless my ears when I would get tangled up in some project and could not seem to get all of the pieces to fit. "WHEN ALL ELSE FAILS, READ THE DIRECTIONS!!!" This should be the first cry of the assemblite, when sanity still reigns and he has spent only eight or nine hours of intense concentration trying to get a program to run and simultaneously have the video maintain horizontal synchronization. Many of you probably will not believe me when I say this but I am going to say it anyway. What the heck.

"There is useful information in both the Editor Assembler manual and the MiniMemory manual." There, I got it out. But before you rip this article apart and mail the pieces back for a refund let me make another comment which is perhaps at least as significant in scope. "The information in these manuals may not always be in a form that will answer your questions directly."

You see, because of the level at which you are trying to control the computer when you are running an Assembly language program, it would take an entire bookcase full of volumes to even begin to give you a pat answer for all of the possible questions you might come upon in your work. Many times, I have retreated from my console to spend several hours browsing through my Editor Assembler manual grasping for some clue as to what is crashing my program to bits.

I feel the best way to help people to get involved in Assembly language programming is through examples. That gets back to my earlier comment that in order to become an assemblite you are going to have to write programs. The program that we will work on here is a RAM confidence tester.

This refers back to the comments made earlier on the number of unknowns and the solving of problems. Many times when you have spent eight and/or nine hours trying to get a program to do more than make psychedelic designs on the screen, you need something that will reassure you of the integrity of your computer, if by no other means than to show that yes, programs can still be run successfully and that they don't all have to end with the same tragic demise. I realize that the chances of the problem being a bad RAM chip are Slim and None, and Slim left town.

But if you are going to learn Assembly language then you are going to have to begin with programs that accomplish very small and sometimes meaningless tasks before you can tackle something as involved as, let's say, a word processing program.

When you tried riding a bicycle for the very first time, you probably did not expect to head across the country on a marathon bike trek. In fact, I feel fairly confident that your goals were much closer to home, for instance, just not getting hurt when you fell off. We should hold the same type of attitude with anything new we are trying to learn. This includes programming, especially Assembly language programming.

So, although this program will not really be the life saving program of the century, it will help us to begin to see some of the techniques used in Assembly language programming and will help us to get started in this not so simple endeavor of understanding Assembly language.

I like to begin most of my programming efforts with a blank sheet of paper. Then I begin to write on this sheet all of the things I would like to see the program do. By writing these ideas down, I can begin to weed out the things that just are not feasible or convenient for this project, and I can begin to sort the ideas into logical groups. Next, I write the ideas out in a logical step by step sequence that briefly describes the processes and procedures that will be performed by the program.

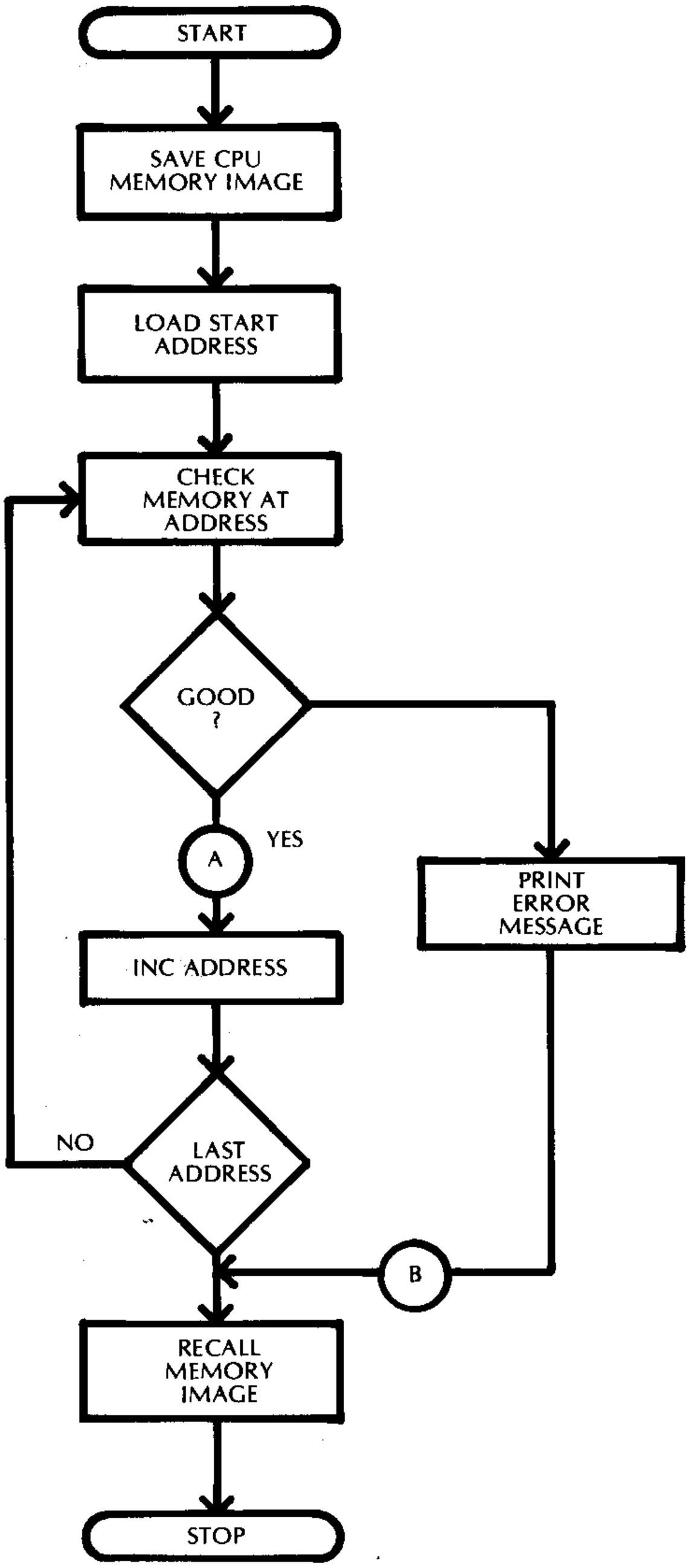
For instance, in our RAM test program, I felt that the area of CPU memory should be saved in VDP, so that any already existing programs would not be affected by the test. Then I decided that each memory location would be tested by moving a value to that location and then verifying that the value stored at that location is correct when it is read back. Also, to add a little integrity to the operation, I felt that each memory location should be tested with several patterns, and that these patterns would include all bits zero, all bits ones, and two combinations of alternating bits on and off. Then I realized that there would have to be some kind of display to show the operator that a.) the test is running, b.) it is progressing in proper order, c.) should a fault be detected, then there should be some sort of indication.

After writing these specifications down on paper I was ready for the next step, the flow chart. I will not go into the details of how to do a flow chart at this time, but I will tell you that I can not really get anything accomplished without first writing a flow chart. This helps me to see the logical sequence of events that must occur in the program, and helps me to spot areas where either I did not consider a point or I had redundant structure. I usually do two flow charts — one very general and one in more specific detail. The general flow chart will usually work if I want to write the program in several languages because all it does is show the logical flow of events, whereas the detailed flow chart shows me how the program will work with the instruction set available in the language that I am using.

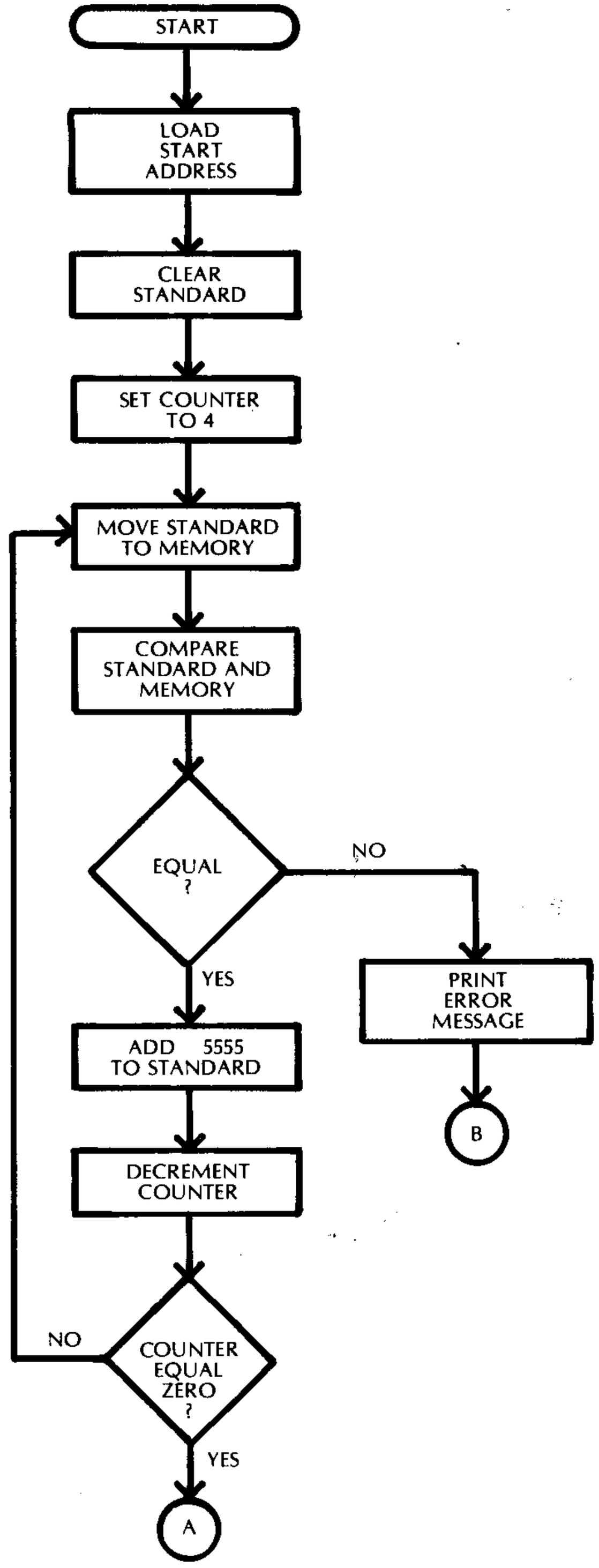
Sometimes, I can get by without the detailed chart, but I can almost never get along without the general flow chart. In the case of our example program, the general flow chart was adequate for most of the program development. Only in the case of the actual testing to the memory locations did I need to go into more detail. The next step was to write the Assembly code necessary to perform the functions described in the flow charts.

All the work done up to this point was easy compared to the work that lay

Minimemory RAM Confidence Check Flow Chart, OVERALL



Minimemory RAM Confidence Check Flow Chart
Memory Checking Routine



ahead. Once the program was coded, I had to try running it. And this began a long and drawn out procedure involving both of the assemblite's battle cries. The problem that caused me the most sweat was that after running the program I found that it would never end. It just continued to cycle through the area of memory then it would start all over again.

After much gnashing of teeth I gave the first battle cry of the assemblites.I went to the manuals looking for a clue as to what was causing this strange behavior in my program. Then I saw it. On page 74, appendix D of the MimiMemory manual, I saw that the workspaces used by the utilities I was using to communicate with the VDP memory were being overwritten by my program when I recalled the CPU image from VDP. This meant that those workspaces were being returned to their state when they were stored in VDP.

When the routine returned to my program it returned to the program after the first multibyte write and the program would begin all over again. To fix this problem I added the two statements just before the multibyte write and the statement just following the multibyte write. Also I had to add the two statements just previous to the multibyte read that returns the CPU memory to its original state.

There are probably other ways to do what this program does, but this is how my program turned out. I encourage you to try this program out and if you come up with any suggestions, work them out and submit the program to the Users—Group library.

I need to make one more comment on this program. It has a fault in it, it can not check the area of memory in which it resides. This is a problem we can tackle later.

```
0001  ********************************************
0002  * MEMORY CHECK PROGRAM                     *
0003  * FOR THE MINIMEMORY                       *
0004  ********************************************
0005          DEF RUN
0006  ********************************************
0007  *       ;REGISTERS                         *
0008  *       ;R0  VDP ADDRESS                   *
0009  *       ;R1  CPU ADDRESS                   *
0010  *       ;R2  NUMBER OF BYTES               *
0011  *       ;R3  CPU ADDRESS CHECKED           *
0012  *       ;R4  CHECK STANDARD                *
0013  *       ;R5  COUNTER                       *
0014  *       ;R6  LAST ADDRESS CHECKED          *
0015  *       ;R7  USED IN DISPLAY ROUTINE       *
0016  *       ;R8  DITTO                         *
0017  *       ;R9  NOT USED                      *
0018  *       ;R10 NOT USED                      *
0019  *       ;R11 NOT USED                      *
0020  *       ;R12 USED FOR CRU ADDRESSING       *
0021  *       ;R13 VDP STORAGE AREA              *
0022  *       ;R14 FIRST ADDRESS CHECKED         *
0023  *       ;R15 LAST ADDRESS CHECKED          *
0024  ********************************************
0025          AORG >7D00
0026  VSBW    EQU  >6024          ;THESE ARE FOR
0027  VMBW    EQU  >6028          ;MINIMEMORY
0028  VMBR    EQU  >6030
0029  WS      EQU  >8300
0030  RUN     LWPI WS
0031          LI   R6,>7CFF
0032          LI   R13,>1000
0033          LI   R14,>7000
0034          LI   R15,>7CFF
0035          MOV  R13,R0
0036          MOV  R14,R1
0037          MOV  R15,R2
0038          S    R1,R2
0039          INC  R2
0040          MOV  @A,@B2+2
0041          CLR  @A
0042          BLWP @VMBW          ;STORE CPU IMAGE
0043  A       JMP  B3
```

```
0044            LI    RØ,2
0045            LI    R1,ST1
0046            LI    R2,9
0047            BLWP  @VMBW       ;DISPLAY EXECUTING
0048            MOV   R14,R3      ;MEMORY CHECKING
0049  A1        CLR   R4
0050            LI    R5,4
0051            JMP   D1          ;DISPLAY ADDRESS
0052  A2        MOV   R4,*R3
0053            C     R4,*R3
0054            JNE   C1          ;JMP IF ERROR
0055            AI    R4,>5555
0056            DEC   R5
0057            JNE   A2
0058            INC   R3
0059            C     R3,R6
0060            JLE   A1          ;PROGRAM ENDING
0061  B1        MOV   R13,RØ
0062            MOV   R14,R1
0063            MOV   R15,R2
0064            S     R1,R2
0065            INC   R2
0066  B2        LI    R3,>1021
0067            MOV   R3,@A
0068            BLWP  @VMBR
0069  B3        NOP
0070            LI    RØ,66
0071            LI    R1,ST2
0072            LI    R2,4
0073            BLWP  @VMBW
0074            CLR   R12
0075  B4        TB    7
0076            JEQ   B4
0077            B     @>609C      ;RETURN TO TITLE SCREEN
0078  ********************ERROR DETECTED
0079  C1        LI    RØ,40
0080            LI    R1,ST4
0081            LI    R2,5
0082            BLWP  @VMBW
0083            JMP   B1
0084  ********************DISPLAY ADDRESS
0085  D1        LI    RØ,34
0086            LI    R7,4
0087            MOV   R3,R8
0088  D2        MOV   R8,R1
0089            ANDI  R1,>FØØØ
0090            SRL   R1,12
0091            MOVB  @ST3(R1),R1
0092            BLWP  @VSBW
0093            INC   RØ
0094            SLA   R8,4
0095            DEC   R7
0096            JNE   D2
0097            JMP   A2
0098  ST1       TEXT  'EXECUTING'
0099  ST2       TEXT  'STOP'
0100  ST3       TEXT  '0123456789ABCDEF'
0101  ST4       TEXT  'ERROR'
0102            END
```

ASSEMBLY LINE

A QUICK REVIEW OF THE DIFFERENCES BETWEEN WRITING ASSEMBLY CODING FOR THE EDITOR/ASSEMBLER AND THE MINIMEMORY

By Bill Gronos
Senior Technical Editor
9505½ S.E. 15th #B
Midwest City, OK 73130

I once took a course in effective writing that taught me the most important thing to keep in mind was the background of the intended readers. Who are they? What is their educational level? What do they want to gain from your writing?

I decided that the readers of this column were probably the most diverse group of people that any of the personal computers could have as owners. The reason for this is simple; TI designed the 99/4 for every member of the family — that is why they call it a home computer rather than a personal computer.

The 99/4 uses the most precise arithmetic of any of the small computers, thus it would be the best choice for people who needed to do serious number crunching. But it also has a joystick port so it can be used as a video arcade. The sophisticated graphics of the 99/4 make it a natural choice for the artistically inclined. The multi—octave range of its sound processor would appeal to musicians. All of these categories of individuals, and many more, are 99/4 owners. But many of this sundry group do have one thing in common: they want more from their computers, to push it to the limits of its powerful abilities.

The mathematician wants lightning fast calculations that will solve complex problems in seconds rather than minutes. The video game addict wants arcade quality action without having to forfeit a pocketful of quarters. The artist wants access to bit-map graphics. The musician wants to enhance his compositions with sound's most delicate subtleties. When this diverse group outgrows BASIC, they become interested in Assembly language and quickly learn to their distress that there is a severe shortage of Assembly language instructional material.

This is the readership of "Assembly Line" and this is the source of my dilemma — how can I possibly please all of these people? TV sitcoms know the answer: write for the lowest common denominator, hand the hoi polloi a continual stream of well-digested hash. I decided not to take this approach.

Instead I try to vary the content of my articles so that sometimes my writing is directed toward the novice and at other times to the more advanced Assembly programmer. At times the advanced users will yawn while I explain some basic principles and at other times the inexperienced programmer will nod off as I belabor an esoteric technicality. Hopefully, I won't bore anybody all of the time.

My goal is primarily to inform, but I also wish to entertain. I hope that you'll smile at least once per column. Assembly language isn't exactly a barrel of laughs, so I try to liven it up a little. I read the Editor/Assembler manual cover to cover and I didn't smile once, though I did cry in a couple of places. If the E/A manual came in bottles it would be labeled Sominex. One of the nicest compliments I ever received was when a reader told me his wife enjoyed my column, though she hardly touches his 99/4.

My mail indicates that I haven't covered the basics of Assembly programming well enough and the following letter is tyical of many I've received:

Dear Mr. Gronos,

This is just to let you know that Gronos' Assembly Translated BASIC as described in the July 1983 edition of the Enthusiast '99 has to be the most exciting development for the TI 99/4 since Extended BASIC! I look forward to reading about the new features as you present them. MY one request is that you print a VERY simplified step-by-step procedure for using this program with the Mini-Memory. As I'm sure you realize, the instruction booklet that comes with the Mini-Memory is worthless for an Assembly language beginner to learn from. A little basic guidance would be very helpful for a lot of us.

Keep up the amazingly good work! I can hardly wait to see what you come up with next.

Steve L.
Springfield, MO

Thank you very much, Steve, and "right—on" about the Mini—Mem documentation. I saw the TI reps at the Houston User's Group meeting catch a few well deserved spears in the vitals on that subject.

Mimi-Mem owners, GATB™ hasn't forgotten you. On the contrary, I'm working on coding designed exclusively for the constraints of Mini-Mem assembly. The GATB routines won't take a single byte of the less than 1K of CPU memory that is left for your Assembly programs when the Line-by-Line Assembler is loaded. You will use the L/L Assembler to create your GATB programs and then use "Easy Bug", which resides in ROM, to load the GATB support routines, which will over—write the L/L Assembler but leave your GATB program intact.

Judging from my mail, GATB has generated quite a bit of interest, so I hope you won't be too angry if I delay giving you another installment until the next issue. I feel it is necessary to explain the differences between the three currently available systems for writing/running Assembly code. It is difficult to present programs to a mixed audience of Editor/Assembler

and Line-by-Line users. I'm still getting many inquiries about a previous article on how to use text (40 column) mode in BASIC. Usually it is the Mini-Mem users who ask me to explain what is required to adapt E/A Assembly programs, but in this case it is the reverse; many E/A users couldn't get the text mode utility to function. Hopefully this article will adequately explain the system differences so that the two major types of Assembly programmers will understand their particular Assemblers well enough to adapt "generic" Assembly code to their own systems. This should cut down the amount of re-explaining needed for every article. Hopefully, Mini-Mem users will come to learn that when I use a line such as "BLWP @VMBW", they will have to substitute "BLWP @>6028" and E/A users will know to load their BASIC support utilities file when I use "BLWP @NUMREF" in a program.

We must consider that there are two systems for writing Assembly programs for the 99/4 (the Editor/Assembler and Mini-Memory Line By Line systems) and there are three different loaders to contend with the Extended BASIC module has the ability to load disk-based Assembly programs.

Note: it is also possible to write and run machine language programs using only the Extended BASIC module and the Memory Expansion, but this is a very tedious and demanding process and if you value your sanity you'll buy the Mini-Memory module.

The first difference is the allowed length of labels. I usually limit the length of all labels to two characters, as this is the limit imposed by the Line By Line Assembler. In doing so I have given up a powerful memory aid, for it is far easier to connect the label RANDOM to a random number generator than the two character label RD. I encourage all E/A users to take advantage of your system's six character label feature. It is especially helpful when you review old programs, as the more meaningful label will quickly jog your memory and save you a lot of head scratching.

Another difference between the L/L and E/A Assemblers that I had to allow for involves the way labels and constants are handled. Both allow "forward references", which means you can use a symbol within an instruction before it has been defined. For example:

```
C    1,2

JEQ LP
```



```
     AI  1,>24

LP MOV  1,3
```

In this example the label LP doesn't have a value when it is first used, but both Assemblers will write themselves a note to plug in a value when LP does get defined. This is true no matter how many times LP is used before being defined.

The forward reference difference occurs when you try to modify the reference prior to its definition:

```
     LI    1,LP+>300

     B

LP DATA >1800
```

The E/A handles this easily, but the L/L assembler blurts out an error when enter is pressed after the first instruction.

To make all programs compatible, I sometimes have to resort to coding whch looks a bit peculiar:

```
     JMP   ST

LP DATA >1800

ST LI    1,ST+>300

     B
```

Since label LP is defined before we add >300 to it, both Assemblers can digest this coding easily.

The same problem could also have been solved by redefining the entry point of the program in the Mini-Mem "Ref-/Def" table, but unlike the E/A which has a "DEF" directive, the Mini-Mem Def's must be recalculated and changed manually. It is less complicated for Min-Mem users to simply define the entry point once as address >7D00 and leave it at that.

The last big difference between the L/L and E/A Assemblers involves the use of utility references. In the L/L Assembler, typing in the line:

```
BLWP @VSBW
```

won't result in an immediate error, but it certainly won't provide the correct address for the VSBW utility. What it will do is enter the label BW into the symbol table and if BW never gets defined you will receive an "UNRESOLVED REFERENCE" warning after you type in END. If you should ignore this warning and attempt to run your program, BW will have a value of >0000. Used as an address in a BLWP instruction, >0000 will likely lock your console up tighter than Fort Knox.

There are two solutions to this problem. You can define your own symbol for

the utility addresses at the start of your program by using the EQUATE directive or you can simply use the utility address in all instructions that require it. Both of the following two forms work equally well:

```
VS EQU  >6Ø24

   BLWP @VS

   AI Ø,32

   BLWP @VS
```

Even better is:

```
BLWP @>6Ø24

AI Ø,32

BLWP @>6Ø24
```

I prefer the latter method of using utilities in the L/L Assembler because it saves room in the "symbol table", which starts at Mini-Memory RAM address >7CD8., This address allows only ten symbols if you use >7D00 as the starting point for your program. By using the actual utility address I save space for an additional symbol.

If you need room for more symbols than the Mini-Memory default address will allow, you can easily change the program start address as follows:

```
7DØØ ØØØØ AORG >7D2Ø
```

Be sure to change the address of the entry point to >7D20 or your program will try to execute the symbol table.

Each Mini-Memory requires four bytes of space: two for the symbol label and two for its address. Thus, >7D20 gives you room for eight more symbols than starting at location >7D00 does.

Editor/Assembler users don't have this problem with utility addresses. They only need to include the directive:

```
REF VSBW
```

and they can then "BLWP @>6024" to their heart's content. Of course, "BLWP @>6024" will not work in the E/A, as that utility address is only correct for the Mini-Memory.

This brings up a point that a caller asked me:

"I can load "Tombstone City" (a game included with the E/A that can also be purchased separately on disk) with the Editor/Assembler and I can load it with the Mini-Memory 'Load and Run' option, but it causes an error when I try to load it using the Extended BASIC loader. I called Texas Instruments and talked to one of their Assembly programmers, but he couldn't tell me why it won't load with Extended BASIC loader."

Well, the reason came to mind instantly—the Extended BASIC loader doesn't support utility references or compressed object code, nor will it load relocatable code larger than 8K. If the Ex. BASIC loader encounters any of these when loading tagged object code it will terminate the load and issue an error.

A utility reference is nothing more than a predefined address which gives the starting point of a built-in subroutine or the location of a frequently used memory area. The most commonly used utility references are those used with the system utilities: VSBW, VMBW, KSCAN, etc. The E/A must include all of these in a reference directive if they are used in a program:

```
REF VSBW,VMBW,KSCAN
```

Now here is something that isn't made clear in the Mini-Memory booklet: if you have a disk memory system, you can use the "LOAD AND RUN" option to execute Assembly programs that were written for the E/A system. When your Mini-Mem encounters "BLWP @VSBW" while it is loading a disk program, it will look up the correct address it needs in order to use this utility (in this case >6024). Thus, while the Mini-Mem won't let you use an instruction such as "BLWP @>VSBW" when you are writing an Assembly program with the L/L, it will recognize such a line when the 'LOAD AND RUN OPTION" is used. All the utility references that are predefined in the E/A will load correctly into the Mini-Mem because all of them are defined in the Mini-Mem's internal table. Not all the legal utility references that the Mini-Mem will recognize and resolve are listed in appendix B of the Mini-Mem instruction booklet, which may lead one to believe that they can't be used. But don't worry, I checked to make sure the Mini-Mem could handle references such as "PAD" and "VDPSTA".

In doing this, I uncovered another mistake in the Mini-Mem documentation: the start of the predefined REF/DEF table is >6F0E, not >6F38 as page 72 of the Mini-Mem booklet would have you believe. This is a minor error, but there are other Mini-Mem documentation errors that will ruin your programs and have you trying to figure out what you did wrong for hours.

One such error is on pages 46 and 50 of the Mini-Mem booklet. At the top of page 50, the routine code to access the "CONVERT FLOATING POINT TO INTEGER" is given as >2300. TI can't say this mistake is some poor secretary's fault, for that number is the code to be used with the E/A (see page 261 of the E/A manual). The correct code that must be used in the Mini-Mem is >7200. I get awfully tired of debugging TI's mistakes and believe me, that is far from being the only one!

So as far as I know, the "Convert Integer to Floating Point" routine is the only utility that will prevent E/A Assembler programs from running correctly on both Assembly systems. Just as the Mini-Mem loader can handle all the utility labels the E/A can throw at it, the Mini-Mem can also handle any programmer defined label that is used in the E/A created programs, up to the E/A maximum of six.

Because of the similarities between the E/A and Mini-Mem loaders, no great

problems arise when the E/A programmer wants his coding to run on both systems. A far greater problem arises when the E/A programmer wants to write coding that will be acceptable to both the Mini-Memory and the Extended BASIC loaders.

This problem results from the Extended BASIC loader drawback I mentioned earlier; it won't support utility references. If you have any "REF" statements in your E/A Assembly code, you will get a bad tag error when you attempt to load it with the Extended BASIC loader.

To get around this drawback, you will need to use an "EQUATE" directive for every utility routine your program uses. Section 24.4.8 in the E/A manual lists the required Ex. BASIC equates. An example should clear this up:

```
REF VSBW,VMBW
```

This will be accepted by the E/A and Mini-Mem loaders, but will cause an error with the Ex. BASIC loader. For Ex. BASIC, replace the "REF" statement with the following two lines:

```
VSBW EQU >2020

VMBW EQU >2024
```

These Equate directives will not work correctly in the Mini-Mem or E/A; both define these functions at different addresses.

Having to look up equate addresses for the Ex. BASIC loader isn't the only utility problem you'll run into. What equate address would you use for GPLLNK? Can't find it in the book, can ya'? No, TI didn't forget to put the address in the book; there is no equate for this routine. Ex BASIC doesn't include all the E/A and L/L utilities. Should you need them, you will have to write them yourself.

The Ex. BASIC loader is inferior to both the Mini-Mem and E/A loaders in other ways as well. It is slower to load and is unable to load as large an Assembly program as the other two.

In spite of the drawbacks of the Line By Line Assembler, the Mini-Memory actually has some advantages over the Editor/Assembler. In the E/A system, the BASIC Support Utilities (NUMASG, NUMREF, STRASG, STRREF and ERR), if they are used in a program, must be loaded along with the Assembly program from a disk that is included with the E/A system. This is why many E/A users couldn't get the text mode utility program to work, as it used the built-in parameter passing functions of the Mini-Mem and they didn't know the extra disk file would have to be loaded.

These utilities, which greatly simplify the passing of variables between BASIC and Assembly programs, are included in the Mini-Mem ROM and do not require a separate loading.

Another advantage over the E/A is the extra 4K of RAM space that the Mini-Mem provides, so if you have the Memory Expansion you can actually run larger Assembly programs than the E/A can support.

Also, in spite of its severe editing limitations, I feel it is easier to learn Assembly programming with the Mini-Mem than with the Editor/Assembler. You are instantly alerted to any syntax errors you make as soon as you type them into the Mini-Mem. These errors will only be detected when the E/A systems begins to assemble a file you have already created.

Another learning advantage the Mini-Memory has over the E/A system is that you get to see the exact object code created as you enter each of your Assembly instructions. This gives you a better understanding of what the Assembler actually does.

SUMMARY

There are differences between the Editor/Assembler and Mini-Memory Line By Line Assembler that have to be taken into consideration in preparing the program listings in these articles. Where possible, I use formats that can be handled by both systems. However, there are some differences that will require Mini-Memory users to replace some program lines with others. The major difference is the L/L Assembler's inability to handle predefined utility labels. Normally, all necessary changes will be fully documented at the beginning of each program in a comment section titled "Mini-Memory Modifications".

I hope this will help end the confusion caused by having to contend with different Assemblers, but what can you expect when it's possible to write a program with the Editor/Assembler that doesn't work when someone else uses it with their E/A! This can be caused by differences between consoles, even between two 99/4A's. There are several different versions of console ROMS and even TI isn't sure of all of the differences! Before they release any software, they test it out on six different consoles. These differences make third party programmers into nervous wrecks when the software they thought was thoroughly debugged is returned by consumers with torrents of angry complaints. In an attempt to avoid these programmatical uncharted coral reefs, I try to stay away from "magic address" shortcuts which may not work on all consoles.

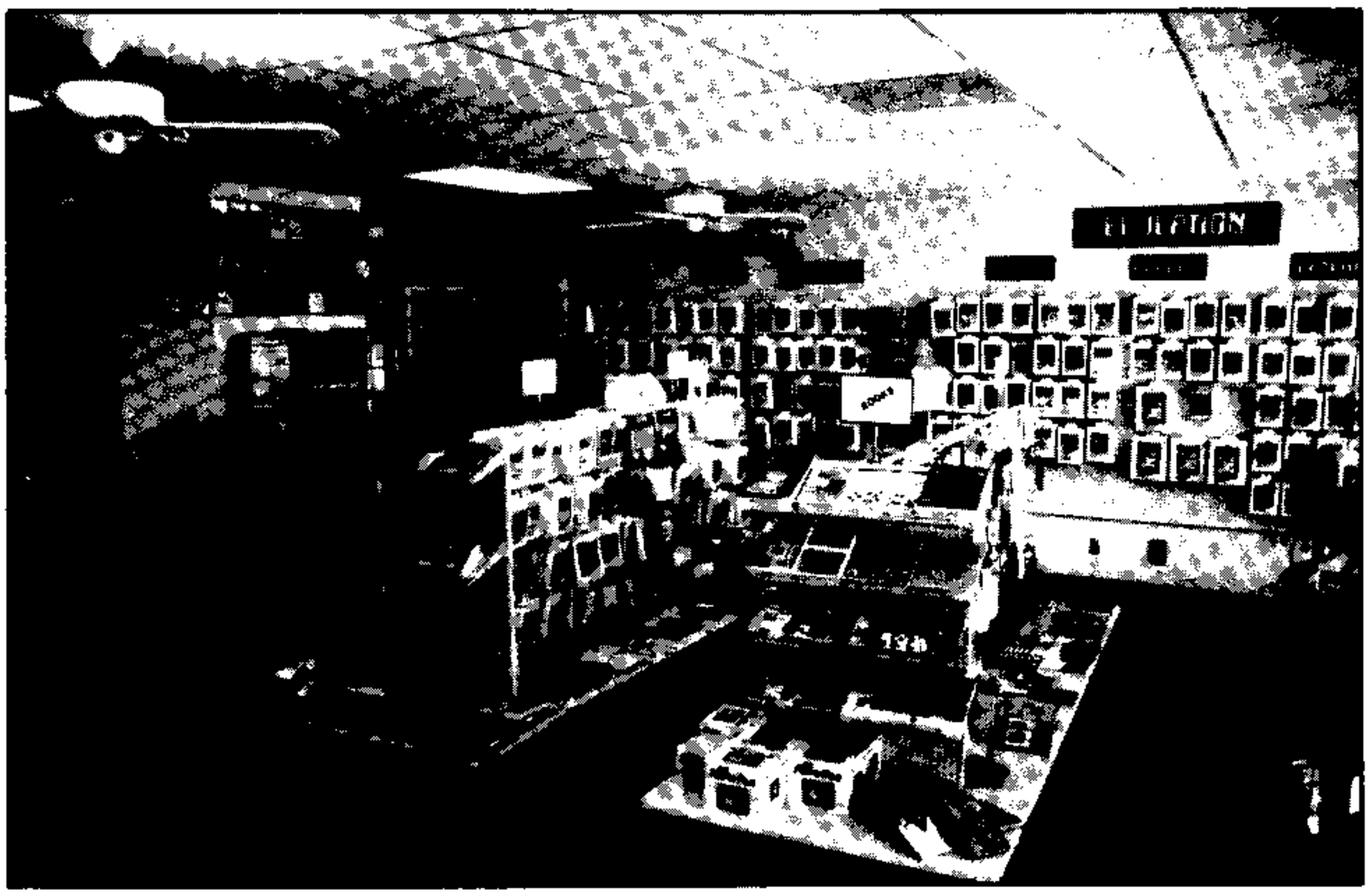
OOPS!

Several lines of coding were omitted in last issue's GATB routines. The following lines should be inserted between lines 0165 and 0166:

```
     RTWP

PD3  LI  0,'--'

     ABS 2

     JMP PD4

PD2  DATA 10000,1000,
                    100,10
```

A big "thanks" to Edward D. Kennedy of Trotwood, Ohio, for notifying me of the errors and sending me his assembler output list of GATB which allowed me to find the mistake in a matter of minutes.

RETAILERS SHOWCASE



UNISOURCE HOME COMPUTER CENTER

Can a successful mail order company make it big in a retail environment?

That's the question Craig Reitan, President of Unisource Home Computer Center and Unisource Electronics, is asking himself at this very moment.

Unisource Home Computer Center is a new retail store located in Lubbock, Texas. It is nestled in the University Square Shopping Center at University Avenue and South Loop 289, and will specialize in filling the needs of the Home Computer customer. Unlike most computer centers, Unisource will not cater to the small business computer user. Featuring more than 1000 software programs, peripherals, and accessories for the TI Home Computer, Unisource hopes to offer specialized services for the ever-increasing numbers of home computer enthusiasts.

The name Unisource is probably familiar to most of our readers. For more than two years prior to opening the Home Computer Center, Unisource Electronics has been selling Texas Instruments Home Computer software and peripherals to its thousands of mail order catalog customers.

According to Reitan, having a retail outlet while continuing in the mail order business has several advantages.

"It gives us the opportunity to inventory several hundred thousand dollars worth of product so our customers can try out these products and examine them first-hand prior to their purchase. Our current inventory levels are in excess of $200 thousand, and include everything from dust covers to hard disk drives," Reitan went on to say.

In addition to the multitude of software products at Unisource, they will also offer hands-on classes in separate on-site classrooms staffed by professional teachers. Classes will range from subjects of getting acquainted with the home computer to Assembly language programming. Many of these informative classes will soon be available to Unisource customers on video tape for home viewing.

Unlike the mass-merchandisers who sell the TI Home Computer, Unisource Home Computer Center plans to carry every conceivable software title for the 99/4A Home Computer. Recently, Unisource was awarded a $200 thousand contract with the Lubbock Independent School District to supply Lubbock's elementary schools with computer systems for the upcoming school year.

Lubbock School District's commitment to the TI Home Computer will give hundreds of elementary school students the ability to participate in computer educational courses and operation.

As a former TI employee, Reitan is very familiar with the product line he sells. His love for computers started several years ago as a student at the University of Minnesota and has continued to grow ever since.

Can a computer store specializing in items exclusively for the Texas Instruments Home Computer be successful? We here at the International Users-Group certainly think so.

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USERS-GROUP SPOTLIGHT

OH-MI-TI AND NEW HORIZONS

M*A*S*H's Corporal Klinger may have thought the greatest things about Toledo were the Mud Hens baseball team and Tony Paco's hungarian hot dogs. But he never attended a meeting of our local TI-99/4(A) Users Group!

In all fairness to Jamie Farr, though, we really haven't been around that long. A few of us remember the days when the computer had those funny little keys and when Charles LaFara was about the only other person you knew who had a TI. But most of us got our computers during the Great Rebate of 1982. After Christmas, it was becoming obvious that the time for a local Users Group had finally arrived when TWO groups started the same week without knowledge of each other.

The OH-MI-TI (Ohio-Michigan) club was organized by George Knight-Smith, a TI representative, and Don Wollenbecker. In his retail sales activities, George encountered many people who expressed interest in forming a Users Group. After talking with George, Don decided to get things started. Since he is a fireman in Oregon, Ohio, Don was able to line up the fire station meeting room for the first organizational meeting. Although they expected the usual 20 to 30 people, their newspaper ad drew 80! That led to the group's name because when he saw the size of the crowd, Don exclaimed, "Oh my...", and George quickly added "TI!"

Meanwhile, across town, John and Norma Clulow had been reading Bernie Elsner's TIUP newsletters from Western Australia. The enthusiasm evident in the TIUP group motivated them to contact Nanci Lucas, Director of New Horizons Academy, to sponsor the New Horizons Home Computer Users Group. Nanci, Norma, and John knew several people with TI's, and those people knew still others: Forty-five people showed up at their first organizational meeting.

From the first meeting, our membership has continuously increased thanks to the publicity given us by a number of local retailers. Our combined mailing list is over 200 and growing. If you don't have a Users Group in your town there's no need to worry about membership: Get a group started and TI users will find you.

Soon after their first meetings, the two groups discovered each other. They decided to organize separately to provide a choice of meeting dates and locations for the growing membership. But at the same time there was interest in sharing functions like the newsletter and program library. The club Presidents, Don Wollenbecker (OH-MI-TI) and Phil Newton (New Horizons) worked together in the spirit of cooperation, and many people decided to become active members in both clubs.

During the organizational process both groups relied heavily on TI's Users Group Start-Up Kit. We also had the benefit of the ideas and experience of other groups such as Cin-Day, Milwaukee, Washington D.C., TIUP, and the IUG, and their help proved invaluable. Of equal importance was our emphasis on member involvement. We wanted everyone to have the opportunity to contribute. We found that a good way to encourage participation in the first few meetings was to have members work on questions in small groups of four or five and share their results later with the larger group.

People are first attracted by what they can get out of the group, but they soon discover how rewarding it can be to make a contribution themselves.

As Roger Diddle, OH-MI-TI vice-president, put it, When someone calls with a question I can't answer, I'll often sit down and take the time to figure it out. In helping them out, I learn a lot, and that's one thing I really enjoy about being a member."

Our members have a broad cross-section of interests and abilities. Through their interaction all kinds of new ideas can emerge, and finding ways to facilitate that interaction has been a continuing challenge.

One way we've tried to do that is to have club members give presentations at every meeting. Our members have given tutorials on BASIC and Extended BASIC, graphics, programming, cassette data files, and program debugging techniques; demonstrations of game and educational modules; and packages like TI Writer, Multiplan, and TI LOGO. Two topics are usually presented at each meeting, and they are given twice so that everyone can attend both.

At one particularly interesting meeting, Mike Flaker (a TI employee) and Will Anderson ran the TI Professional Computer through its paces. Several jaws dropped at the quality of the color graphics generated with the three-plane graphics board. The recently introduced TI

850 printer was also demonstrated at that meeting and in a subsequent meeting Lamar Parker showed how the 850 could be interfaced with the TI-99/4(A).

The newsletter can also be an important way of encouraging member involvement. The first issues simply summarized the previous meeting and provided current information on TI products. Recently, however, we have tried to adopt the format developed by Bernie Elsner of TIUP. Our first attempt contained over twenty articles by fifteen different members, and we plan to issue that kind of newsletter every two or three months.

To encourage members to write and share programs with others, Kent Sheets established four "neighborhood" member lending libraries. The librarians are strategically located throughout the area, providing easy access for everyone. Kent hopes to expand this concept to include such items as books, modules, and back issues of publications like Enthusiast '99 and our local newsletter.

We also try to provide services designed to enrich our members' experience of personal computing and at the same time minimize cost. In one such project we learned something about high-speed cassette duplication. The IUG sent us four disks containing 50 programs to get our library off to a good start. Of course, everyone wanted to know how they could get copies, so we purchased C-30 cassettes in bulk and rented a duplicating machine from a local church. In preparing our first batch, we discovered what happens when too many programs are squeezed onto the master tape. Cassettes vary in length, so some were missing parts of programs. In our second edition, we learned not to make more than 50 copies from a single master. After that the master tends to stretch creating distortion. In spite of the problems, we were able to make the programs available at cost.

We have also purchased items in quantity for resale at cost to our members, such as blank cassette tapes and Steve Davis' book *Programs for the Home Computer* . These group purchases help offset part of the $12.00 annual dues.

Other club activities include social get-togethers like our first annual picnic organized by OH-MI-TI, giving members the opportunity to get to know each other outside the context of a regular monthly meeting.

We are very much interested in communicating with other Users Groups, and if your group would like to correspond or exchange newsletters please contact our newsletter editor: John Radscheid, 1106 Cribb St., Toledo, OH 43612; Phone (419) 478-5950.

CHARLIE'S PAGE

By Charles La Fara
President, Interational 99/4 Users-Group

STANDARDS?

Several months ago Microsoft Corporation, the people who wrote TI BASIC, Multiplan and most of the current operating systems for today's Home and Professional computers, announced a new product called MSX. The joint announcement said that Microsoft and 15 computer manufacturers are setting MSX as a standard operating system for their current and future computers. Will this bring standardization to the entire industry? Is this what we really need, a standard?

Certainly standardization has its appeal to the manufacturer. By using the same operating system research and development costs would be reduced for key elements such as software and peripherals. Use of a system like MSX would give the manufacturer more of an opportunity to concentrate on marketing and product differentiation rather than obfuscation and technical gee-whiz.

One would also think that most retailers would welcome standardization. No more stocking the same software product for different machines. Titles could be increased due to the reduction on inventory demand. Surly consumers would welcome standardization. No longer would there be the frustration of knowing that there is a title for his friends or neighbors' computer that he could not find for his own.

Standardization will come to this industry as it has to others either by de facto or by law. Standards in software, peripheral design and operating systems are a must for the computer industry if it is to survive. The big question is, however, this: has the industry evolved to that point?

To help us make this decision we have to look at other industries, and see how standards evolved for the benefit of the entire market. One such industry is the automobile industry. Sixty years ago there were more than 100 manufacturers of automobiles in this country alone. Each offered to consumers a wide variety of designs and technologies. Automobiles ran on gas, steam and other forms of propulsion. Transmissions consisted of everything from manual and semi-automatic to fully automatic. Some cars had to be crank started while others offered electric ignition systems. Is this any different than having different formats and initializing routines for every microcomputer?

What about the phonograph or photographic industries? How many of us are still playing 16 rpm or 78 rpm records, and when is the last time you bought some TYPE 42 Polaroid film? Automobile, record player and camera sales have not fallen off because these industries have built their products around standards. In fact, these industries have grown possibly because of it. Still, that does not mean that the computer industry is ready for standardization.

Recently Don Bynum and John Yantis, two TI executives who I have a great deal of respect for, visited with me here at the Users-Group office. Both of these gentlemen are charged with the development of future TI products and strategy in the Home Computer line. During our conversation we talked about standardization and the positive and negative aspects it may have on the industry. Although I am not sure any of us totally agree with each other on all points of standardization, several interesting questions arose.

The personal and professional computer industry is less than half a decade old. It is divided into two distinct factions, much as the automobile industry was in its beginning stages; that of the entrepreneur and the corporate giant. Each lending its own expertise. Each struggling for dominance. Both bringing new technologies to a single market place. Good for the entrepreneur...Good for the corporation...but not maybe so good for industry or all consumers. Yet without both of these factors competition and ingenuity would stop or at least slow down.

I shudder to think the ultimate operating system has been developed in the first five years of this high-tech industry. Has the fastest possible data transfer rate for tape already been established?. Can we achieve no higher resolution from monitors? Is the 5¼ inch diskette the 45 rpm record of this industry? I for one hope not.

Any attempt at a total industry standard at this time could be fatal. We are just not ready for it. I find it almost loutish to hear our educational community calling for a standard in computers. They can't even set a standard on a pencil or text book let alone a computer operating system. Sure, it would be nice to have all of our children learn TI BASIC or some other standard BASIC language, but if it is so important to have a standard why do we educate our children in French, German and Spanish? As I said earlier, standardization in this industry will come, but not today or maybe not even in the next decade. It's just too early!

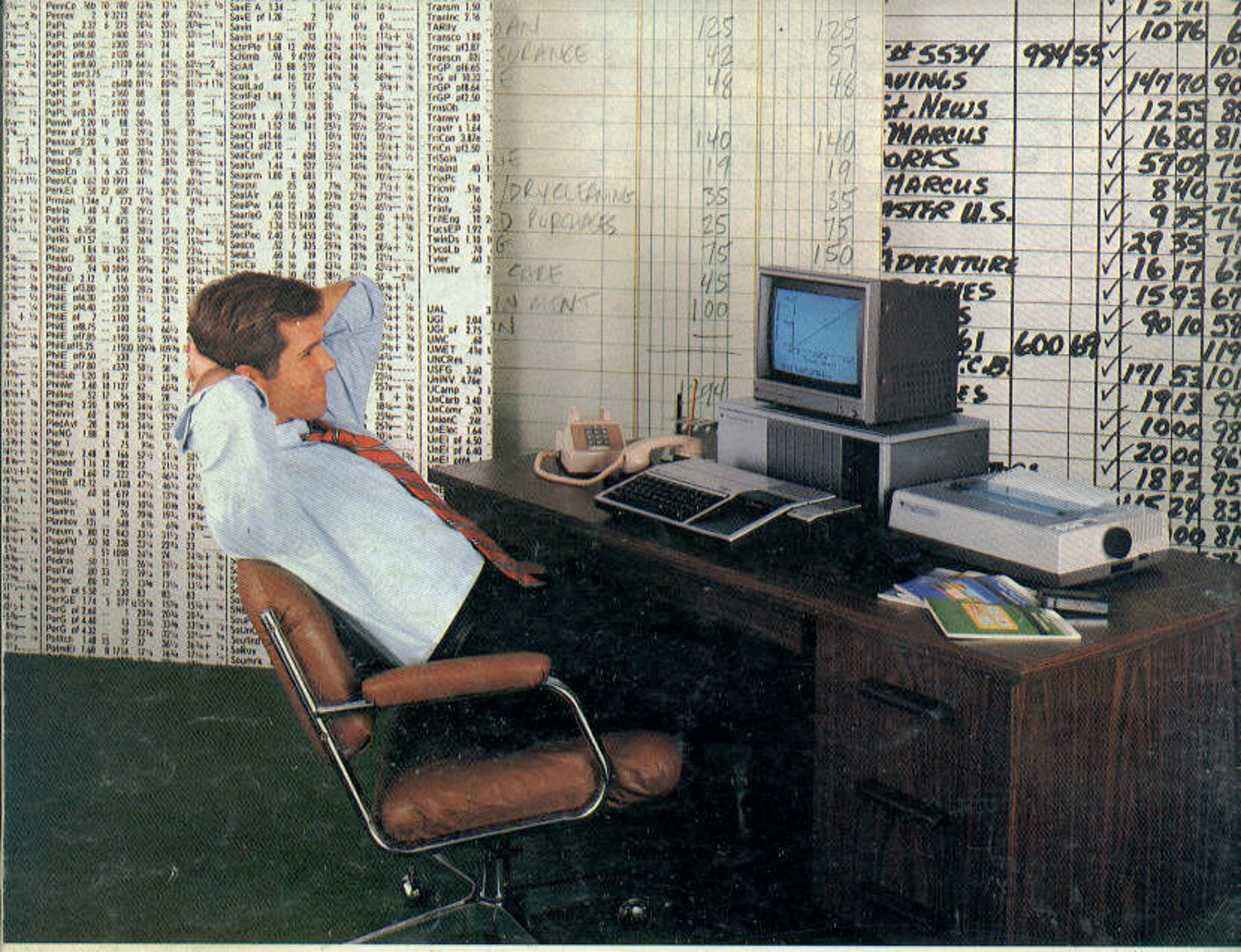
Sure, many of us have seen our equipment and software become obsolete and possibly if there had been an industry standard this would not have happened. By the same token, however, we only have to ask our fathers why he no longer drives a Nash or Studebaker or 16 cylinder Morman as my dad did. The reasons are clearly the same. Yet without the Nash, Studebaker and Morman, what would our fathers have learned to drive in and enabled them to teach us?

Standards will indeed come but for those of us who were farsighted enough to own a computer in this industry's infancy, we will be not only versed in the old but ready to accept the new. We will be the experienced. Able to teach as well as learn. And what greater gift can one give to another than knowledge?

No one has the IUG in their hip pocket...

Our members get all the facts in Enthusiast '99

International 99/4 Users Group



TI's Home Computer Software. The most management for the money.

Think of all the questions facing your family today. What if your son decides to attend a private college instead of State U? How will the economy affect your investments? The Texas Instruments 99/4A Home Computer and its information management software can give you more answers you can really use. Whatever you need, we have.

For home or personal business decisions, Microsoft® Multiplan™ has a comprehensive spreadsheet program. TI Count offers an integrated accounting system which stores, retrieves and displays valuable financial information. Personal Tax Plan from Aardvark Software, Inc. performs comprehensive tax planning calculations in seconds. You can also do word processing at home with TI Writer.

You can use TI software like Personal Record Keeping and Home Financial Decisions to keep things running smoothly. With optional equipment your TI-99/4A Home Computer can access many on-line computer information and communication services to help keep track of your real estate and securities investments. For budgets, finances, investments, TI has the program for you.

For all your personal money matters, the TI Home Computer can be your most valuable information management tool. For more details about our information management software or our broad selection of other software applications, call toll-free: (800) 858-4565.

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