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# MICROpendium

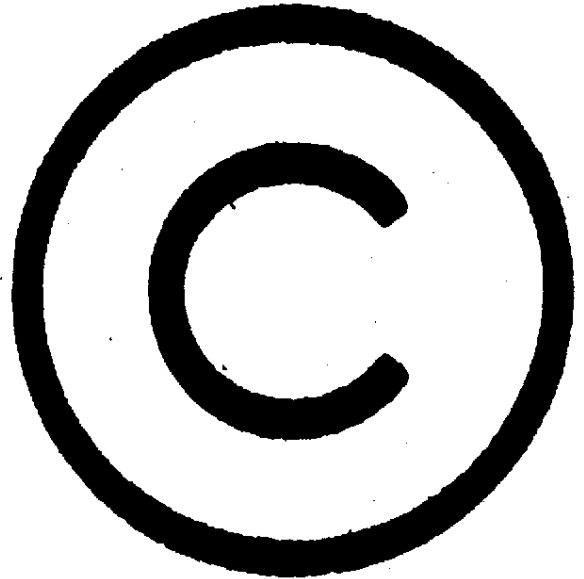
Covering The TI99/4A Home Computer And Compatibles

Volume 3 Number 2

March 1986

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mean—Page 14



**DONT XRAY** #01

Computer Disk: DONT BEND !

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- Souped-up TI99/4A keyboards
- Structured BASIC programming
- Who's that Tigercub?

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# Comments

## Christmas in February

Christmas came in February for me. That's the month I received GRAM Kracker from Miller's Graphics, the Horizon RAMdisk and Maximem by 146 178 CAN INC. Obviously, we can't get reviews out on these products in this issue, but be on the lookout next month. We've farmed out Maximem for a review, so I can't speak for it. But the RAMdisk and the GRAM Kracker are two very nice products. The RAMdisk I'm using has 180 kilobytes of memory, all of it battery backed. That's the equivalent of a double-sided disk drive. GRAM Kracker makes saving cartridge programs to disk easier than I would have believed possible. Both the GRAM Kracker and the RAMdisk use battery backed CMOS chips, which means both devices can store programs or files even when the computer is turned off.

One advantage that seems to be due to the GRAM Kracker: since I've plugged it into the GROM port, I've not experienced a single system crash. I've got an Extended BASIC cartridge that is as temperamental as my neighbor's cat, but since I saved the XBASIC program to disk and reloaded it into the GRAM Kracker there has been not even a flicker on the monitor.

What can you do with the GRAM Kracker? It depends on how skilled you are or how much time you want to spend to get the most out of this device. At its simplest, it allows anyone to dump the contents of most cartridge-based software to disk. These programs may then be loaded into the GRAM Kracker, with GK serving as a pseudo module, so to speak. One can save Extended BASIC to disk, load it into GK and have it available any time the computer is turned on. The user can load and reload as many cartridges as desired, without having to insert various cartridges in and out of the GROM port. Having saved a cartridge to disk with GK, there is no reason to use it again. This appears to reduce wear and tear on the GROM port.

Having a program loaded into GK memory means that a hobbyist may modify it to his heart's content. This includes the TI operating system as well as most cartridges, with the exception of the Milton Bradley cartridges for the MBX system. Those who own a Version 2.2 console can convert its operating system to a non-V2.2 system by loading the operating system of a non-V2.2 system into the GK. Having saved XB to disk, the user can load it into GK and change color defaults or add a slash to the zero character. One can turn Terminal Emulator II into a 1200 baud terminal emulator with a few code changes. Early TI cartridges that don't include parallel printer options may be modified with GK to output data to a PIO port. GK can also emulate a

Super Cartridge by providing an additional 8K of RAM for assembly language programs. All of these changes are documented in the GK manual. One can also save a number of BASIC programs or utilities to GK and call them up via a menu. For that matter, one can load more than one module in GK and access them via a menu. GK also comes with a set of Extended BASIC CALLs, including CALL NEW, CALL BYE for use in programs, CALL CLSALL to close all open files, CALL CLOCK, which displays a 24-hour clock in the upper right hand corner of the screen, CALL CLKOFF to turn the clock off and CALL CAT to catalog a diskette without losing the program in memory.

This should give you an idea of what this device does. I have barely scratched the surface. It includes a Memory Editor that allows the user to modify any program that is loaded into GK GRAM. Readers who have made useful modifications to the TI operating system or cartridge software are encouraged to share their discoveries with others. We'd like to hear from you.

### FULL-SPEED AHEAD

Mack MacCormick finally received his computer after being stationed in Germany—he's a major in the U.S. Army—and we're continuing his assembly language tutorial with installment No. 4 in this issue. The tutorial went on a two-month hiatus while Mack got settled in Europe.

We're also welcoming our BASIC/Extended BASIC columnist Lee Wilkerson. Lee's first column appears in this issue. We hope you enjoy and learn from it. We anticipate introducing a Forth columnist this spring, also.

### Z80 HELP SOUGHT

We've had a few inquiries from purchasers of the Foundation Computing Z80A and 80-column cards. Most have to do with questions about using the card, (We've not been able to get in contact with Foundation, which recently went out of business.) Questions include how to access printer ports and the like. Although we don't have the space for a regular column, we would appreciate any help from readers that we can pass on to these new "orphans." Right now, advice on accessing a parallel or serial port using both the Z80A and 80-column card would be helpful.

### PAYING FOR BA-WRITER

One of the visitors to the TI Fest-West in Los Angeles was Paolo Bagnaresi, author of BA-Writer, who arrived there with a stack of \$10 checks from the U.S. that he had been unable to cash in Italy. So we are passing along that he would appreciate receiving payment with international money orders (the cost of these money orders is fairly high, but we repeat that his program is an excellent one).

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The **SST EXPANDED BASIC COMPILER** package translates a Basic program into TMS9900 machine language, resulting in a great gain in program execution speed. The compiled commands are up to 160 times faster than the corresponding commands in **TI BASIC** or **EXTENDED BASIC**. For a comparison we used our Compiler to run the benchmark program for making change in the April 1984 **MICROpendium**. This program takes over 30 minutes in **TI BASIC**. When the program was compiled using the **SST EXPANDED BASIC COMPILER**, the program ran in 37 seconds. In fact, you can compile the program, save it on a disk, recall it, run it and still be considerably faster than **TI BASIC**.

A second benchmark program appeared in the November 1984 issue of the **MICROpendium** (page 22). This program took:

209.4 seconds in <b>TI BASIC</b>	7.2 seconds in <b>TI FORTH</b>
219.6 seconds in <b>TI EXTENDED BASIC</b>	4.9 seconds in <b>WYCOVE FORTH</b>
<b>2.5 seconds in <b>SST BASIC</b> or <b>EXPANDED BASIC</b></b>	

The **SST EXPANDED COMPILER** is also many times faster than **TI PASCAL**.

The **SST EXPANDED BASIC COMPILER** contains most of the standard features of **EXTENDED BASIC** and is especially useful for number crunching, text manipulation and for producing arcade type games. However, some translation of a Basic program may be required.

**SST Software** has invested about two and one half man-years in the development of this package. With the requirements of **Memory Expansion**, **Disk Drive** and either **Editor/Assembler** or **Mini-Memory** the **SST EXPANDED BASIC COMPILER** gives you the following features:

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# Feedback

## Don't despair

Amazing but true! A Trio+ Software disk arrived in my postal box recently and I was looking forward to it too. My heart sank, though, when I saw the heavy cardboard mailer it was in had been creased right across the middle.

I wondered about the possibility of a cross or jilted postal worker, someone who may have snapped perhaps. I opened the mailer when I got home, and, yes, there was also a heavy crease across the plastic disk sleeve.

I turned the disk by its hub slowly, checking through the read hole for a crease or damage to the disk inside. There was a gradual hump in the disk, but no sharp crease at all.

There seemed to be no likely risk to my disk drive, so I attempted to load the software, something I would not do if there had been a sharp crease on the disk inside. The program loaded flawlessly, and I was able to make a back-up, saving the "folded" original for a standby.

So do not despair, if you get a creased mailer, it may very well contain "survivor" software just as mine did.

**A. Robinson**  
Vancouver, British Columbia

## Counter point

I wish to comment about a letter from Fred DuVall (Feedback, Jan. 1986).

I wonder if Mr. DuVall owns a Myarc product, or has any idea what Myarc/Lou Phillips has done for the 99/4A owner.

1. Double-sided, double-density disk drive controller.
2. Memory expansion/RAM disk 32, 128 and 512.
3. RS232 card.
4. Hard drive personality card.
5. Hard drive system.
6. MPES mini-peripheral system.
7. Extended BASIC Level IV.

TI was famous for delays, and I'm sure TI had more tech...

and money.

I think we should thank people like Lou Phillips and Jackirae Sagouspe for the support that has allowed the 99/4A user to upgrade.

My 99/4A systems have the Myarc double-sided, double-density disk drive controllers and 128 and 512K memory expansion/RAM disk, and operation is excellent and fast.

It is a shame that impatient people like Mr. DuVall complain about something that hasn't hurt anyone in any way, but his negative comments can be a black mark in the mind of the consumer.

**Jay Axelrod**  
Miami, Florida

## An easier way

[In] an article in your January issue....about multi-column printing....it was mentioned that once formatted, the text file must be reloaded and the symbols removed. The suggested method is using the global replace. An easier method is to load it into the editor and then use PF to print it back out, but precede the filename with a "C". For example:

```
C DSK1.TEXT
```

This will strip away all control codes. Another method is just to load it into the E/A editor, then resave it. This editor automatically removes control characters.

**Joe Spiegel**  
Coraopolis, Pennsylvania

## Try XBASIC instead

This letter is directed to Terence Mahoney and any other readers who are trying to use the control keys to enter reserved words into program lines in BASIC. Instead of BASIC, try XBASIC. In the immediate mode, "UNRECOGNIZED CHARACTER" is the result, but in a program line, no REM is needed. The reserved word is inserted into the program line where it is required without any errors! Try it!

**Kurt Elliott**  
Pottstown, Pennsylvania

## 'Chronicles' called 'must reading'

Ron Albright's book *The Orphan Chronicles* [from Millers Graphics]...is MUST (should be required) reading for ALL members of EVERY users group. It'll certainly answer Gary Kaplan's question which was his answer to a question about a "new machine": "What do you want to do that you can't do now?"

**Roy C. West**  
Lexington, North Carolina

## Don't lump together all TI-Writer loaders

I have just sighted your December 1985 issue, as such things take a long time to get to Newcastle. It is reassuring for TI99 users to learn from your editorial of another example where an individual programmer using only a TI99 has produced the kind of utility that TI's programmers with their fancy development systems and inside knowledge should have produced years ago.

However, your statement lumping all previous TI-Writer loaders together is just too sweeping. the FUNLWRITER program, an Extended BASIC loader for TI-Writer entirely written here at Funnelweb Farm and also distributed by the Hunter Valley 99 User Group, was made available in Europe through Stephen Shaw in mid-1985, and sent to North America only slightly later.

Support of SD was a design goal from the very beginning, and as released SD supported a paged display of any possible number of files on a disk, along with other useful snippets of information not usually given by disk catalog programs. This is obtained with no decrease at all in the size of files that may be loaded or written with the Editor.

FUNLWRITER V3.0, now issued as "freeware," has now already been sent to my contacts in North America and

(Please turn to Page 10)



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"The Leader of the Pack"

# Feedback

(Continued from Page 8)

the UK. This has improved on V2.1; for instance, it no longer dumps you back to the title screen on exit, even from the Editor after paged SD of a full disk, and now almost completely supports Editor/Assembler module functions as well. It loads and modifies the TI-Writer Editor as a source code editor, fully supports the Assembler, will LOAD and RUN D/F80 object files, and will also load TI-Forth as a bonus. The user interface to these programs has been improved, and the effects of having the loader program in memory have been eliminated where possible. Once V3.0 is loaded you can switch between Editor, Formatter, Source Editor and Assembler indefinitely, without return to the title screen. The program has been used as its own development system for some time now.

The program also has a built-in interface to the program files of the excellent DM1000 V2.3 disk manager program issued as "freeware" by the Ottawa User Group. Combination of these programs means that a single SSSD utility disk used with the XB module can entirely replace the TI-Writer and Disk Manager modules, and almost entirely replace the E/A module. Just think what TI could have done originally to provide an integrated operating environment on this machine, if they had not been so bewitched by the idea of selling software a little module at a time.

**Tony McGovern**  
**Funnelweb Farm**  
**Kotara, Australia**

## Different products, same name

I noticed an advertisement by a company who has released a new product that has the same name as one that I have developed and is marketed by Texaments from Patchogue, New York.

This product is TI-ARTIST COMPANION and sells for \$17.50. My

product has been on the market since December and, with this other company's product having the same name, this could cause some confusion among purchasers of my product. This ...is to point out to your readers the differences between the two and to dispel some of the confusion.

Since I have not seen the product by the other company, I will not compare content quality. In regards to price, their claim of "cheapest" is misleading. Their price is for two disks, mine is for five, with both averaging \$3.50 per disk. I don't have Chris Bobbitt or Warren Agee as artists. The artists that designed the graphics and fonts for my Companion are just as professional, they being the users of my CSGD [Character Sets and Graphics Design] products. All purchasers of my Companion have been elated over the explicit detail afforded by all the graphics and fonts in the package.

**Dave Rose**  
**Fairfield, Ohio**

## Get around spacing

In answer to your reader on TI-Writer problems with the automatic double-space after a period, and the equally troubling automatic single-space after the question mark and exclamation point, the TransLiterate command can be used to get around all three problems.

Try this: Include in your formatter commands

.TL 62:46 and  
 .TL 63:63,32  
 .TL 33:33,32

.TL 62:46 translates the "greater than" sign over the period back into a period, but when encountered by the formatter disables the automatic double-space. The .TL 63:63,32 translates the question mark into a question mark and a space automatically, and provides two spaces after a question mark. .TL 33:33,32 does the same for the exclamation point.

The only thing to get used to is to use the [shift] period when you want a single space after a period. This should

not be too difficult, especially for an experienced typist, as on the standard QUERTY keyboard [shift] period is a period anyway. If you do want a double space after a period, then just type the regular period.

If you want a single space after the "?" or "!", then do not include a space after the use of these marks, and one space will be automatically provided. One minor bug...is the failed attempt to close up the space between the question mark and the single quote but the great majority of the time I want two spaces after a question mark.

An advantage of the method described here is that it allows for use of the Formatter capabilities. For instance, you can still use a 40 column screen and use the .FI command for later formatting to an 80 column print-out.

**John P. Stephenson**  
**East Waterford, Pennsylvania**

## Key stroke left out

I found that I omitted an important key stroke in my letter in the February issue on "Taking Control of CTRL U." In the most difficult case, I omitted a CTRL U. The correct sequence for subscript is CTRL U, FCTN R, CTRL U, S, CTRL U, A. It should be noted that all letters and characters should be capitalized or shifted (i.e., the ASCII symbol for 0 is CTRL U, @, not 2).

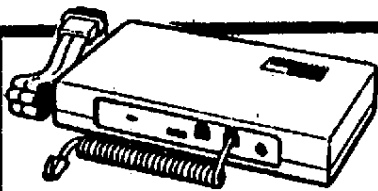
**Clinton A. Chamberlin**  
**Mountaintop, Pennsylvania**

## More on disk drives

On behalf of my coauthors as well as myself, I would like to respond to J. Nuvolini's comments (Feedback February '86) regarding our article on disk drives (December '85).

Mr. Nuvolini is correct when he states that both drive motors come on when either drive is accessed. However, the drive that was not chosen turns very slowly and does not draw full power.

(Please turn to Page 12)



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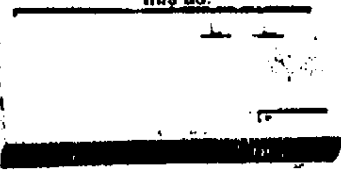
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## The sysops of CompuServe's TI Forum

Paul Charlton hails from Charlottesville, Virginia, and, in his fourth semester, is classified as a junior at Rensselaer Polytechnic Institute in Troy, New York.

His major is computer systems engineering, which he describes as "designing digital systems, stuff like that. I haven't really decided on a specialty, though."

He has been a regular member of the TI Forum since January 1985 and a sysop since October 1985.

He says he has had a TI for about three years.

"I picked one up the summer after I graduated from high school," Charlton says.

He says he had the computer without a disk drive or an expansion system for a year. "I just got those two years ago."

Charlton is the author of *Fast-Term*, a fairware terminal emulator program (available on CompuServe's TI Forum) which was one of the first telecommunications packages allowing easy uploading and downloading of files from CompuServe by TI users. He has also done bulletin board software and recently released a GPL disassembler. Charlton also does consulting work for Myarc.

Before he got the TI, he says, he had used a ZX-81 Sinclair which belonged to his family and "used computers a little in high school, not very much."

Charlton says that his specialty on the CompuServe TI Forum is "answering questions about hardware and assembly language programming" as well as "any questions that people aim in my direction or any that I can answer."

**Access CompuServe  
At the prompt type  
GO TINEWS**

# Feedback

(Continued from Page 10)

Our information indicates that the power supply is adequate for this project. The one possible area of concern is the PE box's voltage regulator. The regulator is supposed to maintain 12V DC. If too much current is drawn, it is possible that the voltage will oscillate around the 12V.

We have recently learned that an upgrade for this part is available. The PE box's 1A regulator may be replaced with a 5A one (Sylvania ECG-933). This is readily available in most electronics stores.

Even with the original PE box regulator, I have been able to power both drives as well as five peripheral cards (not including PE box interface), one of which (Foundation CPM) has the power requirements of two cards.

**Jeff Shaw**  
Troy, New York

## Watch out on drives

I wish to reply to "Using an External Drive Internally (December 1985). I wish to say that if it has worked for him, that is great, but there are a few drives which use too much power and should not be used.

One of the types of drives which I have found not to work properly is the Qumetrack 142. It can be used if you replace the 12 volt regulator in the P-box to one which is rated at three amps or greater. At present the P-box has a 1.5 amp regulator in it, which is not adequate for two full power drives.

**Mark Milam**  
Austin, Texas

## Hooking up drives

Hooking up Tandon TM100-1 or -2 drives to TI99/4A: PEB drive = Shugart No. 1 drive access as DSK1 needs one resistor in No. 3 position of Resistor Pak Socket (furnished with external disk drive cabinets from Tex-Comp).

Shunt Pak should have HS and No. 1 shorted (cut all the rest of the jumpers).

First external drive TM100-1 or -2 = No. 2 drive access as DSK2. Resistor Pak out. Shunt Pak should have No. 2 shorted (cut all others).

Second external drive TM100-1 or -2 = No. 3 drive access as DSK3. Resistor Pak in Shunt Pak should have No. 3 shorted (cut all others).

Note: If only one external drive is connected TM100-1 or -2 = No. 2 drive access as DSK2. Resistor Pak in Shunt Pak should have No. 2 shorted (cut all others).

Connect the cable supplied with the TI disk controller card to back of PEB disk controller card (red lead down). Plug little card furnished with controller into cable above and into cable supplied with Tex-Comp external disk drive cabinet (center connector). Plug first external drive into one end connector (blue lead down) and second external drive into other end connector (blue lead down).

**H.G. Bieker**  
Burbank, California

## On double disk drives

Reference Darrel Sparkman's double disk drive using power supply in PEB (October 1985): Voltage regulator in PEB P/S is only rated for one amp. DSK 2 is pulling more than one amp and voltage regulator is going into thermal protection. Suggest changing this VR to three amp version—I believe PEB P/S is capable of delivering more than two amps. Caution: Do not expect to power more than two drives. Result will be wipe-out of P/S transformer! Put resistor pack in DSK2 also. Keep area behind PEB blower clear!

**Gene R. Pfeiffer**  
New York City

The Feedback column is for readers. It is a forum to communicate with other readers. The editor will condense excessively lengthy submissions where necessary. We ask that writers restrict themselves to one subject for the sake of simplicity. Our only requirement is that items be of interest to persons who use the TI99/4A home computer. Mail Feedback items to: MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

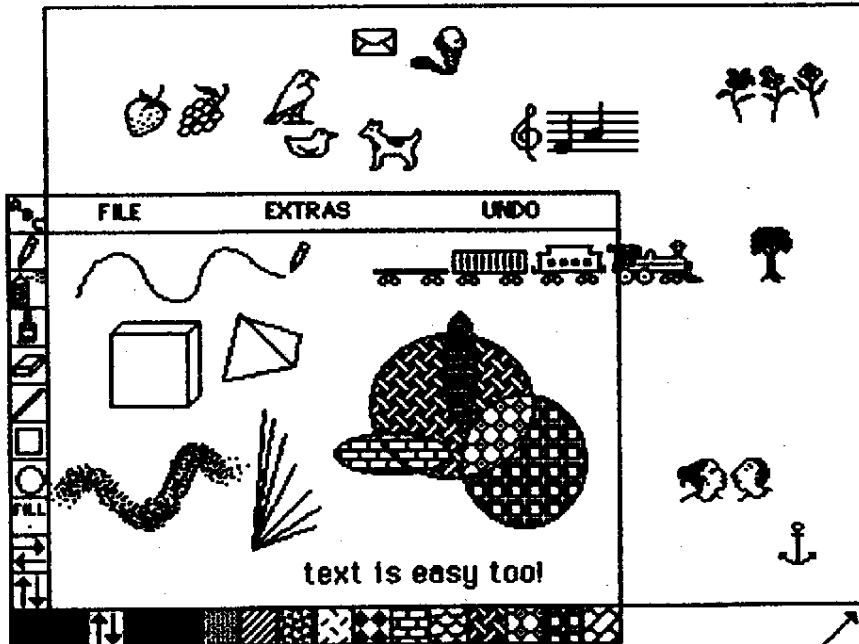
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# Copyright: What is it?

*The following is an edited version of an interview conducted by MICROpendium's editor, Laura Burns, with Jack Goldstein. Goldstein is an attorney with the Houston, Texas, firm of Arnold, White and Durkee and specializes in copyright law.*

**MICRO:** One of the things that made us want to do an interview on this is that we publish Freeware listings. We ask that those who contribute programs for these listings send us a statement that the program is in the public domain. What some people do is send us a statement that they are copyrighting the program but that it is in the public domain. Is this possible?

Goldstein: No, you can't do both. That's like saying it's night and it's day.

When you're putting something in the public domain you are relinquishing all rights of ownership. That is what we call in law a total non sequitur, to say that you are doing both.

**MICRO:** If a statement like that is on the title screen of a program, would the copyright notice or the public domain release take precedence?

Goldstein: I don't know. There have not been any court decisions on that. What the person may be meaning to say is that he is retaining the copyright but is offering the program free to the public at this time.

**MICRO:** If an electronic bulletin board displays a copyright notice when you sign on, are they asserting copyright to public domain files or the copyrighted works of others which may be on that board?

Goldstein: No. You can't claim copyright to anything already in the public domain. We use the analogy of the bird in the cage, that is the copyright, but when the bird is out of the cage, the copyright is lost forever. You cannot catch the bird and put it back in the cage.

**MICRO:** Suppose you or someone else has written a public domain program. What if you write a new version that is better or faster or something? Can you copyright that?

Goldstein: The general answer is yes, provided the updated version raises it to the level of an additional work of authorship. For example, there are many pieces of music which are in the public domain. But someone can write a new arrangement of original public domain music and copyright that arrangement.

**MICRO:** We have heard that there are now moves to patent software rather than copyright it. Can you comment on that?

Goldstein: Yes, I know about what you are referring to. The patenting of software has been an issue since the mid to late '60s. You can't patent software, but you can patent the machine process carried out by the software, provided it meets patent requirements. That is, you can patent a computer-controlled process which meets patent requirements, but not the software

itself. The program per se cannot be patented.

**MICRO:** About a year and a half ago I did an article explaining the steps people could take to copyright their software. The people at the copyright office said it is not yet really clear what a software copyright protects, because there had not yet been many court decisions. Is this still true?

Goldstein: Yes, it is. There have been two or three court decisions and the appeals verdicts haven't come down yet. Copyright was never intended to protect ideas. There is a Supreme Court case from the early 1900s regarding a copyrighted book on a new method of accounting. The court ruled that the copyright did not give exclusive right to that method of accounting, but only that particular form of expression of it.

If you create a painting of a king on a throne, that does not mean that all subsequent pictures of kings on thrones are a violation of your copyright, only if someone copies that particular painting. With software it gets more complex. To solve a particular problem, the input and output may be very similar and the basic math solution may be similar for different pieces of software. The courts don't seem to be able to draw the distinctions between the functional aspects and the particular style. Copyright law was intended to protect against the infringement of the form of expression—artistic, esthetic or literary. My personal view is that computer software doesn't lend itself to copyright protection, and Congress should have created a different category for it. It doesn't have much to do with these means of expression.

**MICRO:** Well, there are computer games, things like that.

Goldstein: Yes, that's true, but the majority of computer programs are set up to solve problems.

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Written By Erik Olson

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## BASIC/XBASIC

# How to speed things up

By LEE WILKERSON

This is the first in a series of columns designed to help you get the most out of TI Extended BASIC, by showing efficient ways to use this language, answering questions and covering some things that aren't in the user's manual. Suggestions for topics and questions for a Q&A section are welcome.

Extended BASIC (XB for short) is a sophisticated and powerful language. It possesses features that in many ways make it superior to versions of BASIC that come with other microcomputers. It has the potential to let you program in an efficient, structured style, using BASIC or machine language subroutines and subprograms. Most anything, including sound, sprites, speech and graphics, can be controlled with logical statements, as opposed to the ubiquitous POKEs and PEEKs required by many other machines. An XB program listing can be read and the programmer's intentions understood without consulting or memorizing tables of RAM or ROM addresses and hex values.

Probably the most obvious shortcoming of XB is its relatively slow execution speed. Many users are surprised by this, since the TI 99/4A is a 16 bit machine, right? Well, it is and it isn't. The internal operation of the computer is complex and unconventional. The TMS9900 chip is indeed a 16 bit microprocessor, but it only handles part of the workload, and even then data is passed to and from it on an 8 bit bus. Many functions are performed by the TMS9918A, an 8 bit video processor, which is controlled by a proprietary, interpreted language called GPL (Graphics Programming Language.) TI BASIC and XB are interpreted statement by statement, which in itself slows things down quite a bit, but this is true of BASIC on all computers, unless a compiler is used. What slows the TI down even more is that BASIC and XB are not converted

into 9900 machine language, but mostly into GPL, which is then handled by the internal GPL interpreter. The overhead of double interpretation exacts a high price in terms of program execution speed.

Can anything be done to make programs run faster? Yes, several things, and they are all up to you. Following are some guidelines to help speed things up:

1—Reduce the number of program lines whenever possible. Using multi-statement lines helps considerably. Every extra line increases the size of the line number table and the time it takes XB to search for the next line number. Keep the number of lines of code in frequently executed routines and loops to an absolute minimum.

To help pare down the code, find the most efficient algorithms to perform the necessary functions. This may be easier said than done; an entire career could be based on a study of algorithms and computer language efficiency. Unfortunately, really concise coding is sometimes nearly incomprehensible unless thoroughly documented, which brings up another question: What about remarks? Documentation is important in any program, but REM lines slow things down just by existing, even if they aren't encountered during the program flow. Keep them to a minimum, or try keeping two versions of the program: one with documentation for reference, and one without, for running.

2—Use subroutines for any procedure which is used repeatedly. Consider making any multi-line loop which is used for many iterations into a subroutine, even if the loop is only used in one section of the program. Place the most-used subroutines at the end of the program. The line number table used by XB to find specific line numbers is searched in reverse order, starting with the highest numbered line.

Therefore lines near the end of a program are found fastest, and lines accessed most often should be placed near the end.

3—Plan the use of variables carefully. Use as few as you can get by with, make their names as short as reasonable, and refer to them as infrequently as practical. The more variables in a program, the longer it takes XB to find any given one in the symbol (variable) table. It also takes longer to find one with a longer name. Arrays, especially string arrays, tend to slow down access to variables, so limit them to the smallest number of elements that will do the job.

When you enter the RUN command, a prescan is done of the entire listing, line by line, from beginning to end. Among other things, this is when the symbol table is built. Due to the structure of the symbol table, variables which are added to the table last during the prescan are found faster than those added first. This is because the table is built like a stack of books: the first ones end up at the bottom of the pile and take the longest to find. Take advantage of this by making sure the prescan encounters the most frequently used variables last, perhaps by initializing all variables at the beginning of the program in the reverse order of frequency used.

Sometimes it is helpful to use a variable instead of a constant. If the constant is long, such as 43.55643214, and is called up frequently, it will probably be faster to set a variable to that value and use it throughout the program. This is because a good bit of time is consumed in converting a long string of digits into an internal number. It will not pay to use variables in place of shorter constants, such as 1 or 6.5, however.

4—Simplify arithmetic expressions. Every number, parenthesis, operator

(Please turn to Page 18)



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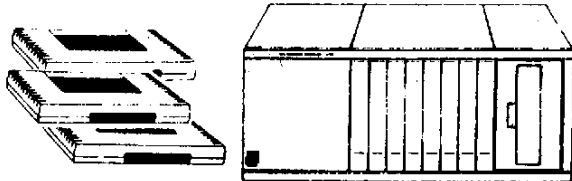
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## BASIC/XBASIC—

(Continued from Page 16)

(+, -, \*, /, -, &) and variable which can be left out will speed evaluation of an expression. The INT function can often be omitted, since many functions automatically round expressions to integer values. These include HCHAR, COLOR, SPRITE, DISPLAY AT, etc.

Avoid time-consuming functions like LOG, EXP, SIN, COS, TAN and SQR if an alternative can be found. For example, if the square root of two is used repeatedly, initialize a variable to that value early in the program (R2=SQR(2)) and use the variable from then on. Or, instead of raising a number to a power with “~”, use “\*” which is much faster, usually. For example, “X=5\*” will be evaluated quicker than “X=5-2”. But be reasonable; “X=5-9” goes faster than “X=5;5;5;5;5;5;5;5”.

5—Arrange the results of condi-

tional statements so that the most likely results are treated first. For example, the statement “ON X GOTO 100, 200, 300, 400, 500” will execute fastest when X=1, a bit slower when X=2, etc. The same applies to ON-GOSUB. Structure IF-THEN-ELSE statements so that the most likely results of the evaluated expression are tested for first.

6—Avoid scrolling the display. Plan the screen input and output so that DISPLAY AT and ACCEPT AT will be used, instead of PRINT and INPUT. Scrolling is a relatively time-consuming chore for the computer. If you only want to display a single character, HCHAR is even faster than DISPLAY AT.

7—Define more than one character at a time with CALL CHAR. Up to four can be done with a single definition string, and many individual defini-

tions can be included in one statement.

8—To erase the screen use DISPLAY ERASE ALL AT instead of CALL CLEAR::DISPLAY.

9—Use FOR-NEXT loops to repeat a sequence of instructions. It is not only faster, it is easier to understand than an IF-THEN....GOTO construction.

10—Subroutines are faster and more memory efficient than subprograms. But subprograms have other advantages, which will be dealt with in a future column.

These hints will help you write or modify programs so they will move along a bit faster. Any one of them could be elaborated on in greater detail, but that's all we have room for in this issue.

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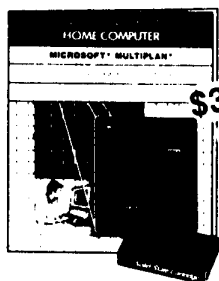
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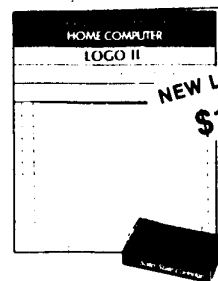
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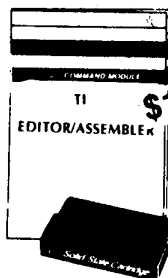
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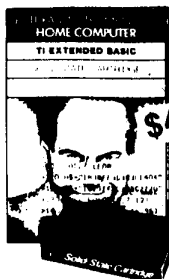
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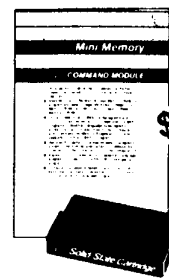
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# Festivals, festivals

## New England Faire scheduled for April 5

The Boston Computer Society TI-99/4A User Group is scheduled to sponsor the New England 99 Faire from 10 a.m. to 6 p.m. April 5 at the Diamond Junior High School in Lexington, Massachusetts.

According to J. Peter Hoddie of the Boston Computer Society, other groups involved in the Faire include, MUNCH, Worcester, Massachusetts; the North East 99ers, Providence, Rhode Island; the Greater Brockton TI User Group; Club 99, Attleboro, Massachusetts; Magnetic, Andover, Massachusetts; Connecticut's Nutmeg 99ers; the New Hampshire 99ers; Maine's Downeast 99ers; and others.

Hoddie says featured speakers include Lou Phillips, Myarc; Barry Traver, Genial TRAVeLER; Paul Charlton, author of Fast-Term; Richard Roseen, hardware designer; and Jonathan Rotenberg, Boston Computer Society founder. Mark Hoogendoorn, author of one of the first TI BBS programs, will speak on his work. Milo Tsukroff, whose pro-

grams have appeared in *Compute!* will speak on his MITI-Calc and MITI-Plan programs.

Also scheduled for demonstration, according to Hoddie, are TI-Writer, Multiplan, GRAPHX, TI-Artist, GRAM Kracker, Myarc's Extended BASIC II, BASIC programming techniques, console cleaning, a robot arm for the TI, Advanced Diagnostics, Myarc's hard disk system, CompuServe and the BCS TI99 BBS.

A dealer area will feature products from Tigercub, Myarc, Asgard and other firms, according to Hoddie.

Admission is \$3 for adults, \$2 for children 6-12. Children under 6 will be admitted free.

For more details, travel directions or dealer information, write Boston Computer Society, TI99/4A User Group, One Center Plaza, Boston, MA 02108 or call Hoddie at (617) 353-7369.

## TI Swap-n-Shop set April 13 in Missouri

A TI99/4A Swap-n-Shop is scheduled to be held from 2 to 4 p.m. April 13 at the Arthur Mag Center behind MRI, Rockhill Road and Volker Boulevard, Kansas City, Missouri, phone (913) 371-1092.

There is a \$1-2 registration fee for the event, sponsored by the TI99/4A KC Users Group, P.O. Box 12591, North Kansas City, MO 64116.

## Canadian TI FEST set April 26 in Nepean

The TI99/4A National Users Association of Canada, in co-operation with the Ottawa TI99/4A Users' Group, is scheduled to present a TI FEST from 10 a.m. to 4 p.m. April 26 at Merivale High School, 1755 Merivale Road, Nepean, Ontario.

Vendors may display goods for \$50, according to Bob Boone of the TI-NUAC. Boone says that the show's sponsors will provide a working TI system in any configuration a vendor specifies, if this is required.

Admission is \$2 or \$5 per family, according to Jane Laflamme, vicepresident of the OttawaUsers Group (Canadian funds).

For further information, contact Laflamme c/o TI-NUAC, 83D Glen Park Drive, Gloucester, Ontario, Canada K1B 3Z1 or (613) 837-1719.

## Australians to show local, foreign wares

A stand for American TI products and one for European products are planned for the first Australian TI-99/4A Users Fair, scheduled for June 14 at the Malvern Town Hall and sponsored by the Melbourne TI Users Group.

Manufacturers will be able to send videos or items for demonstration, according to Peter Glead of the Melbourne group.

Glead said TI will be showing its new 74 model, a handheld calculator with ROM in BASIC and Pascal. Brother Printers will also be exhibiting, he noted.

Numerous Australian peripherals will be shown at the fair, he notes, including 32K peripherals, RS232s and modems.

Glead said the information address in MICROpendium's February issue (reprinted from the TISHUG newsletter of Sydney, Australia), is incorrect and that persons wanting information should write TI-Fair, P.O. Box 218, Ashburton, Victoria 3147, Australia.

International reply coupons are not necessary, he said.

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# Triple Tech reset switch move is easy

By KUROSH AMIRKHANI

When I decided to move the Triple Tech's switches, my greatest concern was to make it easy to pull apart so I could move the computer easily.

I had some switches left from when I put a load interrupt switch on my computer, which I purchased at Radio Shack. The part number is 275-1547 and the price is \$3.79 for five (you need two switches). All other parts needed can also be purchased at Radio Shack. You need two jacks one to be installed on the computer, and one on the Triple Tech Card or the P.E. box (I installed mine on the card).

The jacks I used are 1/8 inch, three-conductor, open circuit jacks (part no. 274-249A, (There are two in a pack for \$2.29).

You also need some cable and two plugs to connect the two jacks together. I used phone cable, and the plugs I used are 1/8 inch, 3 conductor mini phone plugs, part no. 274-284, (There are two in a pack for \$2.79).

To start I soldered the plugs onto the cable (FIG.1). Use as much cable as you need to go from the computer to the P.E. box. I used the yellow, red, and the black wires. The important thing is to be consistent. I soldered the black wire to the big terminal and the red and yellow wires to the other two.

Then I proceeded to make the assembly for the computer end. For this part I used one of the mini jacks and soldered two black wires to the side terminal. I also soldered a yellow and a red wire to the two bottom terminals (all about four or five inches long), (FIG.2).

Then I soldered the yellow and one of the black wires to one switch, and the red and the other black wire to the other switch.

You have to drill three holes on the computer for the two switches and the jack. I put the switches on top of the computer beside the cooling vent and the jack at the back of the computer. This was tricky since the neck of the jack almost was not long enough, but it worked fine.

Then I started soldering the other jack (FIG.3); I soldered a piece of black wire to the side terminal and a piece of yellow and red wires

(Please turn to Page 24)

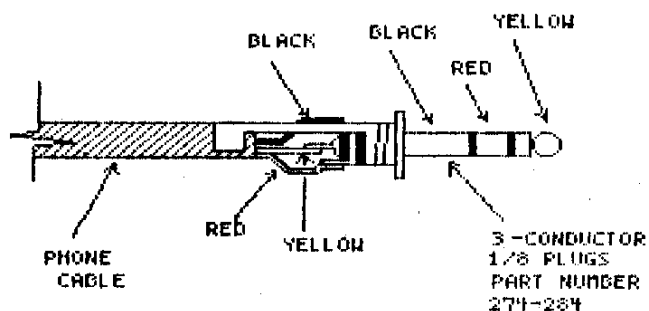


FIG. 1

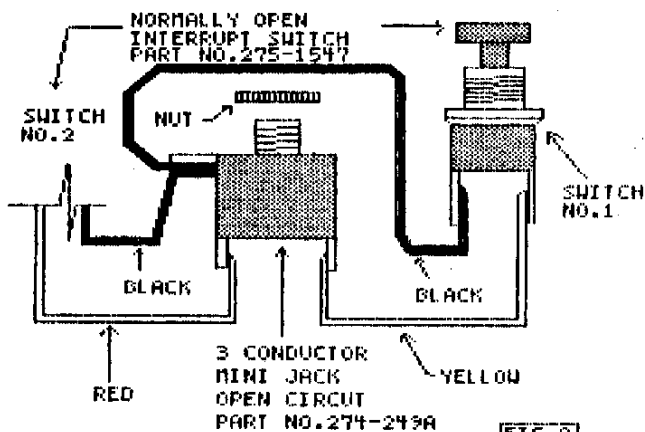


FIG. 2

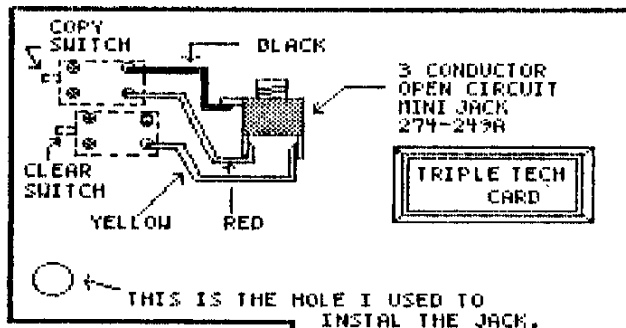


FIG. 3

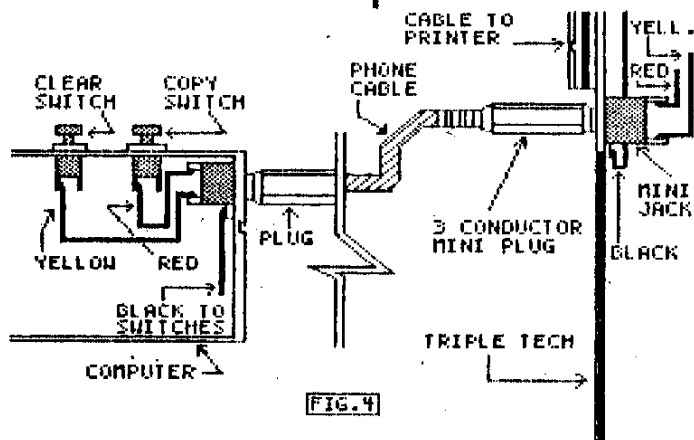


FIG. 4

# INTERN<sup>o</sup> TI99/4A ROM and GROM Listings w/ Commentary by H. Martin

## plus GPL Directions

**THIS BOOK IS THE KEY!** INTERN ("Inside") the TI 99/4A reveals the hidden secrets of the 4A. Essential for owners, enthusiasts, programmers, developers or anyone who wants in-depth understanding of how the TI 99/4A works.

Over 200 pages of complete disassembled internal code found in the 4A console. ROM and GROM listings are fully commented with GPL directions explains how the entire operating system functions — including the GPL interpreter. Hidden tricks and tips are discussed along with the commands, format, opcodes and uses of Graphics Programming Language used in the computer.

Starting with the console ROM: address >0000 to >1FFF, this book gives you a detailed look at every secret. Interrupt routines, power-up functions, system Monitor, cassette routines, Basic and Extended Basic interaction and various utility routines. GROM 0, 1 and 2 are also listed and commented in detailed descriptions.

If you've ever wondered why your TI 99/4A acts as it does, what the tricks and hidden features are, where the "blank" spaces exist, why Texas Instruments kept all this information a secret: well, this is your chance!

Order now! Only \$17.95 (US) Cheque, Money Order or COD. Add \$1.00 via Ground \$3.00 via Air \$5.00 shipping overseas.

# GPL Assembler v2.1

**UNLOCK ALL THE SECRETS!** New GPL Assembler Version 2.1 available exclusively through Ryle Data.

This program provides the power to write, edit and assemble true GPL programs for the TI 99/4A. Create code that accesses console operating system routines directly. Develop programs that use the GPL interpreter and all the features of the TI 99/4A.

One of TI's major secrets was the GPL interpreter contained on GROM chips in the 99/4A console. This internal code, "Monitor" and the operating system, was never documented. Many of TI's routines, programs, languages and command modules are written in this "Graphics Programming Language."

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This package includes the GPL Assembler disk, printed documentation, GPL tips and hints, update support service and commented GROM/ROM listings (with the book "INTERN"). An example for a command module type GPL program is included with source, object and list files on disk.

Requires: 32k memory, disk drive(s), TI Editor Assembler package. Printer/RS-232 recommended. Price: \$59.95

Package w/ INTERN \$75.00 (US)

Add \$3 S & I.

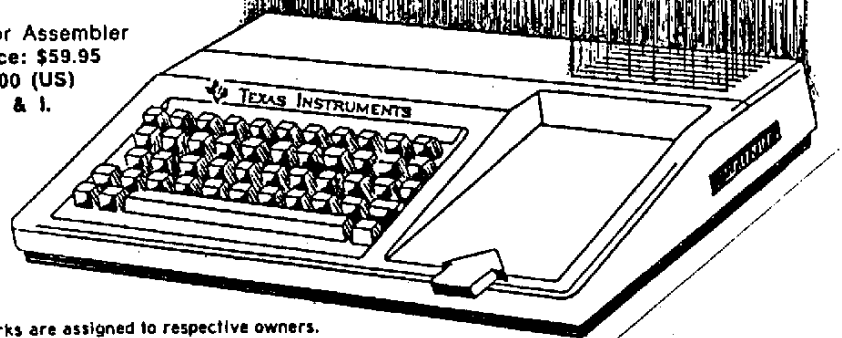
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## SWITCH—

(Continued from Page 22)

to the bottom terminals. All three wires are about three or four inches long, but it depends on where you decide to put the jack. I soldered the black wire to the common lead of the card's switches (you can tell by looking at the solder line on the card which goes to both switches).

Then I soldered the yellow and red wires to the other lead on each switch. I decided to put the jack on the card and, if you look, there is a hole below the switches on the card. This hole wasn't big enough for the jack so I enlarged it to fit the jack. A word of caution: be careful not to damage the solder line on the card; there is one close to this hole.

So that is all there is to it. It costs less than \$10 and takes about an hour, but what a relief.

## Wrong price listed in ad

The February issue of MICROpendium erroneously listed the price of the MBX Expansion and Baseball sold by South Jersey Computers as \$30.95. Actual price is \$40.95. MICROpendium regrets the error.

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"After having purchased or reviewed close to a hundred programs for the TI-99/4A computer during the past year, I can recommend without qualification that COMPANION is the best program published to date for this computer. It is also certainly the best documented. Your program and text are a joy to work with... Thank you for creating a program worthy of its investment." — Robert Wolff, Somerset Electronics, N.J.

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## Assembly tutorial

# Access to PEB cards explained

By **MACK McCORMICK**  
Technical Editor

Did you ever wonder how the computer accesses the cards inside the Peripheral Expansion Box (PEB)? For example, how does the computer do a disk access from a program?

The purpose of this tutorial is to ex-

plain this process. Each of the cards inside the PEB has its own device service routine (DSR) on a chip programmed by the manufacturer which carries out the actual work. Usually it's on an EPROM. TI made it very easy for us to access each card using a standard Peripheral Access Block (PAB). The

format is the same for each device. This really makes programming a cinch because you do not have to know exactly how each device operates internally. You'll appreciate this better after you see my advanced tutorials dealing with direct disk and RS232 access.

The PAB has several key parts which tell the device the operation you are performing, fields to describe the data, where the data buffer is, and the device you are accessing. Remember this cardinal rule for most DSR accesses, in particular disks: You should always open, read or write, and close the file. Just like BASIC. PABs are located in VDP RAM any place where they will be out of the way. Usually the best place is around

F80. The first byte in the PAB or byte zero (with PABs always begin counting with 0) contains the opcode you wish to perform on the file. These are listed on pages 295-297 in your E/A manual but are summarized here for your convenience.

HEX VALUE	OPERATION
00	OPEN
01	CLOSE
02	READ
03	WRITE
04	RESTORE/REWIND
05	LOAD
06	SAVE
07	DELETE
08	SCRATCH
09	STATUS

Here are a few notes about each opcode which may ease your learning curve. "Open" must always be used prior to accessing a device except for the "load" and "save" commands. "Load" and "Save" are the opcodes used by the computer with program-type files. "Scratch" is not supported on the TI-99/4A by most devices. "Status" may be used to

(Please turn to Page 28)

```

*****
* THIS PROGRAM DEMONSTRATES HOW TO USE *
* THE DSRLNK ROUTINE VIA A PAB TO *
* ACCESS A DEVICE IN THE PEB. *
* ADAPTED FROM THE PROGRAM IN THE E/A *
* MANUAL (P. 303) *
* BY MACK MCCORMICK *
*****

DEF DSR          THE PROGRAM ENTRY POINT NAME
* SYSTEM UTILITIES WE WILL USE
* FOR INFO. MOST COMMERCIAL SOFTWARE CONTAINS IT'S OWN UTILITY ROUTINES
REF DSRLNK, VMBW, VMBR, VSBW, KSCAN, GRMRA, GRMWA

BUFFER EQU >1000      THE BUFFER ADDRESS IN VDP RAM
PAB EQU >F80          THE PAB ADDRESS IN VDP RAM (NOTE IN UNUSED PORTION OF
*                      THE CHARACTER TABLE)
STATUS EQU >837C      THE GFL STATUS BYTE LOCATION
PNTR EQU >8356         THE POINTER USED BY THE DSRLNK ROUTINE
* SETS UP THE PAB FOR A INPUT, DISPLAY VARIABLE 80, SEQUENTIAL RECORD
* TO USE A BUFFER AT >1000

PABDAT DATA >>0014, BUFFER, >5050, >0000, >0008

* NAME YOUR FILE ON THE DISK SOURCE FOR THIS PROGRAM
TEXT 'DSK2.SOURCE'

READ BYTE >02        THE OPCODE FOR READ
CLOSE BYTE >01       THE OPCODE FOR CLOSE
EVEN
*GRMSV DATA 0      A WORD TO ADD IF YOU USE THE RS232 OR TP
GFLWS EQU >83E0     THE GFL WORKSPACE
WS EQU >8300        SET IN THE HABIT OF USING HIGH SPEED RAM FOR WS
CPURUF BSS 80       SET ASIDE A CHUNK OF EXPANSION MEMORY FOR BUFFER

* THE PROGRAM ENTRY POINT IS HERE
DSR LWF1 WS          POINT TO OUR WORKSPACE

* SAVE THE GROM READ ADDRESS IF YOU ARE USING THE RS232 OR TP
* HERE IS THE CODE TO INSERT IF YOU USE THESE DEVICES
* MOVB @GRMRA, @GRMSV GET THE FIRST BYTE
* NOP                WASTE TIME BECAUSE GROM IS SLOW
* MOVB @GRMRA, @GRMSV+1 GET THE SECOND BYTE
* DEC @GRMSV         DECREMENT THE ADDRESS SINCE GROM IS AUTO INCREMENTING

* NOW MOVE THE PAB TO VDP AT >F80
LI R0, PAB          LOCATION IN VDP
LI R1, PABDAT       LOCATION IN CPU RAM
LI R2, >15          21 BYTES TO MOVE TO VDP.
BLWP @VMBW         DO IT.

LI R6, PAB+9        PLACE THE START OF THE FILE DESCRIPTOR AT >8356

* OPEN THE FILE
BL @MYDSR

* NOW CHANGE THE PAB TO READ
MOVB @READ, R1     MOVE THE >02 OPCODE TO THE PAB
LI R0, PAB
BLWP @VSBW

* NOW READ THE FILE
BL @MYDSR

* JUST FOR GRINS MOVE THE RECORD TO CPU RAM
LI R0, BUFFER      LOCATION IN VDP PAM WHERE THE DATA IS LOCATED

```



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BITMAC has provisions for trackballs, joysticks and even a second computer input! If you have a second computer such as an IBM PC, an Apple Macintosh even an IBM 370 main frame there are provisions for your second computer to create graphics with BITMAC!

BITMAC can make "slide presentations" for group meetings (and print the graphics!), give hours of "just doodling" pleasure, create charts for a stock holder report, print camera ready art for business ads, make still cartoon sequences (and print them in one of two sizes), create mechanical drawings, draft floorplans and many other uses!

BITMAC, with a second computer, can plot satellite data, statistical data, computer generated art plots, analog sampled data and just about anything your second computer can throw at BITMAC.

BITMAC offers BOOLEAN disk input (just like NASA enhances photos!) and a wealth of computer enhancement techniques that lend raw power to your ability to manipulate bitmapped graphics.

BITMAC offers icon input that allows you to point at the functions you want. Nothing was spared in making BITMAC easy and simple to use. Even a child can use it!

BITMAC requires either the Extended Basic, Mini Memory or Editor/Assembler Module, as well as a disk drive system, memory expansion and joysticks or trackball (for precision work).

NOTE: Compatible only with Epson, Star 10X or SG10, or other fully Epson compatible dot matrix printers (the TI-99/4A Impact Printer made by Epson [MX80] requires the upgrade of a GraphTrax or GraphTrax Plus chip set, available from Epson).

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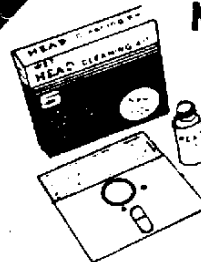


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## ACCESS TO CARDS—

(Continued from Page 26)

determine the current state of the device.

PAB byte one describes the record type (fixed or variable), data type (display or internal), mode (update, output, input, or append), and file type

(sequential or relative). Additionally, bits 0-2 tell us if an error has occurred. These error codes are listed on Page 299 of your E/A manual. If you are not familiar with the file characteristics you can find a complete discussion in your BASIC reference manual. Here is

### PAB BYTE ONE RELATIVE FILES

```

>01      UPDATE,DISPLAY
>03      OUTPUT,DISPLAY
>05      INPUT,DISPLAY
>09      UPDATE,INTERNAL
>0B      OUTPUT,INTERNAL
>0D      INPUT,INTERNAL

```

### SEQUENTIAL FILES

```

>02 OUTPUT, FIXED, DISPLAY
>04 INPUT, FIXED, DISPLAY
>06 APPEND, FIXED, DISPLAY
>0A OUTPUT, FIXED, INT
>0C INPUT, FIXED, INTERNAL
>0E APPEND, FIXED, INT
>12 OUTPUT, VARIABLE, DIS
>14 INPUT, VARIABLE, DIS
>16 APPEND, VARIABLE, DIS
>1A OUTPUT, VARIABLE, INT
>1C INPUT, VARIABLE, INT
>1E APPEND, VARIABLE, INT

```

Bytes 2 and 3 (1 word) contain the buffer address in VDP RAM where the data is transferred. This is just temporary space but must be large enough to accommodate the entire record. A good place generally is >1000 in VDP RAM. Note that for program image files which use the load and save functions, this buffer must be able to accommodate the entire program, usually .8K. That's why large A/L program image files are fractured and why large XB programs are saved in internal/variable format. If we had more VDP RAM this wouldn't be a problem. By the way, one hardware manufacturer allows you to transfer data directly to/from CPU RAM (using disk or hard drive), bypassing VDP RAM, which really speeds processing time. More on this later.

Byte 4 contains the logical record length in bytes. Its value can be between 0 and 255 (>0 - >FF). When using variable length records this value is the maximum record size. Now you know the reason we are limited to 256 byte record sizes. If TI had made this a word value in-

(Please turn to Page 30)

```

LI R1,CPUBUF LOCATION TO MOVE THE DATA TO IN CPU RAM
LI R2,80     80 BYTES TO MOVE
BLWP @VMBR

```

```

* NOW MOVE THE DATA TO THE SCREEN. IF WE DID NOT PLAN TO MANIPULATE THE
* DATA IN CPU THEN WE COULD HAVE MOVED IT DIRECTLY TO THE SCREEN BY SPECIFYING
* THE SCREEN LOCATION IN THE PAB BUFFER ADDRESS.

```

```

LI R0,160     PUT ON THE 4TH LINE
LI R1,CPUBUF
LI R2,80
BLWP @VMBW

```

```

LOOP BLWP @KSCAN WAIT FOR A KEY PRESS
MOVW @STATUS,R0 IS THE EQUAL BIT SET YET?
JEQ LOOP YEP.

```

```

* NOW MOVE THE CLOSE OPCODE TO THE PAB
MOVW @CLOSE,R1
LI R0,PAB
BLWP @VSBW

```

```

* CLOSE THE ACTUAL FILE
BL @MYDSR

```

```

* NOW RESTORE THE GROM READ ADDRESS IF YOU USED R5232 OR TP
* MOVW @GROMBV,@GRMWA RESTORE FIRST BYTE OF ADDRESS
* NOP WASTE SOME MORE TIME
* MOVW @GROMSV+1,@GRMWA RESTORE THE SECOND BYTE

```

```

* RETURN TO THE CALLING PROGRAM
CLR @STATUS CLR SO WE DON'T GET ERRORS ON RETURN
LWPI GPLWS POINT TO THE GPL WB
B @>0070 RETURN TO THE GPL INTERPRETER

```

```

* MY ROUTINE FOR DSR ACCESS
MYDSR MOV R6,@PNTR POINTER TO LEN BYTE AT >8356
BLWP @DSRLNK USE THE SYSTEM UTILITY
DATA B STANDARD ACCESS 8 BYTES IN DSR HEADER
JEQ DSRERR EQUAL BIT IS SET IF THERE IS AN ERROR
RT NO ERROR, SO GO BACK

```

```

* ROUTINE TO HANDLE ERRORS. YOU COULD IGNORE CERTAIN ERRORS, LIKE EOF, IF DESIRED
DSRERR MOVW R0,R7 R0 CONTAINS THE ERROR CODE
SRL R7,8 SHIFT TO THE RIGHT BOUNDARY
DEC R7 SET TO BASE 0
A R7,R7 MAKE A WORD OFFSET

```

```

LI R0,320 DISPLAY ON LINE 9
LI R2,24 24 BYTES TO WRITE
MOV @ERROR*(R7),R1 GET THE ADDRESS OF THE ERROR MESSAGE INDEXED OFF R7
BLWP @VMBW WRITE IT TO THE SCREEN
RT

```

```

* ERROR MESSAGES
ERROR# DATA ERRO,ERR1,ERR2,ERR3,ERR4,ERR5,ERR6,ERR7 ERROR TABLE
ERRO TEXT 'ERROR:BAD DEVICE NAME'
ERR1 TEXT 'ERROR:WRITE PROTECTED'
ERR2 TEXT 'ERROR:INCORRECT TYPE,LEN'
ERR3 TEXT 'ERROR:ILLEGAL OPERATION'
ERR4 TEXT 'ERROR:DISK FULL'
ERR5 TEXT 'ERROR:END OF FILE ERROR'
ERR6 TEXT 'ERROR:NO DISK OR DRIVE'
ERR7 TEXT 'ERROR:FILE NOT FOUND'

```

```

* PLAY AROUND WITH THIS ROUTINE. TRY DIFFERENT FILE TYPES, OUTPUTING TO YOUR
* PRINTER. EXPERIMENT UNTIL YOU FEEL COMFORTABLE. TRY THE ROUTINE IN THE WRITTEN
* TUTORIAL.

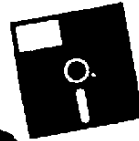
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## ACCESS TO CARDS

(Continued from Page 28)

stead of a byte then we could have had 64K byte record sizes. Maybe someone will fix this with one of the GRAM simulators on the market. Of course you'd have to modify the disk controller card EPROM also. Hmm...

Byte 5 specifies the number of bytes to be transferred during a WRITE operation or the number of bytes to be read during a READ operation. PAB bytes 4 and 5 should be set equal when writing and will always be set equal when reading. This byte contains the actual record length for a read and may be dynamically tested.

PAB bytes 6 and 7 (one word) are used only for relative files. This word contains the relative record number to be accessed and may be in the range of 0 to 32,767 because the first bit of this word is ignored.

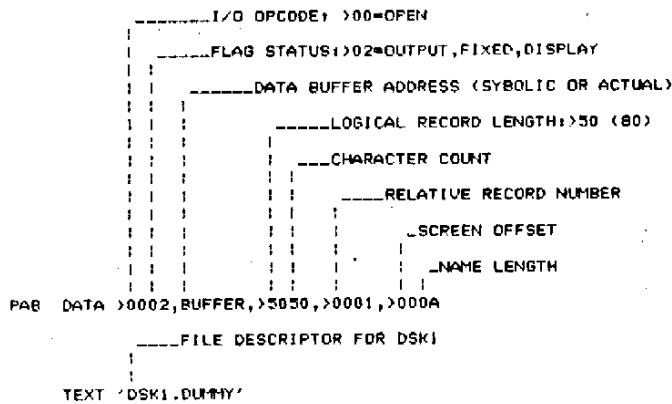
Byte 8 is used only with the cassette tape device. It specifies the screen offset bias to be used by the computer. When accessing from a running BASIC program the offset is >60 and from A/L it is 0. This bias is required because of where the character set resides in VDP memory.

Byte 9 defines the length of the device description which begins in byte 10.

Byte 10 on describes the device you are accessing. For example:

"RS232/2.BA = 4800.PA = N.DA = 8" to access the RS232. This device length in PAB byte 9 would be >19.

Here is an example PAB:



All files are accessed through the DSRLNK routine. You should reference DSRLNK in your program when programming from the editor assembler or include your own DSRLNK routine when programming from Extended BASIC. Several sources have published the TI standard DSRLNK routine so I won't republish it here unless there is a demand. Once you place the PAB in VDP RAM using a VMBW command the DSRLNK routine needs the VDP RAM address of the file descriptor byte (byte 9) to be placed at >8356. You must also follow the DSRLNK routine with a DATA 8 statement to tell the routine to use the standard DSR routines. We'll cover in a later advanced tutorial the use of DATA > access the GPL routines. Here's an example:

BLWP @DSRLNK

DATA 8

PAB byte 0 actually dictates the operation to be performed (open, read/write, close, etc). Remember errors are reported in bits 0, 1, and 2 of byte 1. The equal status bit of the GPL status byte at >837C is also set. Your program should check this byte for errors and handle them appropriately.

One final point before we get to the program. When accessing the RS232 or thermal printer (TP) you must first save the GROM read address because the RS232 card will alter the value. The value is restored after accessing the RS232 device. This is documented in the program.

Finally lets get to the program. You should create a file display/variable 80 file using TI-Writer or your E/A module for this test. I recommend you just use one on a disk you have laying around. In fact, the source listing for this program will be great.

I recommend you read the following references in your editor/assembler manual:

Section 16.2.4 page 262

Section 16.5 page 270 through Section 16.5.4 page 271

Section 18 pages 291-304

**ADDITIONAL PRACTICE**

The only way to become a proficient programmer is to write programs. For extra practice try converting this BASIC program to assembler. You have had all the programming pieces in previous tutorials, you just have to put them together. All you lack is confidence. Try this program. Send your solution to MICROpendium, ATTN: Mack and we'll publish the best solution in a later issue.

100 CALL CLEAR

200 OPEN #1:"PIO",SEQUENTIAL DISPLAY, OUTPUT, VARIABLE

300 REM SUBSTITUTE YOUR PRINTER DESC FOR "PIO"

400 FOR I = 1 TO 10

500 PRINT "YOUR NAME"

600 PRINT #1:"YOUR NAME"

700 NEXT I

800 CLOSE #1

900 END

**Freeware listing requirements**

Anyone wishing to have a Freeware announcement included in MICROpendium's Freeware listing may do so by submitting a copy and brief description of the program, and a note indicating that it is in the public domain, to MICROpendium. Complete Freeware listings, updated quarterly, are available from MICROpendium for \$1 (or 50 cents and a self-addressed stamped envelope). Freeware announcements will continue to be published in the listing until withdrawn by the persons submitting them or the publisher.

# IBM keyboard interface debuts at Los Angeles TI FEST-WEST

By **RANDY AINSWORTH**

The 99 FEST-WEST opened its doors to an eager crowd of 99'ers on Saturday, March 1, at the Shrine Exposition Hall in Los Angeles. The show was held on the upper floor in conjunction with a larger Computer Sellathon and Expo on the main floor.

The first major event was a presentation by Craig Miller. Miller, president of Miller's Graphics, introduced a new piece of hardware, an IBM keyboard interface card. According to Miller, the card will go in the Peripheral Expansion Box and allow purchasers to use any IBM-compatible keyboard. The 4A will still need to be connected, but it can be put aside in a spot where you can get to the module port.

By using an IBM keyboard, users will have dedicated cursor keys, a 10-key numeric pad and programmable function keys. The interface card will have a 32K buffer that will allow for macros and batch files. Due to the current flux in the chip market, no definite price was given, but Miller said he will try to keep it as low as possible since users will still need to buy a keyboard. (At the main computer show, IBM keyboards were selling for \$55-\$90.) The keyboard buffer will be battery-backed and users will be able to save the keyboard configuration to disk. Miller anticipates he should be in production in 10-12 weeks.

Both CompuServe Information Service and The Source were online throughout the duration of both faire days. CIS was in conference most of the weekend and several CIS regulars (Howie Rosenberg and Ron Albright, among others) were in different parts of the country, keeping up on what was happening in LA. Jim Horn, head sysop of the TI Forum, and Scott Darling kept things rolling on the LA end of the connection.

The Source featured Blaine and Diane Crandell, who are in charge of TEXNET. They demonstrated various parts of The Source to fairgoers. There were also occasional reports from RANdY's RumOR RaG concerning what was happening around the faire. (RRR is an electronic magazine featured on TEXNET—Ed.)

Several authors of freeware programs were present in a booth dedicated to that type of software. Several user groups also displayed wares. Among the more interesting offerings in that department were a set of calendar nudes by Ken Gilliland, a Terminal Emulator 2 encoder for BBS sysops (also by Gilliland), and an excellent assembly database written by William Warren.

There were many vendors of both hardware and software. Among the dealers represented were Texaments, DataBioTics, Asgard Software, and Bits & Chips (a Seattle-based store). All of the vendors not only had products available for purchase, but they also were able to demonstrate the products so fairgoers could see the product before buying. Among the more noteworthy products was

the new version of TI-ARTIST. A number of PC people drifted up from the main show and almost bought a copy of the program before learning it was for TI, quite a testimony to the program.

Richard Mitchell of Bytemaster Computer Services in Sulphur, Louisiana, was selling subscriptions to his technical newsletter, and announced that Craig Miller and Doug Warren would be doing some guest columns in the future. Mitchell also introduced some disk-based software: one was a mixture of miscellaneous programs and the other was a horserace handicapper.

The Germans were represented by T.A.P.E. and Ryte Data and had their hardware offerings on display. Of interest was the GRAM-KARTE, a 128K card (expandable to 512K) that lets users save modules to disk, and store them in the card and have up to eight modules on the menu. Watch for more innovative and different products from Mechatronics GmbH of Germany.

The big event on Saturday afternoon was a presentation by Lou Phillips of Myarc Inc. For openers, he demonstrated the new Extended Basic II. A demonstration and explana-

(Please turn to Page 33)

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# Fancy characters with Forth

By HOWARD H. ARNOLD

Here's a program that will let you design your own three-row graphics characters for printing fancy titles or labels. Written in Forth, it is indeed quick. Designing an individual letter takes only a minute; storing it on disk for future retrieval takes only seconds.

The full screen of the monitor is used for designing each letter. The arrow keys move your "brush" around the screen. The shift key paints as the brush moves, and moving without the shift key depressed erases.

The screen is set up in a 30-by-24 pixel mode. Each letter, then, is composed of 720 individual dots, just right for a three-row-high character. Because of the very large magnification, diagonal lines appear quite jagged, but when reduced to print by your Epson printer, I think you'll like the result.

First, let's consider the variables used in the program. If you've ever written programs for high-resolution graphics printing, you know that there is much arithmetic involved in determining the byte that must be supplied to the printer for each horizontal position of the print-head. This program does this calculation for you as it scans each element of your font. Each element is one pixel wide by eight high. The variable EL (line 1 of screen 60) is used for accumulating these values. Variable EL# is the number of the element being scanned, PRT is used for storing the "power of 2" of the bit (pixel) number as the element is scanned from bottom to top. The sum of these "powers of 2" for each pixel that is turned on then accumulates to the value of the byte that must be supplied the printer for each element of the font.

Variable LTR stores the identity of the letter being designed. 0=space, 1=A, 2=B etc. CO and RO are column and row (pixel positions) used in the key-scan and painting routine. And finally, BFR is the buffer set up to store the byte values for each font ele-



```
SCR #60
0 ( FONT DESIGN) --GRAPH --GRAPH1 DECIMAL      1 VARIABLE CO
1 0 VARIABLE EL 0 VARIABLE EL# 1 VARIABLE PRT 0 VARIABLE LTR
2 0 VARIABLE RO 0 VARIABLE BFR 90 ALLOT
3 : SETUP GRAPHICS 5 5 7 COLOR 9 9 6 COLOR 2 9 5 COLOR ; ( B,R,G)
4 : BKG 24 0 DO 0 I 32 55 HCHAR LOOP ; ( RED SCREEN)
5 : PT CO @ RO @ 1 56 HCHAR ; ( @=BLU PIX -- PAINT )
6 : ER CO @ RO @ 1 46 HCHAR ; ( .=GRN DOT ON RED BKGND - ERASE)
7 : MV CO @ RO @ GCHAR 46 = IF CO @ RO @ 1 55 HCHAR THEN ; ( ERA)
8 : LTADD LTR @ 128 * 1024 /MOD 40 + BLOCK + ; ( STORAGE ADD)
9 : CUM SWAP 1- DUP @ + DD DUP I GCHAR 56 = IF 1 ELSE 0 THEN PRT @
10 * EL +! PRT @ 2 * PRT ! -1 +LOOP DROP 1 PRT ! ; ( PRNT BYTE)
11 : THD @ * 31 1 DO DUP I CUM I SCREEN EL @ BFR EL#
12 @ + C! 0 EL ! 1 EL# +! LOOP DROP ; ( RASTERIZE 1/3 OF LTR)
13 : VST 0 EL# ! 3 0 DO I THD LOOP ! ( VIDEO SCAN LETTER )
14 : STRE VST LTADD BFR SWAP 90 CMOVE UPDATE FLUSH ; ( STORE LTR)
15 -->
```

```
SCR #61
0 ( FONT DESIGN CONT)
1 : DR KEY DUP 69 = IF MV RO @ 0 > IF -1 RO +! THEN PT THEN
2     DUP 88 = IF MV RO @ 23 < IF 1 RO +! THEN PT THEN
3     DUP 68 = IF MV CO @ 30 < IF 1 CO +! THEN PT THEN
4     DUP 83 = IF MV CO @ 1 > IF -1 CO +! THEN PT THEN
5     DUP 101 = IF MV RO @ 0 > IF -1 RO +! THEN ER THEN
6     DUP 120 = IF MV RO @ 23 < IF 1 RO +! THEN ER THEN
7     DUP 100 = IF MV CO @ 30 < IF 1 CO +! THEN ER THEN
8     DUP 115 = IF MV CO @ 1 > IF -1 CO +! THEN ER THEN
9     DUP 12 = IF STRE THEN ; ( KEYSKAN FOR DRAW OR ERASE)
10 : LTR? CLS ." Letter to be designed? " KEY 64 - DUP
11 0 < IF DROP 0 THEN LTR ! ; ( A=1 <A=0 )
12 : DES LTR? SETUP 0 CURPOS ! 15 SCREEN CLS BKG
13 BEGIN DR 13 = UNTIL TEXT ; ( USER WORD TO DESIGN FONT)
14     ( <enter> Escapes )
15 : HELP CLS 0 0 GOTOXY 272 264 DO I MESSAGE CR LOOP ; -->
```

ment (90 of them) for later transfer to disk.

Next let's consider the procedures line by line. SETUP, line 3 of screen 60, redefines three character sets to be used in painting. The number 8, included in character set 7, is redefined as a blue block; the number 7 (character set 6) is changed to a red block, and the period is colored green on a red background. The word BKG simply colors the screen red by placing red 7s in every block. PT is the word for "painting" a pixel. It places a blue 8 in the designated column and row. ER erases by placing a period (.) in the block. MV replaces periods with red 7s as the period moves about the screen.

LTADD determines where on the disk the font design will be stored. It starts at block 40 and stores each letter in a slot 128 bytes above the last one. Eight characters are stored in each block, so blocks 40 through 42 are used for a full alphabet of upper case characters.

CUM accumulates the bit values for each 1 by 8 pixel element of the letter as it is scanned, resulting in a byte value in EL for that particular element. THD examines the 30 elements in a row (one-third of the font) individually and stores them in BFR. VST calls THD one row at a time. STRE is the word

(Please turn to Page 33)



## FANCY CHARACTERS—

(Continued from Page 32)

that causes all of the above to happen! You may note that the word THD calls SCREEN to change the background screen color (around the design section) as the storage progresses. This provides a signal that "something is going on" and was placed there, actually, before it was found how quickly the process really takes place. Experience with BASIC versions of the program had led us to believe that the computer was "out to lunch" during this period. I left it in as a continuing reminder of how great Forth is!

SCREEN 61 is devoted mostly to the word DR. It simply scans the keys and moves the location of the period (.), either painting (PT) or erasing (ER) depending on whether the shift key is depressed. Note here, by the way, that the arrow keys are scanned as E, X, S and D; that is, you DO NOT use the FCTN key with them. Takes fewer hands! And when your design is done, pressing P'RCD (code 12) initiates the

storage process. (Two hands here—use FCTN 6.)

LTR? simply identifies which letter you're about to design. And DES is the final user word that is entered in order to start the process. It should be noted that the keyboard is scanned for ENTER to escape the program, or to start designing a new letter.

So type it in and enjoy. Later I'll give you a couple of programs to use these fonts to print fancy address type labels and to print a disk mailing wrapper with suitable warnings in graphics characters.

NOTE: If you don't need the typing practice, or if your Forth skills mitigate against finding your errors through running the program, the author offers this program and the two printing programs to be printed in future issues as Freeware. Both binary code and source screens are included on the disk. Send \$5 for disk, shipping and handling to Howard Arnold, 210 Beech Valley Rd., Lewisville NC 27023.

## FEST-WEST—

(Continued from Page 31)

tion of its many features brought an enthusiastic response from the audience. XB II has many Unix-like commands and operates much faster than TI Extended BASIC. Phillips pointed out that XB II requires the Myarc 128K card. Perhaps the most impressive demonstration of XB II's power was when Phillips listed a program to the screen (at about three times normal speed) and then opened up a window and listed the program to just the upper left quarter of the screen (at blinding speed).

Following the discussion of XB II, Phillips displayed the keyboard for the new computer his company is designing, along with a power supply board and a wire-wrapped motherboard. The computer was not operating, but he promised a working model would be demonstrated on March 15 at the New Jersey Texas Instruments Computer

Owners Fun Festival (TICOFF).

A detailed discussion followed Phillips' demonstration of XB II. He concentrated on the architecture and technical aspects of the new computer. Phillips noted that the chips his company is using use intelligent instructions while many of the routines used by comparable machines are done through software. He hopes to be able to take orders by June. Phillips said he hopes to have a name for the new machine in time for the New Jersey fair.

Overall attendance for the faire was down somewhat from anticipated levels, but it was still an excellent opportunity to get to know some of the shakers and movers in the TI community and see them as real people. It was a good effort for a first attempt, and next year's LA faire should be even better.

## New products slated for TI from Germany

New TI products from Germany are expected to be available soon, according to Bruce Ryan of RYTE Data in Canada.

Ryan says he learned of the products by talking to Manfred Wilhelm of Mechatronic GmbH at the TI Fest-West in Los Angeles March 1-2.

Ryan says Wilhelm told him he would have a model of a 128K card for the PE box "ready to go in the next 30 days." An 80-column card will be available around June 1, he says.

With the 80-column card, 256 colors will be available and it will be compatible with all TI software, Ryan says. The card would have a resolution of 256x208 pixels and allow multi-colored sprites in all 256 colors, with 192K video RAM. This is a version of the 99/38 chip without the MFX option and will put out RGB or composite monitor signals, according to Ryan, who says samples should be available in mid-May. Users will be able to access 80 columns directly using assembly code, Ryan says.

Also being developed is a new disk program by Heiner Martin which "makes the 128K GRAM Karte act like a RAM disk," according to Ryan.

For further information, contact RYTE Data, 210 Mountain St., Haliburton, Ontario, Canada KOM 1S0.

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## 99 Home Sentry from CorComp to turn on household appliances

The 99 Home Sentry, usable for home security or just for convenience, has been developed by CorComp in coordination with X-10 USA, Inc.

Shipping for the product was scheduled to begin in mid-March, according to Jackirae Sagouspe, CorComp president.

X-10 USA has developed similar home management packages for other computers, Sagouspe said.

Software for the product was written by Mike Norton, a design engineer at CorComp, she said.

The product requires only a TI99/4-A console and a monitor or television set, she noted. It consists of a module and a cable connecting to a stand-alone RS232 interface.

The user can turn lights on or off or can dim or brighten them with the package as well as turning other appliances such as stereos on and off.

"You can use it for security, to make it appear that someone is home, or just for comfort, to turn on the heat and the coffee in the morning," Sagouspe said.

After the user establishes timings for turning appliances on and off with the module, his program is stored in the X-10 Powerhouse stand-alone RS232 interface, which works with small modules which control the appliances or lights. Thus the computer is freed for whatever other functions the user desires, she said.

She said the package containing the software, cable and interface would retail for "around \$100." The small modules for the appliances sell separately, she said, because of users' differing requirements.

For further information, contact CorComp Inc., 2211-G Winston Rd., Anaheim, CA 92806 or (714) 956-4450.

### Reviewed in MICROpendium

#### 1984

**February:** B-1 Nuclear Bomber, Tandon TM-100 Disk Drive, Void, Beanstalk Adventure, Microsurgeon, On Gaming, Database 500

**March:** Star Trek, Escape From Balthazar, Garkon's Getaway, Sky Diver, Mail-Call, Pro-writer 8510 Printer

**April:** Monthly Budget\$ Master, Budget Master, Home Budget, Thief, Donkey Kong, Khe Sanh  
**May:** Companion Word Processor, Q\*Bert, Mad-Dog I & II, Programs for the TI Home Computer

**June:** Creative Expressions Accounts Receivable/Accounts Payable, CDC 9409 Disk Drive, Starship Concord, Lost Treasure of the Aztec, ASW Tactics II

**July:** Theon Raiders, Introduction to Assembly Language for the TI Home Computer, Game of Wit, Pole Position

**August:** TE-1200, Tower, Galactic Battle, Galaxy

**September:** Wycove Forth, 99/4 Auto Spell-Check, QUICK-COPYer, Wizard's Dominion, Anchor Automation Mk XII Modem

**October:** Killer Caterpillar, ZORK I, Defender

**November:** 9900 Disk Controller Card/Manager, Super Bugger, Transtar 120S printer, Floppy-Copy, Data Base-X

**December:** Gravity Master, Data Base Manager

System, Learning 99/4A Assembly Language Programming

#### 1985

**January:** Super Sketch, Foundation Computing 128K Card, PTERM-99, TI-Runner

**February:** Super Extended BASIC, Beginning Assembly Language for the TI, ZORK II

**March:** Morning Star Software CP/M Card, WDS/100 Winchester Disk Drive, Sketch Mate, BMC Color Monitor

**April:** 9900 Micro Expansion System, Disk + Aid, Gemini 10X-15X

**May:** Character Sets and Graphics Design, Draw 'N Plot

**June:** GRAPHX, DATA BASE I

**July:** Acorn 99, Advanced Diagnostics.

**August:** Model Dow-4 Gazelle, TI-Artist, PC-KEYS, Not-Polyoptics' Bankroll

**September:** Midnight Mason, Myarc 32K/128K Card, GRAPHX Companion

**October:** 4A/TALK, Extended BASIC II Plus, XB Detective, Console Writer 2.1

**November:** Foundation Z80A/80-column cards, 9900BASIC, Adventure Editor

**December:** Display Enhancement Package, Triple Tech

#### 1986

**January:** BITMAC, Starcross

**February:** Night Mission, Peripheral Diagnostic Module, BA-Writer

## Free GENie uploads for freeware offers

General Electric Information Services announced a three-month pilot program, March 1 through May 31, for the free uploading of public domain software programs on RoundTable offerings of GENie—the General Electric Network for Information Exchange.

The free service is available during non-prime time for uploading of shareware or freeware in the public domain, according to William Loudon, general manager of GENie. GENie users who download the public domain software will pay for their actual time used on GENie to download it, he said.

He noted that "to our knowledge no other commercial communications service provides free uploading of public domain software. At the end of the three-month pilot program we will evaluate it and determine whether or not it will become a permanent feature on GENie."

He said more than 3,000 public domain software files are available in the various RoundTables on GENie. A TI RoundTable is one of the user group RoundTables on the service.

The uploading and downloading of the public domain software programs is done using the XMODEM error-free asynchronous file transfer protocol available on GENie.

GENie is available for \$5 per hour for non-prime access at either 300 or 1200 baud. Non-prime time rates apply Monday through Friday from 6 p.m. to 8 a.m. local time, and all day Saturday, Sunday and national holidays. Prime time rates for GENie at 300 or 1200 baud are \$35 per hour.

Personal computer users can sign up for GENie from their own keyboard by calling 1-800-638-8369. Users are asked to set their modems for half duplex (300 or 1200 baud) and be ready with a VISA, MasterCard or CheckFree account number. Upon connection, HHH should be entered, then RETURN pressed. At the U#= , prompt, 5JM11999,GENie should be entered, then RETURN pressed.

For further information, call 1-800-638-9636, ext. 21.

## Super Duper

## Cartridge backs disks up faster

By GERALD A. EVANS

I didn't buy my TI 99/4A Home Computer to be enslaved by slow moving software or firmware. Therefore it came as a shock to me that the simple task of backing up a disk with the TI Disk Manager 2 Module can take so long. I am using three DS (double-sided) disk drives with my system. This gives me 718 sectors or 192 Kbytes/disk storage. This is quite impressive and allows me a lot of flexibility, especially when using TI-Writer or Multiplan.

However, and here is where the trouble starts, I am a firm believer of backing up all my important disks. Especially software that I purchase. I backed up a full double-sided diskette, single-density (718 sectors, remember) and it took 22 minutes 34 seconds using Disk Manager 2 and two disk drives. When I only had one drive it took me more than 40 minutes to backup the same disk and I had to switch disks 154 times. That figures out to twice for each of the 77 files on the disk, for those of you who are counting.

I was therefore ecstatic when I read the ad for Navarone's Super Duper cartridge and saw its claims for faster backups in only one or two passes per disk.

**Documentation:** On receiving Super Duper the first thing I had to do was dig into the manual. All four pages of it. To use Super Duper all you need is the TI 99/4A console (except that the 1983 version 2.2 models need another cartridge called "GROM BUSTER," also available from Navarone), any disk drive controller card, at least one disk drive and 32K memory expansion (or alternatively I know that the Foundation 128K card will work as well). I found the manual to be very brief and easy to read. The instructions fall into four categories:

1. Getting Started. 2. Duplicating Disks. 3. Verifying disks. 4. Error messages.

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## Review

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### REPORT CARD

**Performance**.....B+  
**Ease of Use**.....B  
**Documentation**.....B+  
**Value**.....A  
**Final Grade**.....B+

**Cost:** \$24.95

**Manufacturer:** Navarone Industries, Inc., 21109 Longeway Rd., Suite C, Sonora, CA 95370

**Requirements:** Console (except 1983 V2.2 consoles), 32K memory expansion, disk drive controller and at least one disk drive

---

The instructions for each category are all very simple. For example, Getting Started displays what the main menu will look like after you plug in the cartridge and turn on the computer or reset the system. It will look like this:

PRESS

1. TI BASIC
2. FOR DUPLICATING DISKS
3. FOR VERIFYING DISK

If you press 2 then the screen will read:

ENTER MASTER DISK DRIVE:  
and you enter a 1, 2 or 3 depending on where your master disk is. The screen now will display:

ENTER COPY DISK DRIVE:  
and you once again enter a 1, 2 or 3. The screen will now display:

INSERT MASTER IN DRIVE (n)  
THEN PRESS ANY KEY

Follow these simple directions and in less than five minutes for a double sided disk that is stuffed full with 77 files in all 718 sectors and using two drives you will have an exact sector for sector copy. This includes formatting time which, by the way, Super Duper will do automatically. No operator prompts are asked for or required for format-

ting a new diskette. (By the way, remember how long it took using only one drive with the Disk Manager 2 module? More than 40 minutes, right? Well, with Super Duper the same process took 7 minutes 40 seconds and required exchanging disks only 12 times instead of 154.

**Performance:** I found that it took Super Duper a minimum of six passes to do a full double sided disk and Super Duper makes an exact, sector for sector copy of the original disk whereas the Disk Manager 2 module reformats the copy disk so that the files are listed in alphabetical order (no doubt this process adds to the time required to accomplish the task). Disk Manager 2 also processes each file separately and Super Duper reads a very large block of sectors and then writes them to the copy disk.

If you use the Verify feature (this takes less time than to copy a disk) the process is simpler. The steps you follow are essentially the same, but here the program only reads the sectors on both disks and then either displays the error message:

"DISK NOT THE SAME AS SECTOR (nnn)"

or simply reverts to the verify main screen and waits for you to give the drive numbers for the next disk you want to verify. The major drawback to the Super Duper module is when you finish copying a disk and wish to verify it you must restart your computer to get back to the main menu. This means turn off the computer, then back on, or if you have the Widget or cartridge expander then you can push the built-in reset button and then press any key to get the main menu back on the screen. This is a minor inconvenience though.

The only disk drive options available are 1, 2 or 3 so if you have a four-drive configuration you would only be able to use 1, 2 or 3 and if you have the DSK

(Please turn to Page 38)

T.O.D. Editor

# Change the rules of the game

By JONATHAN ZITTRAIN

The Tunnels of Doom Editor is a boon to anyone who has grown tired of the game that comes with the Tunnels of Doom module (PHM 3042), Quest for the King. The T.O.D. Editor allows modification of quite a few aspects of the game, from text displays (game descriptions, weapon names, character names, etc.) to graphic displays (monster graphics, weapon graphics, map graphics, etc.).

**Performance:** The T.O.D. Editor runs using Extended BASIC but displays little of BASIC's characteristic slowness. It does take some time to load, but only while designing graphics does one notice any slowdown in speed. The program requires that a current TOD game, such as the game that originally came with the module, be placed as the first program on an empty disk. Modifications are made as soon as the user makes them, so there is no no separate "save" command.

One problem with the T.O.D. Editor is that it is not a true "editor." A current game is modified part-by-part, but each part must be made from scratch. For example, when a graphic is entered, the original graphic is never displayed. The user must start from a blank screen and create the graphic from there; there is never an option to begin with the original graphic and then modify it. For creation of monsters, horizontal and vertical flip are included for the graphics, but the use is limited since it cannot be applied to the second monster graphic (each monster has an offensive and defensive graphic which alternate on the screen at times). With little to go on, it takes a while to learn the conventions of size and shape once the graphic is scaled down in the game.

Another problem with the T.O.D. Editor is that it is somewhat limited in many areas. Although the manual says that eight quest objects can be designed, I only saw numbers 0-2 available,

## Review

### Report Card

Performance .....	A-
Ease of Use .....	A
Documentation .....	A+
Value .....	A
Final Grade .....	A

**Cost: \$26.00**

**Manufacturer: Asgard Software, P.O. Box 10306, Rockville, MD 20850**

**Requirements: TI-99/4A console and monitor, disk drive and controller, 32K memory expansion device, Tunnels of Doom cartridge, printer (optional)**

and some other areas have similar limitations on size. This is understandable, though, considering the memory constraints and other programming hurdles that hamper an undertaking as large as a Tunnels of Doom editor.

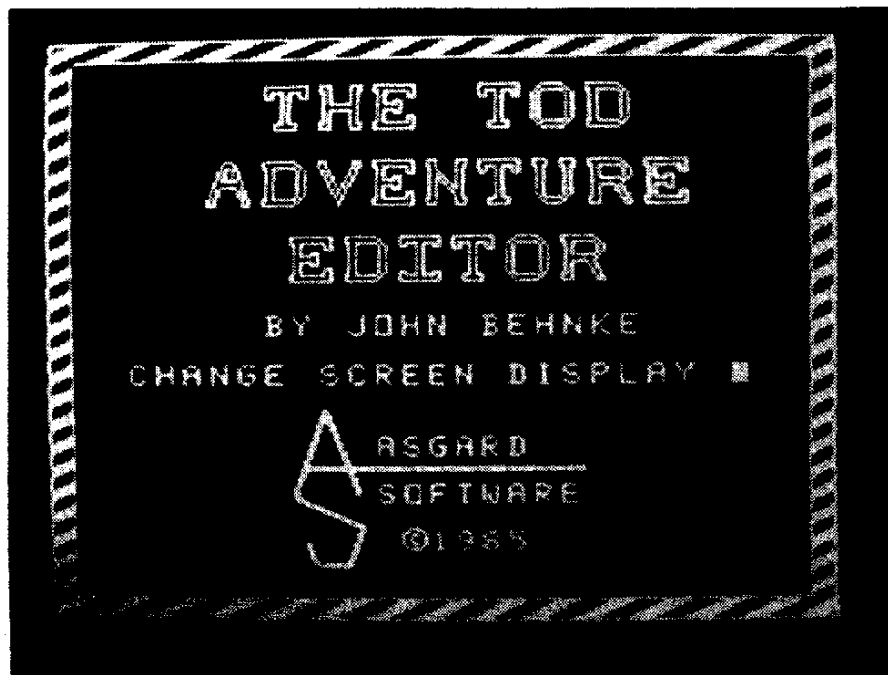
Also, the weapon names may be changed, but where they may be found and the damage they do is left to the module.

One excellent feature is "Print Monster Statistics," which will dump information about each of the 51 monsters to a compatible printer. Graphic definitions that the user creates can also be dumped to a printer.

**Ease of Use and Documentation:** The T.O.D. Editor comes with two programs, A and B, which are menu driven and easy to use. The manual is complete, and includes a partial tutorial with sample screen entries and helpful hints on modifying the game. The documentation is clear and extensive, with an addendum included for version 2.0 of the game, which corrects some minor bugs of 1.0 and adds some features to the graphics editor. No special knowledge of BASIC or assembly is required, but a thorough familiarity with the Tunnels of Doom game is very helpful.

**Value:** The T.O.D. Editor is an excellent addition to a software library that includes the Tunnels of Doom module. The customized games that the user can design have endless

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## Business Graphs 99

# Enhancing your productivity

By **RON ALBRIGHT**

I have viewed software development for the TI 99/4A in three distinct phases. First, when TI was producing software, we were in the "cutesy" phase with games and educational software predominating (certainly, TI-Writer and Multiplan were exceptions).

Second, immediately after TI left the market, we entered the "hacker's" phase, with software from third-party developers opening up the disk operating system and machine architecture for exploration (Miller's Graphic's Advanced Diagnostics and Explorer as examples).

Over the past several months, we have entered and are still in the "productivity" phase of development. Advanced communication software and graphics software have been increasingly dominant. One piece of productivity software I have perceived as sorely lacking was graphing software to generate useful graphs for presentations and reports. At least it was lacking until now. With the release of "Business Graphs 99" by McCann Software, this software void has been filled and we now have a useful piece of productivity software that allows us the facility to produce impressive displays of information that rival those of any machine.

**Performance:** BG99 is written in Forth and auto-boots from Extended BASIC or through Editor/Assembler. It is not copy protected and allows easy back-up of the program disk for consumer protection. Even the warranty statement is first-class, as it is the "Fair Use Agreement" pioneered by Jerry Pournelle (a noted computer author who writes regularly for *Byte* magazine), and is clear and precise.

Once the program is booted, you are presented with a menu to choose which type of graph you wish to make, pie chart, bar graph or line chart. The pie chart is automatically booted and choosing bar or line graph will boot the

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## Review

---

### Report Card

**Performance** ..... A  
**Ease of Use** ..... A  
**Documentation** ..... A-  
**Value** ..... A  
**Final Grade** ..... A  
**Cost: \$29.95**

**Manufacturer:** McCann Software, Omaha, Nebraska, available from Disk Only Software, P.O. Box 4170, Rockville, MD 20850.

**Requirements:** Console, monitor or television, expansion memory, disk system, Extended BASIC or Editor/Assembler. Printer optional but recommended.

other routines quickly. After you select which graph, you have a menu to begin construction of your graph. You may now edit the graph's titles. You are, for example, allowed to enter a title, a subtitle (which appears below the graph) and, for bar or line charts, a label for the horizontal and vertical axis.

For pie charts, you also select number of slices (from 2 to 6). Once you have edited the titles, you then begin entering the data. You are prompted for the title for the slice, it's value, and then, are given seven texture patterns or 15 colors for the slice. Finally, you are asked if you want the slice "exploded" (separated from the other slices). You go through this series for each slice. When finished, you then may print out the graph. The printouts are full size and take up, roughly, two-fifths of a page. The graphs are shown on the monitor while being printed. Textures are printed as chosen, but colors are printed without a pattern (I did not use with a color printer and I do not know if the software will support one). You are not allowed to save the pie charts to disk, but, since you are

dealing with a maximum of six data elements, that is not so important.

One other nice feature is a simple mechanism to adjust the x and y axis of the printout to produce perfectly round pie charts. Epson (TI) printers require different settings than Geminis. Since I have both printers, I know the adjustments are needed and work perfectly.

For bar or line charts, you go through the same data entry process. You may have up to 20 data elements for the bar graphs and up to 100 for the line charts. You may also save these two forms to disk for recall later. When the program is loaded from disk, you need only reenter the graphs titles and ranges and the old data will be used to generate the graphs. You also have a choice for data presentation for these two forms of graphs. For bar charts, there are three choices: single bar, stacked bar (maximum data over minimum), or double bar (maximum next to minimum). You may use a different texture or color for minimum and maximum for contrast. For line charts, you also have three choices: a hi-lo plot, a line plot, or a area plot. For both bar and line charts, you may have a grid off or on for the graph. You may also use the same data to display the different forms before printing to see which type of graph is the most visually effective. At any time, you may also edit the data to change any part of the graph. You may also use data saved as a bar chart to be used to generate a line graph if saved to disk and reloaded and vice versa (if the line chart has no more than the 20 data elements a bar graph can use). A nice feature is also the ability to catalog the disk when you chose to retrieve old graph data.

There are a couple more features that set this package above the other graphing software available. First, there is a nice tutorial in the manual on how to access data in Multiplan for use  
**(Please turn to Page 38)**

## SUPER DUPER—

(Continued from Page 35)

X option on the Foundation 128K memory card you would not be able to use that either.

I have not forgotten that the manual has a last section, ERROR MESSAGES. The most significant feature of this cartridge is that it has the ability to I(gnore) any sector errors that you may have on the original disk. Super Duper will copy the disk up to any bad or damaged sectors, attempt to a bad sector several times and then stop and display this error message:

DISK ERROR ON DRIVE (n)

ERROR AT SECTOR (nnn)

Abort (A), Retry (R), Ignore(I)

When I pressed I(gnore) I found that I suddenly had a way of duplicating some disks that previously were "untouchable" (such as the TI Pirate adventure disk).

**Value:** I found that Super Duper is a very useful tool for those with a basic system and one or more disk drives. For those who have the CorComp DS/DD Card this cartridge only offers the ability to Ignore bad sectors and the very convenient verify feature. This cartridge is a must for anyone with only the TI disk controller. Not only will it save much time but it offers two additional advantages: A verify feature which is very easy to use, and also the ability to ignore bad sectors when copying.

## T.O.D. EDITOR—

(Continued from Page 36)

possibilities, and although the basic structure of the game remains unchanged, it will be quite a while before this program or the games created with it begin to gather dust.

The author, John Behnke, is to be congratulated for a fine programming effort, especially since no documentation on the Tunnels of Doom game structure was ever released by TI—not only did Mr. Behnke discover how to modify individual game features, but he has written an easy-to-use and ver-

satile program that allows anyone to modify the game as well without such specialized knowledge.

The program has a lot "under the hood," and is one of the few, and certainly the best, of its kind.

## BG99—

(Continued from Page 37)

in producing graphs (the method has certain constraints, but can be useful). And the structure of the data as saved to disk is presented so that you can produce data files using TI-Writer or Editor/Assembler (the graph data is stored as a Display/Variable 80 file) if the file structure is followed. Secondly is the ability to produce graphs that can be incorporated into TI-Writer text files and printed with the text from TI-Writer. Through a simple conversion program provided by the author, you can convert graphs printed to disk to D/V 80 files and load them into TI-Writer for a combined text/graphics file. This, alone, sold me on the package.

**Ease of Use:** Business Graphs 99 is completely menu driven, has excellent error checking and is extremely difficult to crash. Even when you succeed (or is it fail?), the program can be quickly and easily restarted, without resetting the computer.

**Documentation:** A well-done 27-page manual completely documents every menu and every procedure. The only information I had to find out on my own was that you have to re-enter the titles and ranges for the graphs when reloading previously saved data. On the back of the printed manual is a useful complete set of examples of each type chart BG99 can produce.

**Value:** As a teacher and as one who must give several presentations and lectures, I have used BG99 to produce not only printed graphs for handouts, but also have used them to make clear overhead transparencies without relying on the cumbersome media lab at my office. Further, directly from a high-resolution color monitor I have been able to make 35mm color slides that have been used effectively for in-

struction. Anyone who prepares reports or requires graphic presentation of data would find this software of great use and an excellent value. At \$29.95 it is priced at about one-tenth similar packages for other machines.

## BBS help requested for Australian board

Shane K. Anderson, sysop of the TI-SHUG (TI Sydney Homecomputer Users Group) "TEXPAC ELECTRONIC MAGAZINE" says he wants to contact other TIBBS systems operators with the view of exchanging a flow of news and view items on disk to share with members.

"From my own experience, I have found it too expensive to phone the U.S. BBSs to obtain updated information, and hope that those who read MICROpendium and who run BBSs will contact me," he writes.

Anderson may be contacted c/o TEXPAC CBBS, P.O. Box 595, Marrickville, NSW, Australia 2204 or (02) 560-0926.

## Nashville TI Fair set

A TI Fair is scheduled for 9:30 a.m.-5:30 p.m. May 3 and 12:30-5:30 p.m. May 4 at the Cumberland Museum in Nashville, Tennessee.

Bob Teague, president of the Music City 99ers User Group, said the focus will be on southeastern regional users groups, and that guest speakers are scheduled.

He said there is a \$1 admission charge for entry to the museum, but no charge for the TI Fair itself.

For further information, contact Music City 99ers User Group, P.O. Box 24886, Nashville, TN 37202.

## Bright Idea

Shed some light on consumer problems. The free Consumer Information Catalog can help you find the answers. Write:

Consumer Information Center  
Dept. LB, Pueblo, Colorado 81009

# Newsbytes

## Navarone goes back to California again

Navarone Industries has returned to its home state of California after a brief stay in Texas.

Address for the firm is 21109 Longeway Rd., Suite C, Sonora, CA 95370. Telephone number is (209) 533-8349.

Chuck Humphrey, Navarone's president, explains, "Back in August 1985, Navarone was working with a firm in Dallas towards a merger of the two companies. This merger would provide Navarone with some new resources and allow us to service some new markets. The company moved to Dallas, where we entertained several marketing strategies and even started soliciting companies to license our product line for continued support.

However, Humphrey says, early this year negotiations "fell apart" with respect to licensing Navarone's product line. This and other circumstances led to his decision to withdraw from the merger and move the company back to California, he says.

"Navarone has suffered from the shock of two moves within the last six months," Humphrey says, "but I am confident we have emerged a stronger company, with a great deal more commitment to the TI99/4A marketplace."

He notes that Navarone has tried several approaches toward marketing its products and most recently attempted reaching buyers through users groups.

Humphrey calls this recent attempt, the HIWAY program, "a total disaster resulting in high losses because user groups were more interested in free products and less interested in supporting manufacturers."

## Golf analysis set for release on March 15

Sunn Publishing Co. of Lubbock, Texas, announces the release of the

GOLF PROFILE golf statistical software package, set for March 15.

According to the manufacturer, the package is intended not only for the beginning golfer but also for the seasoned player.

The manufacturer says that GOLF PROFILE will analyze the golfer's game and pinpoint his or her golfing strengths and weaknesses. The program is said to provide single round analysis, total rounds analysis, date/score summaries, review of previous rounds played and an unlimited record of daily rounds.

GOLF PROFILE is also said to provide a complete analysis of fairways, greens, putts, club usage and a history of each hole played. This analysis includes a record of balls hit out of bounds/in a hazard/lost, chip ins and up and ins for par.

The GOLF PROFILE software package requires a TI99/4A console, 32K memory, disk drive and Extended BASIC. RS232 interface and printer (Epson and compatibles) are optional. According to the manufacturer, the software package, consisting of a program diskette, 15 scorecards and a 12-page instruction manual, is available for both single and multiple disk drive systems.

Introductory price for the GOLF PROFILE software package is \$29.95. For information about software packages for teams, clubs or schools, write Sunn Publishing Co., 6801 19th St., Suite 272, Lubbock, TX 79407.

## Cave game revised

Donn Granros, author of the OLD DARK CAVES adventure game announces the release of OLD DARK CAVES revision 2. This will replace the version 1 program which has been on the market since October 1985.

The new program accesses more than 35 additional assembly language subroutines which allow for increased operating speed and which have also made possible the inclusion of a number of new routines "which add to the

game's challenge," according to Granros. He says a number of new traps, creatures, magic spells and goals have been added and the program size has increased to more than 88K.

Granros says all purchasers of the first version may write to him giving their current address to be sent the new version at no charge. It is not necessary to return the old program disks, he says.

Price of the new version has been set at \$19.95. To order or request information, write Granros at 6340 4th Ave. So., Minneapolis, MN 55423.

## TI TALK BBS operates

Arthur J. Casse Jr. of Reading, Pennsylvania, announces his 24-hour BBS, TI TALK, operating at 300 baud with plans for 1200 baud in the near future.

Casse says the board features Xmodem up and downloading, a private message base, 10 bulletin areas and other features including an on-line adventure game. He says the BBS is a modified TI-NET BBS program.

According to Casse, the board operates on a CorComp micro-expansion 9900 unit, two Mitsubishi double-sided drives and a Hayes Smartmodem all connected to a TI99/4A. Plans for expansion include moving to a peripheral expansion box to accommodate either a Myarc 128K card and two additional double-sided drives or a hard drive.

Phone number for TI TALK is (215) 372-1154.

## GADEGO programs

GADEGO Software of Lubbock has a BBS and an adventure game for sale and plans to release three action games in the near future.

The TI-NET BBS, which, according to Matt Storm of GADEGO, emerged from the TI-SUB program, has Xmodem uploads and downloads, up to 99 bulletin sections, and special sys-op function keys including time increase, access raise, "who's there?" and a hang-up key. Storm says it has a

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# Newsbytes

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text file section and keeps up with new messages. The board sells for \$30 and comes with a manual.

The adventure requires the Adventure Command Module. Storm says the adventure, called "The Great White North Adventure," is for the expert adventurer. In the game, the user tries to find a couple of treasures and save the world from evil beer brewers. The game is available on disk only for \$12.

The action games planned for release require Extended BASIC and are written in assembly language. The manufacturer plans to sell them at \$15 each or three for \$35.

The first is Blue Bert. Blue Bert is described as a magical blueberry that came to life and is trying to save his friends, the apples, bananas and cherries, from the evil Yuk and Spoiler.

The second is Bubble Plane. This balloon-like plane flies around and tries to fly through vigorous enemy territory and destroy the enemy's base. The game features scrolling, according to the manufacturer.

The third game is Neandro, in which the user controls a caveman who is trying to save his daughter and pet dinosaur by fighting off the prehistoric monsters. This game also features scrolling, the manufacturer says.

For further information or to order, contact GADEGO Software, 3402 93rd, Lubbock, TX 79423.

## Users to modify Forth

Jim Wray and Edgar Dohmann of the Johnson Space Center Users Group say they are working on a project to modify the kernel of TI Forth.

Wray and Dohmann say they want to provide compatibility with current hardware products as well as to add some new features to the kernel.

Already working, they say, is a modification to allow Forth screens to be stored onto and loaded from a hard disk. They explain that this required the addition of a hard disk I/O routine as well as two new intrinsic words:

USEDISK and USEWDS. These two words set or clear a flag that determines whether screen loading and saving will use the floppy or the hard disk I/O routine. Other than setting the appropriate flag, use is transparent, they say.

Up to 10,000 screens can be stored on a hard disk although this would require a 15MB disk. The maximum number of screens that can be stored on a 5MB drive is between 3,000 and 3,500.

Other modifications they are considering include a version that can load into SUPER SPACE memory and be selected from the startup menu; additional disk size parameters so varying capacity diskettes can be used simultaneously; assignment of screen blocks to any drive number to make use of RAMdisks more convenient; addition of a single step debug mode that will display the stack and register values; and bank switching routines to allow use of 128K/512K memory cards.

The authors say they would like input from the user community on this project and ask that anyone having suggestions for Forth improvements write them at Rt. 5, Box 84, Alvin, TX 77511 or leave E-mail on the Houston Users Group bulletin board at (713) 475-8909. They say that the intensity of effort on the project and the extent of the modifications will be determined largely by the amount of interest expressed.

## Villa-TI BBS operates

Jim Nuvolini, sysop, announces the operation of his 24-hour BBS in Colorado Springs, Villa-TI. The board operates at 300 and 1200 baud and may be reached at (303) 574-2567.

## IUG library available from Oklahoma club

The Central Oklahoma 99ers have purchased the International User Group's Owner Written and Master 99

series libraries, according to Charles C. Hurst, president of the Central Oklahoma 99ers.

Hurst says the libraries are now in the public domain. For further information, send a legal sized self-addressed stamped envelope to the Central Oklahoma 99ers, 307 West Rickenbacker Dr., Midwest City, OK 73110-5646.

## Software Specialties relocates to Florida

Software Specialties, Inc., producer of Midnite Mason, Micro Pinball and other programs for the TI99/4A, has a new address.

Formerly in Evergreen, Colorado, the firm may now be contacted at P.O. Box 3692, Ocala FL 32678-3692.

## Miami Users Group meets second Sunday

The Miami Users Group for the TI-99/4A meets at 1 p.m. the second Sunday of each month at the Miami Springs Field House at the corner of Apache Drive and Westward Drive.

Members and nonmembers are welcome, according to Burt Schreiber, secretary.

## BBS announced

Sysop Roger Davis announces his BBS at (213) 947-7777. Davis says the BBS is a derivative of the 99BBS.

## Downeast 99ers run two BBS systems

The Downeast 99ers in Westbrook, Maine, with more than 250 members across three states in Canada, operates two 24-hour BBS systems, according to Mark Rideout of the club.

The Downeast Connection, a TIBBS, has TE-2 downloads at both 300 and 1200 baud. Most of the downloads on this board are freeware programs, according to Rideout. The oth-

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er board is a Techie named TI DOWNLOADS after its main functions. This board contains many of the more than 1,500 public domain programs from the club's library, Rideout says. He says that both boards have a large message base.

"The TIBBS is running four drives and the Techie is running with three drives, so all together we have a lot of space for our download libraries," he says. "We also trade a lot of disks by mail for people who do not or cannot spend the money on long distance calls."

Address for the club is Downeast 99ers, P.O. Box 542, Westbrook, ME 04103. BBS numbers are (207) 797-5690, TIBBS, and (207) 892-4414, Techie.

## Pilgrim's Pride plans new product for TI

Pilgrim's Pride of Hatboro, Pennsylvania, was anticipating the release of a new product, unnamed as of press time, for the TI99/4A.

The product, a module and disk package tentatively priced between \$60 and \$70, is said to allow the user to load almost any cartridge made for the TI99/4A onto a disk and run it through the module (allowing the user to run all the cartridges through the one module).

According to the manufacturer, the product expands the user's system by 8K and provides an Editor/Assembler loader package (load and run, run program files and print program files).

With the 128K or 512K RAM card, the product is said to allow assembly programs to use all memory as directly programmable, giving the user a true 126 or 520K computer. It is said to allow the user with a single keystroke to run any program file from any drive and page through all files on all disks. Users may load up to seven programs in memory at one time and execute any of them with a single keystroke, according to the manufacturer. Upon completion (or resetting with the Widget

reset button) of that program the user will be returned to the main menu and will be immediately ready to run any other resident program.

According to Pilgrim's Pride, also coming soon is a 136/520K Assembler/Loader package, with the assembler/loader transparent to pages in memory, which includes the following macro instruction routines: Move blocks of data to and from RAM, ROM, VDP RAM, etc.; store several screens; page screens at will; and scroll screens in all four directions (up, down, left and right).

Pilgrim's Pride is located at 5 Williams Lane, Hatboro, PA 19040. Phone is (215) 441-4262 or the new toll-free order line, 1-800-TI-STUFF.

## Thomson Software to close operations

Thomson Software is scheduled to discontinue retail operations April 15.

Don Thomson of Thomson Software says any orders received after that date will be returned to the sender unopened. He says the firm's distributor incentive program will also cease to exist as of that date.

He says he is closing down because he will begin a new job with a large data processing firm, and has been asked to stop business because of conflict-of-interest considerations.

Thomson says he will, however, be putting DISK + AID, MEMORY MANIPULATOR and CREDIT CARD DATABASE MANAGER, with limited documentation on the disk, into user group libraries. Persons using the copies may purchase the full documentation and latest version of the program from Thomson. Prices on the three programs will be DISK + AID, \$20; MEMORY MANIPULATOR, \$10; and CREDIT CARD DATABASE MANAGER \$8.

User groups wishing to obtain the copies should send a self-addressed disk mailer along with one initialized disk for each program wanted and \$5 to Thomson at 1461 Beach St.,

Muskegon, MI 49441-1099.

He says groups will be free to distribute the programs to their users free of charge in an unchanged version only, and that a fee of not more than \$5 can be charged for disk and duplication costs if deemed necessary. All necessary program registration information will be on the disk, according to Thomson.

Thomson notes that the programs are copyrighted and not to be marketed. He says he will provide source code for MEMORY MANIPULATOR and DISK + AID for \$30 to persons with a registered copy of the program. He says the source code is not to be distributed and is not user supported. Thomson says he will continue with planned upgrades for his programs as time permits.

## You can boost your TI with a bumper sticker

E.M. Smith of Knoxville, Tennessee has designed a bumper sticker for users who want to "go public" with their support of the computer.

The illustrated bumper sticker bears the slogan "I'm a 99/4A booster. 'I love my TI-99/4A.' 'We eat Apples for lunch.'"

Smith says he conceived the idea as a way to help expand the membership of his local users group and later launched a promotion through a mailing to other users group.

The bumper stickers sell for \$1.50 each or three for \$4. There is a five percent discount on orders of 36 or more. Mailings are in the U.S. only.

For further information or to order, write TI-BOOSTER, 3506 Garden Dr., Knoxville, TN 37918.

Newsbytes is a column of general information for TI99/4A users. It includes product announcements and other items of interest. The publisher does not necessarily endorse products listed in this column. Vendors and others are encouraged to submit items for consideration. Items submitted will be verified by the staff before inclusion and edited to fit the Newsbytes format. Mail items to: MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

# User Notes

## Improvements to sum program

Robert Carmany of Greensboro, North Carolina, has a couple of ideas that will improve the operation of a program that appeared in last month's User Notes column. The program allows users of TI-Writer to count totals in documents that include numeric entries. It was designed by K.D. Wentzel of Charlotte, North Carolina. Carmany writes:

"As the program is written, any I/O error encountered when trying to access the input file will cause the program to halt execution. It then must be restarted and the parameters re-entered. Since it is written in Extended BASIC, full advantage should be taken of Extended BASIC's superior error trapping routines. The following two lines do just that and allow the user to re-enter the filename and continue without a break in the program:"

```
295 ON ERROR 580
```

"This line will transfer control to line 580 if an error is encountered while attempting to access a file from disk."

```
580 CALL CLEAR :: PRINT "File Not Found -- I/O error" :: RETURN 250
```

This line will clear the screen, print the error message and return the program to line 250 and allow the user to enter the correct filename without having to re-enter the other parameters."

In addition, since I have two disk drives, I changed the disk access in line 280 to read:"

```
280 CALL CLEAR :: DEV$ = "DSK2.&FNS"
```

"This last alteration was for personal conveniences since I usually use disk drive No. 2 for my document disk when I'm using TI-Writer, anyway."

## Sous-routines en assembler

The following program uses the CALL LINK command to provide access to a number of assembly language subroutines. The program was written by Bob Kirouac of the Club Informati-

que Montreal 99. Just about every article published in the club's newsletter is printed in two languages: French and English. The only exception appears to be the article about this program, which was written in French. We have not translated any of the French references in the program, as you can tell from lines 350-420. However, below we provide a rather loose translation of the pertinent words into English. The program requires Extended BASIC and a memory expansion.

The program should be entered as is and then saved to disk. Then, enter RUN and press a key. To call up one of the eight subroutines, enter CALL LINK('name of subroutine') in a program line. For example:

```
100 CALL LINK('TOUCHE') :: GOTO 100
```

Then enter RUN, and observe what happens.

Here are some loose translations in the text in the following program lines:

350—activates several keys on the keyboard, i.e., A, B, C, D, E

360—remember the current screen for later recall.

370—reverses the location of characters on the screen.

380—erases the screen.

390—displays the screen that was "memorized" using MEMSCR.

400—displays a phrase to the screen, in this case the author's name.

410—redefines a character. In this case the letter ' becomes a box.

420—fills the screen with a variety of colors.

```
10 !PAR BOB KIROUAC POUR LE CLUB CIM99
20 ! TEL QUE PROMIS, VOICE LES SOUS-ROUTINES
30 !EN ASSEMBLER PARUES DANS LA CHRONIQUE A
40 !TI-BOB DANS LE BULLETIN VINIO DU CLUB CIM99
100 CALL INIT
110 CALL LOAD(16320,84,79,85,67,72,69,37,14)
120 CALL LOAD(16328,77,69,77,83,67,82,38,2)
```

```
130 CALL LOAD(16336,73,78,86,83,67,82,37,212)
```

```
140 CALL LOAD(16344,69,70,70,83,67,82,37,192)
```

```
150 CALL LOAD(16352,69,67,82,83,67,82,37,150)
```

```
160 CALL LOAD(16360,69,67,82,80,72,82,37,132)
```

```
170 CALL LOAD(16368,68,69,70,67,65,82,37,100)
```

```
180 CALL LOAD(16376,67,79,76,79,82,65,37,82)
```

```
190 CALL LOAD(8194,38,44,63,192)
```

```
200 CALL LOAD(9460,255,129,129,129,129,129,255,33,34,35,36,37,38,39,40,41,42,43,44,45,46)
```

```
210 CALL LOAD(9482,0,47,32,0,4,224,131,117,4,32,32,28,208,224,131,124,32,224,37,12,2,249)
```

```
220 CALL LOAD(9504,4,193,208,96,131,117,2,129,65,0,19,19,2,129,66,0,19,25,2,129,67,0)
```

```
230 CALL LOAD(9526,19,68,2,129,68,0,19,75,2,129,69,0,19,32,2,129,70,0,19,92,2,129)
```

```
240 CALL LOAD(9548,71,0,19,35,4,91,2,0,8,16,2,1,36,252,2,2,0,15,4,32,32,36)
```

```
250 CALL LOAD(9570,4,91,2,0,5,8,2,1,36,244,2,2,0,8,4,32,32,36,4,91,178,175)
```

```
260 CALL LOAD(9592,162,165,178,180,128,171,169,178,175,181,161,163,2,0,0,0,2,1,37,118,2,2)
```

```
270 CALL LOAD(9614,0,14,4,32,32,36,4,91,2,0,0,0,2,1,48,0,2,2,1,0,4,32)
```

```
280 CALL LOAD(9636,32,36,2,0,1,0,2,1,49,0,4,32,32,36,2,0,2,0,2,1,50,0)
```

```
290 CALL LOAD(9658,4,32,32,36,4,91,4,192,2,1,32,0,4,32,32,32,5,128,2,128,3,0)
```

```
300 CALL LOAD(9680,17,250,4,91,2,0,0,0,2,1,48,0,2,2,0,1,4,32,32,44,5,129)
```

```
310 CALL LOAD(9702,5,128,2,128,3,0,22,249,2,0,0,0,6,1,4,32,32,36,5,128,2,128)
```

(Please turn to Page 43)

# User Notes

(Continued from Page 42)

```

320 CALL LOAD(9724,3,0,22,24
9,4,91,2,0,0,0,2,1,48,0,2,2,
1,0,4,32,32,44)
330 CALL LOAD(9746,2,0,1,0,2
,1,49,0,4,32,32,44,2,0,2,0,2
,1,50,0,4,32)
340 CALL LOAD(9768,32,44,4,9
1,255,129)
350 CALL LINK("TOUCHE")
360 CALL LINK("MEMSCR")
370 CALL LINK("INVSCR")
380 CALL LINK("EFFSCR")
390 CALL LINK("ECRSCR")
400 CALL LINK("ECRPHR")
410 CALL LINK("DEFCAR")
420 CALL LINK("COLORA")

```

## Computer type for programs

The following program will give users a whole new character set for screen display purposes. The program, written by Shane Anderson of the TI Sydney (Australia) Users Group (TISHUG), may be used with cassette or disk-based programs. It redefines text characters, including numerals, into a typeface resembling the classic "computer" type font.

After entering the program (try not to strain your eyes while double-checking the character definitions), use it with any Extended BASIC program. Enter the name of the program in which you want the redefined character set to appear in line 220.

```

100 CALL CLEAR
110 CALL CHAR(65,"3844447CC2
C2C200788484FCC2C27C007C8282
80C0C27C00FC828282C2C2FC00")
120 CALL CHAR(69,"7E8080F8C0
C07E007E8080F8C0C0C0007C8282
80CEC27C00828282FEC2C2C200")
130 CALL CHAR(73,"101010101B
1B18000404040406867E00848484
FCC2C2C20080808080C0C0FC00")
140 CALL CHAR(77,"7C929292D2
D2D200FC828282C2C2C2007C8686
8682827C00FC8282FCC0C0C000")
150 CALL CHAR(81,"7C82828282
9E7C00F88484FCC2C2C2007C8280

```

```

7C06867C007E10101018181800")
160 CALL CHAR(85,"82828282C2
C27C00C2C2C2C244443800929292
92D2D27C0044444438C2C2C200")
170 CALL CHAR(89,"8282827C1B
1B18007C8282E3C70C2827C")
180 CALL CHAR(48,"7C82828286
867C00080808081B1818007C8202
7CC0C07E007884841C06867C00")
190 CALL CHAR(52,"7884848484
7E0C007E80807C06867C007C8280
FC86867C00FE02020206060600")
200 CALL CHAR(56,"3844447C86
867C007C82827E06867C00")
210 PRINT "A B C D E F G H I
J K L M N": ;"0 P Q R S T U
V W X Y Z": ;"1 2 3 4 5 6 7
8 9 0"
220 RUN "DSK2.DOWN"

```

## TI customer service centers to close

TI plans to close its local customerservice centers as of March 20.

According to a company spokesperson, service will be available by calling toll-free 1-800-842-2737 (Lubbock, Texas).

## Graph paper from a printer

The following program by John Behnke of the C.C. 99ers users group prints sheets of graph paper. The grid consists of approximately 1/8 inch squares.

```

100 REM ***
110 REM GRAPHSHEET MAKER
120 REM BY JOHN BEHNKE
130 REM
140 REM EPSON OR GEMINI
150 REM PRINTER REQUIRED
160 REM BASIC OR XBASIC
170 REM
180 CALL CLEAR
190 INPUT "NUMBER OF SHEETS?
":A
200 CALL SCREEN(6)
210 @#=CHR$(27)
220 FOR I=1 TO 228

```

```

230 A$=A$&CHR$(128)
240 NEXT I
250 B$=SEG$(A$,1,7)
260 C$=CHR$(255)&SEG$(A$,1,6
)
270 FOR I=1 TO 4
280 FOR J=1 TO 8
290 E$=E$&C$
300 NEXT J
310 E$=E$&CHR$(255)
320 NEXT I
330 F$=@$&"K"&CHR$(484)&CHR$
(0)&E$
340 G$=@$&"K"&CHR$(228)&CHR$
(0)&A$
350 OPEN #1:"PIO.CR"
360 FOR B=1 TO A
370 FOR C=1 TO 11
380 PRINT #1:@$&CHR$(64)&@$&
"3"&CHR$(16)
390 FOR D=1 TO 8
400 PRINT #1:F$;F$;CHR$(10)
410 NEXT D
420 PRINT #1:G$;G$;@$&"3"&CH
R$(2)
430 NEXT C
440 PRINT #1:@$&"3"&CHR$(17)
450 FOR I=i TO 9
460 PRINT #1:CHR$(13)&CHR$(1
0)
470 NEXT I
480 NEXT B
490 CLOSE #1
500 END

```

## Assembly joystick scan

Mike Rotolo of Monroe, Connecticut, has written an assembly language program that will scan either or both joysticks and either or both sides of the keyboard and return X, Y and fire values, similar to CALL JOYST. The program is called from Extended BASIC. The program is called STICK.

X and Y values are returned as -4, 0 or 4 and "fire" is returned as 0 or 18, as in a CALL JOYST statement.

This will allow users to program games and the like with a single statement for input from either the keyboard or the joysticks. No more

(Please turn to Page 44)

# User Notes

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asking which one the player wants to use and no more complicated program logic to transform key codes to JOYST values.

The following keyboard keys are active:

	Left Side	Right Side
Up	E	I
Down	X	M
Left	S	J
Right	D	K
Up + Left	W	U
Up + Right	R	O
Down + Left	Z	N
Down + Right	C	,

Q or Y will register as FIRE

To use the program, put the following statements in the beginning of your program:

CALL INIT

CALL LOAD("DSKx.STICK")

(x = disk drive number of disk with object code)

Then each time you want to scan the keyboard or joysticks, use the following statement:

CALL LINK("STICK",JS,X,Y,F)

Where:

JS = Joystick Number and keyboard side

(1 = JS 1 and left side of keyboard

(2 = JS 2 and right side of keyboard

(0 = both JS's and both sides of keyboard

X = X VALUE

Y = Y VALUE

F = FIRE

(Note: All four variables *must* be passed)

This program requires Extended BASIC, a disk system and a memory expansion.

The following program may be used to test STICK.

```
100 CALL INIT :: CALL CLEAR :: C
ALL LOAD("DSK1.STICK/O")
110 CALL LINK("STICK",0,X,Y,F)
120 DISPLAY AT(10,1):"X =";X:"
Y =";Y:"FIRE =";F
130 CALL KEY(0,K,S)::IF K=13 TH
EN STOP ELSE 110
```

Run this program and press various

(Please turn to Page 48)

## Source code

```
* JOYSTICK/KEYBOARD GAME INPUT ROUTINE
* EXTENDED BASIC VERSION 1.1
*
* BY M. ROTOLO
* MONROE,CT
* SOURCE ID:TI9511
* CIS ID 73277,746
*
*
* SYNTAX INFO :
*
* CALL LINK("STICK",JS#,n1,n1,n3)
*
* JS# = JOYSTICK #/KEYBOARD SIDE TO SCAN
* 0=BOTH JOYSTICKS AND ENTIRE KEYBOARD
* 1=JS 1 AND LEFT SIDE OF KEYBOARD
* 2=JS 2 and RIGHT SIDE OF KEYBOARD
*
* n1,n2,n3 = NUMERIC VARIABLES
*
* (NOTE: ALL 4 VARIABLES MUST BE PASSED)
*
*
DEF STICK
KSCAN EQU >201C \ XB utility equates
NUMASG EQU >200B /
NUMREF EQU >200C /
XMLLNK EQU >201B /
KEYADR EQU >B374 scan type address
KEYVAL EQU >B375 key code address
XVAL EQU >B376 joystick X address
YVAL EQU >B377 joystick Y address
STATUS EQU >B37C GPL status byte
FAC EQU >B34A FAC
MYWS BSS >20 routine workspace
SAVRTN DATA >0000 return address buffer
TABLE DATA >0000,>4004 values for radix 0,4,-4 & 18
DATA >BFFC,>4012 /
FOUR DATA >0002 table offset for '4' (UP or RIGHT)
MFOUR DATA >0004 table offset for '-4' (DOWN or LEFT)
VAL18 DATA >0006 table offset for '18' (fire)
FOUR1 BYTE >04 4
MFOUR1 BYTE >FC -4
LEFT BYTE >02 keyboard 'LEFT' keycode
RITE BYTE >03 'RIGHT'
UP BYTE >05 'UP'
DOWN BYTE >00 'DOWN'
UPLEFT BYTE >04 'NORTHWEST'
UPRITE BYTE >06 'SOUTHWEST'
DNLEFT BYTE >0F 'NORTHEAST'
DNRITE BYTE >0E 'SOUTHEAST'
FIRE BYTE >12 'FIRE'
NOKEY BYTE >FF value for no key pressed
EVEN
STICK MOV R11,@SAVRTN save return address
LMP1 MYWS load workspace
CLR R0 no array
CLR R8 \
CLR R9 - clear temp regs for JS1 scan data
CLR R10 /
LI R1,1 first argument
BLWP @NUMREF get JS#
BLWP @XMLLNK convert to integer
DATA >128B /
MOV @FAC,R3 get it
CI R3,2 is it 2?
JEQ CKJ82 yes, skip scan for JS1
LI R0,>0100 joystick 1
MOV R0,@KEYADR scan for input
BL @SCANIT
CI R3,1
JEQ ASSIGN
MOV R5,R8 store 'X' input
MOV R6,R9 store 'Y' input
MOV R7,R10 store 'fire' input
CKJ82 LI R0,>0200 joystick 2
MOV R0,@KEYADR scan for input
BL @SCANIT
SOC R8,R5 \
SOC R9,R6 - logical 'OR' with JS1
```

(Please turn to Page 45)

(Continued from Page 44)

```

ASSIGN SOC R10,R7 /
CLR R0 no array
CLR @FAC+2 \
CLR @FAC+4 - clear FAC area
CLR @FAC+6 /
MOV @TABLE(R5),@FAC put correct radix number data @ FAC
LI R1,2 second argument
BLWP @NUMASG assign 'X' input
MOV @TABLE(R6),@FAC \
INC R1 /
BLWP @NUMASG \ do same for 'Y' & 'FIRE'
MOV @TABLE(R7),@FAC /
INC R1 /
BLWP @NUMASG /
LWPI >B3E0 load GPL workspace
MOV @SAVRTN,R11 return address
CLR @STATUS clear GPL status so no errors
RT return

*
SCANIT CLR R5 'X' input storage
CLR R6 'Y' input storage
CLR R7 'FIRE' input storage
BLWP @KSCAN scan keyboard
CB @KEYVAL,@NOKEY was a key pressed?
JED JOY1 no, check joystick
MOV @KEYVAL,R4 get key code
CB @LEFT,R4 'LEFT' pressed?
JNE RIGHT no
MOV @MFOUR,R5 yes, put -4 in R5
JMP PASS done
RIGHT CB @RITE,R4 'RIGHT'?
JNE UP1 no
MOV @FOUR,R5 yes, put 4 in R5
JMP PASS done
UP1 CB @UP,R4 'UP'?
JNE DOWN1 no
MOV @FOUR,R6 yes, put 4 in R6
JMP PASS done
DOWN1 CB @DOWN,R4 'DOWN'?
JNE UPLFT1 no
MOV @MFOUR,R6 yes, put -4 in R6
JMP PASS done
UPLFT1 CB @UPLFT,R4 'NORTHWEST'?
JNE DNLEFT1 no
MOV @MFOUR,R5 yes, put -4 in R5
MOV @FOUR,R6 put 4 in R6
JMP PASS done
DNLEFT1 CB @DNLEFT,R4 'SOUTHWEST'?
JNE UPRIT1 no
MOV @MFOUR,R5 yes, put -4 in R5
MOV @MFOUR,R6 put -4 in R6
JMP PASS done
UPRIT1 CB @UPRITE,R4 'NORTHEAST'?
JNE DNRITE1 no
MOV @FOUR,R5 yes, put 4 in R5
MOV @FOUR,R6 put 4 in R6
JMP PASS done
DNRITE1 CB @DNRITE,R4 'SOUTHEAST'?
JNE FIRE1 no
MOV @FOUR,R5 yes, put 4 in R5
MOV @MFOUR,R6 put -4 in R6
JMP PASS done
FIRE1 CB @FIRE,R4 'FIRE'?
JNE JOY1 no
MOV @VAL18,R7 yes, put 18 in R7

*
* CHECK JOYSTICK 'X' LOCATION
*
JOY1 CB @XVAL,@FOUR1 'RIGHT'?
JNE XCHECK no
MOV @FOUR,R5 yes
JMP YCHECK check 'Y' direction
XCHECK CB @XVAL,@MFOUR1 'LEFT'?
JNE YCHECK no
MOV @MFOUR,R5 yes

*
* CHECK JOYSTICK 'Y' LOCATION
*
YCHECK CB @YVAL,@FOUR1 'UP'?
JNE YCHECK1 no
MOV @FOUR,R6 yes
JMP PASS done
YCHECK1 CB @YVAL,@MFOUR1 'DOWN'?
JNE PASS no
MOV @MFOUR,R6 yes
PASS B @R11 $DONE#
END

```

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there's not enough space here to list. Over \$1500 worth for only \$800 (shipping extra). Send S.A.S.E. for list of equipment and software and terms of sale. Ken Allen, 1004 Jurymast Dr., Oxnard, CA 93030. No phone calls please. v3,n2

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The Camp Fitch Computer Camp is entering its 5th year of operation. Located just outside Erie, PA, the residential camp offers summer fun and educational opportunities for boys and girls ages 8 to 18. Individualized instruction is offered with languages ranging from LOGO to BASIC to Assembler, depending upon the age and the experience of the camper. We use a variety of computers including TI's (still the best LOGO going). Outdoor activities include swimming, sailing, horseback riding, and much, much more. For more information contact Roger Patterson, 7366 Ranier Trail, Boardman, OH

# The LEADING monthly devoted to the TI99/4A

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| 5=May      | 9=September | 1=January  |

Our subscription year runs from February to January. In other words, our first edition of any year will be the February edition. The last edition of any year will be the following January's edition.

## User Notes

(Continued from Page 44)

keys to see what happens. Press ENTER to stop.

Rotolo would like to hear comments about this program, and any ideas readers may have about what else they would like to see. His address is: 56 Oakwood Dr., Monroe, CT 06468.

### Word-Count to come

A program promoted in last month's issue, which counts words in TI-Writer documents, is scheduled to be published in the April issue of MICROpendium.

## Object code

```

00196      A0000A0020B0000B0000B4004BBFFCB4012B0002B0004B00067F349F      0001
A0030B04FCB0203B0500B0406B0F0EB12FFBCB0BC0020B02E0C0000B04C07F2B5F      0002
A0046B04CBB04C9B04CAB0201B0001B0420B200CB0420B201B12B8BC0E07F2CFF      0003
A005CB834AB02B3B0002B130CB0200B0100BCB00BB374B06A0C00D0B02B37F2E7F      0004
A0072B0001B130CB0205BC246BC2B7B0200B0200BCB00BB374B06A0C00D07F2D3F      0005
A008BBE148BE1B9BE1CAB04C0B04E0BB34CB04E0BB34EB04E0BB350BC8257F245F      0006
A009EC0022BB34AB0201B0002B0420B2000B0C826C0022BB34AB05B1B04207F2FEF      0007
A00B4B2008BC827C0022BB34AB05B1B0420B2008B02E0BB3E0BC2E0C00207F2C7F      0008
A00CAB04E0BB37CB045B04C5B04C6B04C7B0420B201CB9820BB375C003B7F2B2F      0009
A00E0B133FBD120BB375B9120C0032B1603BC160C002CB1051B9120C00337F2ECF      0010
A00F6B1603BC160C002AB104BB9120C0034B1603BC1A0C002AB1045B91207F2DAF      0011
A010CC0035B1603BC1A0C002CB103FB9120C0036B1605BC160C002CB1A07F2BFF      0012
A0122C002AB1037B9120C003BB1605BC160C002CB1A0C002CB102FB91207F2DAF      0013
A013BC0037B1605BC160C002ABC1A0C002AB1027B9120C0039B1605BC1607F2DFF      0014
A014EC002ABC1A0C002CB101FB9120C003AB1602BC1E0C002EB9820EB83767F29BF      0015
A0164C0030B1603BC160C002AB1006B9820BB376C0031B1602BC160C002C7F2FBF      0016
A017AB9820BB377C0030B1603BC1A0C002AB1006B9820BB377C0031B16027F2E5F      0017
A0190BC1A0C002CB045B7FB62F      0018
5003CBTICK 7FD20F      0019
1          99/4 AB      0020
    
```