

Robert Millikan



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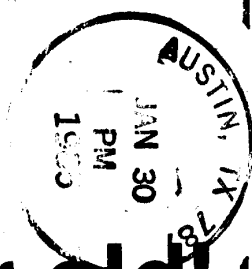


Covering The TI99/4A Home Computer And Compatibles

Volume 2 Number 1

February 1985

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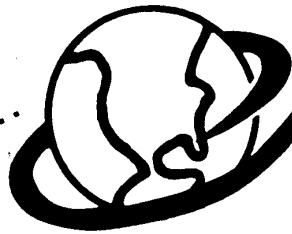
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John Koloen Publisher
Laura Burns Editor

Coming Next Month

- review of Morning Star Software's CP/M card
- how the home computer has changed people's lives

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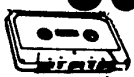
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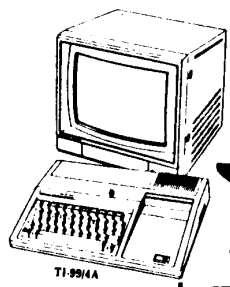
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SECTION #5 APPENDIX'S

- A. ASCII CHARACTER CODES
- B. CONVERSION TABLE/PATTERN IDENTIFICATION
- C. MUSICAL TONE FREQUENCIES/ADDITIONAL MUSIC CAPABILITIES
- D. SAMPLE SHEET OF CHARACTER DEFINING GRAPH PAPER

Comments

Two points of view

There seem to be two approaches developing in the TI hardware market. One approach favors development of a replacement console for the TI99/4A while the other seems to be focusing on creating a dual processor peripheral that will bridge the gap between the TI and other computer brands, such as IBM.

Much of this dichotomy is still in the formative stage, but development has been going on, money has been spent and more money is being invested in both approaches.

The replacement console route seems to be based on an enhanced console similar to the TI99/8. The dual processor peripheral (it may actually include only one processor) may be compatible with another brand of computer software, operating out of a different operating system, while still allowing virtually all TI software and hardware to operate with it. It will, that is, if it comes out.

There is little reason to doubt the feasibility of this since Morning Star Software was able to develop a CP/M card using an Intel 8085 chip while Foundation Computing has developed a similar card using a Zilog Z80A chip. While the Morning Star card uses the single-density, Osborne I CP/M software, the Foundation card is designed to use some if not all CP/M software in the Kaypro double-density format. The Foundation card includes a disk controller, 2 RS232 and 2 parallel ports, making it a computer on a card. The Morning Star is compatible with the TI or Cor-Comp disk controller cards in a single-density format.

There are many who believe that a peripheral that allows TI users to access software designed for other computers stands a better chance of success than a new console. The reasoning here is that there would be a readily available library of existing software already on dealer shelves. The creation of a new console, it is argued, is not likely to result in the creation of any new software, though it may extend the life of the TI market per se. Besides, how many of them will be sold when the only outlet seems to be via mail-order houses? (Actually, mail-order houses have been doing lots of business and offer great potential for marketing third-party products.)

While a co-processor offers some enticing possibilities, I am inclined to continue relying on the TI system. I just like it.

I'm going to take just a paragraph to offer my

thanks to the hundreds of subscribers who write complimentary notes to us. These are included with everything from subscription renewals to freeware orders. They are very much appreciated.

Good news on the Forth front. The documentation for TI-Forth has been printed and we are filling orders. Although we asked that Forth buyers included two diskettes with their orders, we are supplying a third disk with the Forth source code at no additional cost. The Forth package will include the 232-page manual, the program disk with screens, a demo disk and the source code. Enjoy! Also, with thanks to the Los Angeles 99ers Computer Group, we now have a Forth loader that runs out of Extended BASIC. We are adding this to our growing list of freeware. Tom Freeman of the LA group is responsible for debugging the X BASIC loader.

We're starting another, regular feature with this issue. Namely, the Freeware page. This will include a listing of free or nearly free software being offered by users, vendors and us. Although we cannot take responsibility for any offers included on this page, we publish it as a service to readers. Please let us know if you encounter any problems. (Incidentally, anyone wishing to have freeware items included on this page may write us with the details, including a sample of the program(s) being offered.) The information will be published monthly unless withdrawn by the freeware distributor.

You may notice that this issue is only 32 pages long. We had to cut back to get it out because the Christmas-New Year holidays cut deeply into our production schedule. The January issue didn't reach the press until the first week of January. We expect to be back to 40 pages next month. Also, excuse all the text we devoted to programs that use printers. We were going to hold some of the material until next month but our story on the Myarc WDS/100 Winchester wouldn't fit in the space we had available and we didn't feel that it should have been run in two parts.

Oh, yes. I almost forgot. With this issue we are one year old. We've got 12 issues behind us, and it feels great. We hope we're providing a publication that you find useful and worth what you pay for it. We hope you continue to read MICROpendium for a long time to come. Thanks for your support, without you we could never have started our second year.

That's all for now.

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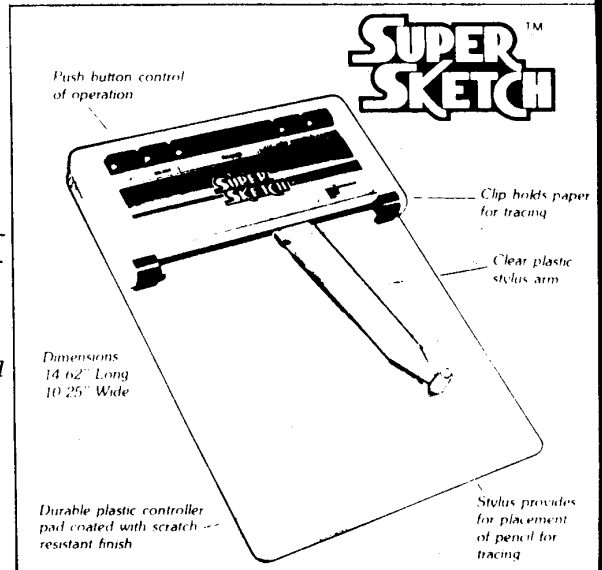
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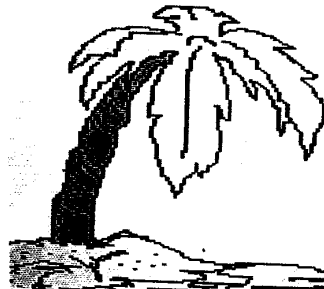
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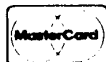
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Feedback

No warning

I just received my second TI disk drive. After hooking up the second drive, I tested the system. All worked OK. The next day, I needed only one drive to run a checkbook balance program. Since I am using an extension cord to power the second disk drive, I did not power the second drive. When I attempted to retrieve the program off of disk one, the program showed error.

Checking the disk with the TIDisk Manager 2, I found that I lost the initialization. My question is, is there any way to reinitialize the disk without losing the programs stored on it? Also, why is there no warning that having the second disk drive not powered will cause damage to the disk in drive one?

John Tomchick Jr.
Stratford, New Jersey

ED: There's no way we know of to reinitialize a disk without losing all data already on the disk.

What happens when we turn the second drive off is that the activity light on drive one stays on. This is probably due to the fact that the termination pack is in drive two and the DIP switches tell the computer that drive one is not the only drive in the system. In a properly set up system, you should not have to turn off the second drive manually as it should be entirely dependent (except for power) on the PEB.

Errors cited

Your November review of the CorComp disk controller card had one drastic error which does a great injustice to CorComp as well as the owners of the original TI disk. Your statement that the TI single-sided drive (which is a Shugart SA400 type drive) is not capable of double-density formatting is incorrect. The Shugart SA400 drive will support both single and double-density formatting. I currently use two such drives, one from TI and the other from Radio Shack, and both drives work beautifully. Because of your

comment I am afraid that a lot of people may forego getting the CorComp card, which I consider the best upgrade I've made to my system.

The other error was in the statement that they made one that didn't work. CorComp may have had quality control problems with their initial release but it did work. I have one of the first units delivered. The dealer I purchased mine from got in four units at the same time, one of which I picked up July 31. I have talked to the dealer and he has had no problems with any of his cards, and I have only had one. After about three months of use the unit started shutting down on me after being used for an hour or two. A quick call to CorComp disclosed that they had a problem with the voltage regulator on the card overheating and shutting down. CorComp immediately sent me an upgrade kit consisting of a heat sink for the voltage regulator, a new PROM, and a new disk manager disk which included the Forth routines. While waiting for the upgrade I fabricated my own heat sink and my problems were solved.

The only other problem I have had with the controller card had nothing to do with the card. I could not get my drive one to format in single density after installing the new card. At first I attributed this to the card. It didn't make sense that it would format in double density and not single density, but I lived with it. I finally did a speed check on both my drives and my sons', and found them all to be off quite a bit. After adjusting the speeds on all units I found that disk drive one would format in both single and double density.

Since speed control adjustments should be routine on all disk drives I include an article I wrote for the Chester County (Pennsylvania) Users Group Newsletter:

Disk drives are very reliable and normally require very little maintenance. However, if you start to have problems reading disks, the solution may be very simple.

The one item that appears to need an occasional adjustment on almost

all disk drives is the drive speed. The following procedure is for the Shugart drive such as that provided by TI. The procedure for other drives is similar, but the adjustment location will probably be different.

In order to perform the following you have to have a fluorescent light. With all power off to the unit remove the screws holding the drive in the PEB (or case screws for an external drive). Gently bend out the tab on the back that holds the aluminum case on the drive and remove the case. On the front top of the circuit board is the speed adjustment potentiometer. The motor flywheel on the lefthand side has a strobe disk. Make sure nothing metal is touching any parts of the circuit board and turn on the PEB and computer. With the area illuminated with a fluorescent light load a program into the computer from the disk drive and watch the line marked 60 on the strobe disk. If the speed is set correctly the marks should appear to be standing still with the motor running. If the marks are moving slowly in either direction the speed should be adjusted. With the drive running simply turn the adjustment potentiometer to change the speed. If the strobe disk seems to turn faster simply turn the adjustment pot in the opposite direction. When the disk appears to be standing still the speed is set correctly. Turn off all power to the unit and put it back together.

Lastly, I have two cartridges that require hitting the space bar to get to the TI menu to use, PRK and Return to Pirates Isle. If you don't use the spacebar method you cannot create a file with PRK, and Return to Pirates Isle has a very annoying ringing sound in it.

Larry R. Thompson Sr.
Wapwallopen, Pennsylvania

Limited use

Here are some problems I've run into that limit my use of my TI99/4A.

Although Flex File allows me to
(Please turn to Page 10)

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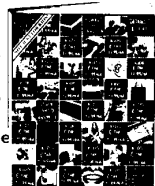


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Feedback

(Continued from Page 8)

download records from Personal Report Generator to my own programs for processing, it doesn't allow me to reload records into PRG.

The fine TI Writer enhancements you sent me still leave me with a text formatter option of RS232/1.BA=4800.LF. What I need is RS232/2.DA=8.BA=4800.LF. Can you tell me how to modify that using my Editor/Assembler or Extended BASIC or what have you?

I bought a lot of software and modules for my TI but so far I haven't used them very much. The real problem is almost philosophical—what can you really do with a computer that is useful or profitable? What can you keep track of that needs the accuracy and speed a computer lends.

It occurs to me that I might be able to use Flex File to download Personal Record Keeping records then use my own program to make them into records that TI Writer or Multiplan can use.

Considering the problems I've listed, I'd like to get some opinions from you and from other readers. I wonder if these things are really possible—if they are I think I can learn to do them—if not, there are better ways for me to spend my time.

I hope someone will come up with a better terminalemulator to printer interface than TEII offers. I always wind up with too many or too few printed lines. I know I can edit using TI-Writer—but that means another half hour of work after each session on the Source.

I think the TI99 ultimately could be to the computer industry what Latin has been to education. Because Latin is dead its users need not worry about shifts in meaning brought on by language evolution; therefore, it has become the dependable baseline to studies over these last 2,000 years.

Tom Bergeron
Normandy, Missouri

ED: TI-Writer file modifications were published in the January Feedback column.

Converting files to be read by TI-Writer is not very difficult in most cases. We have published several conversion programs designed for this purpose in previous issues. You would need only to modify the conversion program to match the file characteristics of the files you want to convert. File conversion is an interesting subject and we'd like to see an article that tackles this subject, perhaps with an emphasis on data files created for use by one file manager or program to be converted for use by another file manager. Any takers?

For CC40 owners

I would like to thank one of your readers, Mr. Sciascia, for calling attention to the plight of us CC40 owners. I had bought one intending to use it to store field data temporarily and later transmit the data to the 99/4 for permanent storage and processing. The portability and numeric keypad of the CC40 would have been ideal for this application. Alas, as you all know, TI pulled the Hexbus adapter and the Wafertape drive off the market.

Perhaps all is not lost. I have been able to get the two computers to communicate data via the RS232 serial interfaces. Thus, theoretically at least, one should be able to store data in the constant memory of the CC40 for later transmission to the 99/4. However, it appears that the SAVE and OLD commands, which would have allowed transmission of programs, is not supported by the Hexbus RS232 interface.

I plan to look into the available terminal emulator programs, such as the Memo Processor cartridge for the CC40, to ease data and program transmission. Perhaps some of your readers have already done so. He or she would do us a great service by writing to your Feedback column or writing a full article on his/her findings.

I urge other CC40 owners to raise a hue and cry so TI will resume production of the Hexbus peripherals or at least allow third parties to produce them. Finally, I would like to thank MICROpendium for allowing us to vent our frustrations.

Tom Elgart
Freehold, New Jersey

Multiplan problem

This letter pertains to the updates you provided for TI Writer and Microsoft Multiplan.

If you are using the Multiplan with the updated files and try to call the "help" function by using either the "?" or the "function 7" the system will go into a sort of loop with the disk drive searching for something without success and the keyboard will lock up, with the result that you lose all of the spreadsheet which you have developed to that point.

The only solution I have found to date is to turn off the computer, which causes you to lose all of what you have developed thus far.

If any of you have a solution for this strange problem, please let me know.

C. Paul Stehling
Santa Fe, New Mexico

ED: I'll bet the "overlay" file is protected. If so, unprotect it using the Disk Manager and everything should be fine. We have not had any problems with the files, except those that were protected. If this doesn't solve the problem, send us another disk and we'll provide you with the updates again.

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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Taking Control of TI-Writer

By RON CASTLETON

The TI-Writer word processor is capable of full in-text software command control of Epson, C. Itoh, Gemini and other dot matrix printers. This capability is achieved through the Formatter and not the Edit mode.

Obtaining this control, however, requires recognition of the importance of the poorly documented Transliteration command.

According to the TI-Writer manual, only three in-text printer software control commands are available: one-word-at-a-time overstriking, dashed underscore, invoked by using the @ and & keyboard characters, respectively, and the caret character, which is used to bridge between words.

That doesn't sound like much con-

trol at all, and it isn't. But users can create a Transliteration Command Set that will provide full access to a printer's capabilities, whatever they are. (Included with this article is such a command set, which can be keyboarded by the reader.)

Once saved to disk, the Transliteration Command Set can be invoked as an invisible header in files created with TI-Writer. This will initialize the printer so that it will recognize the various in-text characters and respond accordingly when printing.

Among the capabilities achieved through this command set are: solid underline, superscript, subscript, italics, backspace and print, sound bell, elite, pica, condensed, enlarged, emphasized and double-strike print modes, perforation skip and reinitializa-

tion of printer. The dashed underscore and overstrike capabilities remain through use of the & and @ keys.

The beauty of creating a command set is that these capabilities can be invoked through the insertion of one or two keystroke commands in the text. When printed, these commands do not appear.

In order to get the printer to recognize and execute these commands, the Transliteration (.TL) commands must be set up in the TI-Writer Edit mode, saved to disk and recalled by the Include File (.IF) command inserted in the header of the text to be printed via the Formatter. (One may include the list of Transliteration commands with the text, but it is more efficient to call them using the IF command.)

(Please turn to Page 14)

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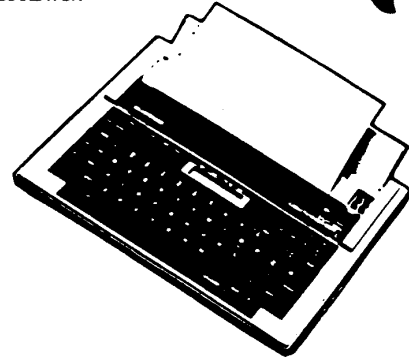
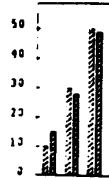
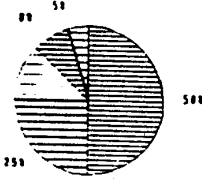


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USING TRANSLITERATION—

TRANSLITERATION	KEYSTROKE	IN-TEXT SYMBOL	PRINTER COMMAND
.TL 123:27,52	FCTN F	Left Brace	Start Italics
.TL 125:27,53	FCTN G	Right Brace	Stop Italics
.TL 91:27,83,0	FCTN R	Left Bracket	Start Superscript
.TL 93:27,83,1	FCTN T	Right Bracket	Start Subscript
.TL 124:27,84	FCTN A	Vertical Line	Stop Super/Subscript
.TL 1:27,66,3	CTRL U SHIFT A	.1	Start Condensed
.TL 17:18	CTRL U SHIFT Q	.1	Stop Condensed
.TL 2:27,87,1	CTRL U SHIFT B	.2	Start Enlarged
.TL 18:27,87,0	CTRL U SHIFT R	.2	Stop Enlarged
.TL 3:27,68,2	CTRL U SHIFT C	.3	Start Elite
.TL 19:27,80	CTRL U SHIFT S	.3	Stop Elite
.CD 0:27,64	CTRL U SHIFT Z	.0	Reinitialize
.TL 16:7	CTRL U SHIFT K	.0	Sound Bell
.TL 92:8	FCTN Z	\	Backspace/Print
.TL 11:27,78	CTRL U SHIFT K	.b	Perforation Skip
.TL 27:27,79	CTRL U FCTN R	.b	Stop Perforation Skip
.TL 4:27,45,1	CTRL U SHIFT D	.4	Start Solid Underline
.TL 20:27,45,0	CTRL U SHIFT T	.4	Stop Solid Underline
.TL 21:27,72	CTRL U SHIFT E	.5	Start Doublestrike
.TL 5:27,71	CTRL U SHIFT U	.5	Stop Doublestrike
.TL 6:27,69	CTRL U SHIFT F	.6	Start Emphasized
.TL 22:27,70	CTRL U SHIFT V	.6	Stop Emphasized

(Continued from Page 12)

The Transliteration set consists of a series of Transliterations from one ASCII character to one or more others. For example, to start italics, the left curly brace (FCTN F keystroke) was chosen due both to its rare use in text and the fact that I had planned to use italics often and wanted a keyboard marked character for easy reference. The Transliteration command to start italics is: .TL 123:27,52.

This means that when the left curly brace (ASCII 123) is encountered in text, the printer executes the commands represented by ASCII 27 and ASCII 52. For logical reasons, the right curly brace was used as the stop italics command, resulting in the following transliteration: .TL 125:27,53.

(Not all printers will be accessed in exactly the same way as this Transliteration set is designed. Refer to your printer manual for software commands that invoke the printer's various capabilities. Also, not all printers will have the capability for italics, super or subscript.)

You may have noticed that a number of the Transliteration commands use ASCII values lower than 32. ASCII values 32 and above are accessed by a single keystroke but those below 32 must be accessed using the CTRL U key followed by another keystroke using the FCTN or SHIFT keys. CTRL U places the computer in a special character mode that gives you access to ASCII characters 0-31. (Page 146 of

the TI-Writer manual documents these codes.) While the computer is in this mode, the cursor is redefined as an underline. Pressing CTRL U a second time will return the keyboard to its normal editing mode and rectangular cursor.

(Please turn to Page 15)

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Catalog 4 disks at once

There's no such thing as the "perfect" program, or so it would seem. Last month we published a program that prints disk directories, but this one works so well that we think it's worthwhile including it this month. (In the periodical business one is supposed to vary the content from month to month.)

According to its author, Tom Knight, of Jacksonville, Florida, "This program will catalog from 1 to 4 diskettes per pass and then print a disk directory in four columns (condensed print) which you can then cut up and place with your diskettes. I find this method much easier than creating and updating files for this purpose."

Knight notes that readers may have to change lines 140 and 360 to conform to their printer requirements. Line 140 is the OPEN statement and line 360 places the printer in the condensed print mode.

Readers may also want to change lines 130, 220 and 420 to increase or decrease the number of files that will be read from

a disk. The program as printed here is set up for 40.

This works quite well with the Gemini printers as is. Knight says the program was written for use with the Panasonic KX-P1090 printer.

This program requires Extended BASIC.

```
100 CALL CLEAR :: CALL
SCREEN(5):: FOR A=0 TO
14 :: CALL COLOR(A,16,5
):: NEXT A
110 TYP$(1)="Dis/Fix" :
: TYP$(2)="Dis/Var" ::
TYP$(3)="Int/Fix" :: TY
P$(4)="Int/Var" :: TYP$
(5)="Program"
120 AV$="Available" ::
US$=" Used=" :: DN$="-D
isk Name=" :: HD$=" Fi
lename Size Type
```

```
P" :: UL$="-----
-----"
130 DIM PRG$(4,40,4)::
CALL CHAR(64,"3C4299A1A
199423C")
140 OPEN #2:"PIO",DISPL
AY ,VARIABLE 132,OUTPUT
150 DISPLAY AT(8,3)ERAS
E ALL:"Press # (1-4)":
:"(Number of Disks to C
atalog)"
155 DISPLAY AT(23,5):"@
1984 By Tom Knight"
160 CALL KEY(0,K,S):: I
F S=0 THEN 160 ELSE K=K
-48
170 IF K<1 OR K>4 THEN
160 ELSE DISPLAY AT(8,2
0):K :: NR=K
180 FOR A=1 TO NR :: DI
SPLAY AT(12,8+(A*2)):ST
(Please turn to Page 18)
```

TAKING CONTROL—

(Continued from Page 14)

The complete Transliteration Command Set used in this article was selected to be visually obvious when viewing text in the Edit mode. All stop and start commands are the same number or letter beginning and ending the text involved. The symbols that appear when in CTRL U mode are unprintable. Viewed on the screen, they consist of two half-size characters. The carriage return that appears at the end of each paragraph created with TI-Writer is an example of these characters.

When using these commands in text, the user enters the command keystroke—CTRL U, SHIFT D to start a solid underline, for example—leaving a space between it and any preceding word. To stop the underline function, enter CTRL U SHIFT T.

One needs to have a reference card on these commands, and you may want to change some of the transliteration commands for easier reference. For example, if you have little use for superscript and subscript but use solid

underlining a lot, you may define FCTN R as your transliteration command for underline and FCTN T as the command to stop underlining. Whatever you do, make it easy on yourself.

Several direct entry commands offered by TI-Writer (overstriking, underline dashes and the word bridge) have been left intact. Others were transliterated to either a readily recognized keyboard character (such as the back-space symbol) or to a CTRL U special character for pairing purposes (such as the Sound Bell and REinitialize printer commands) for ease of use.

Actual use of the Transliteration Command Set requires the following steps:

1. Creation of the Transliteration Command Set in TI-Writer Edit mode. Each .TL command must be entered on a separate line, ending each with a carriage return symbol. The carriage returns should be deleted before saving the command set to disk.

2. As the last command in the

command set, enter the Sound Bell symbol (CTRL U SHIFT P).

3. Save the command set to disk (example: DSK1.TLS)

4. Create your new text in the edit mode, using an Include File command in the header to call the Transliteration Command Set in from the Formatter. Example: .IF DSK1.TLS

5. Save the text to disk.

6. Print the text through the formatter.

It is possible to activate more than one printer command simultaneously. For example, one can use a dashed underline of an italicized word by preceding the left brace with an ampersand. Carets inserted between words can be used to underline phrases.

Use of the fill and adjust (.FL and .AD) commands with condensed, elite and enlarged print will require space compensation with the caret to achieve a right-justified margin.

You can experiment with other command combinations to discover the limits of these printer controls.

DISK FIXER

Unlocks the secrets of the disk and lets you access hidden or "lost" information. Disk Fixer is a must for the serious TI 99/4A user who has a "sick disk" which suffers from a damaged directory. This program lets you recover unscathed information by searching your disk by sector rather than file name. Disk Fixer lets you display/print the actual binary contents with a single command. It allows you to change any byte on any sector, even move data from one sector to another.

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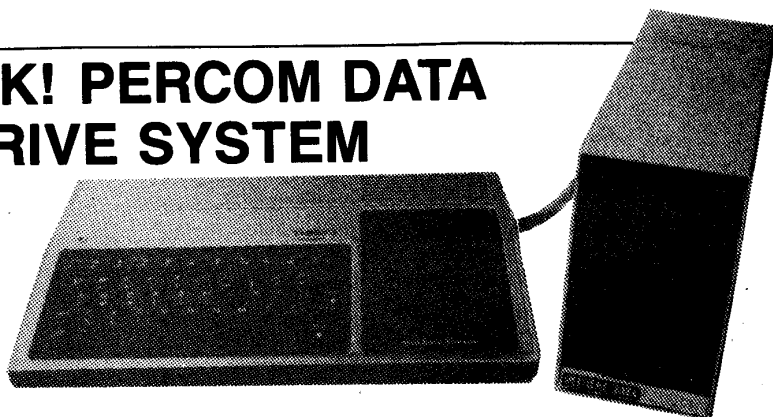
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Example: A For Loop from 1 to 30,000
TI BASIC 85 sec.

SST Expanded BASIC 1.25 sec.

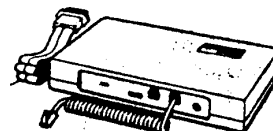
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- The Ability to allow you to build your own features into the Compiler. If you need a feature not in the Compiler, you can easily add it.

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NAV 111 \$34.95



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Super Extended BASIC (SXB) is a powerful extension to the TI Extended BASIC programming language. SXB is comprised of over 100 TMS9900 Assembly Language subroutines which substantially expand your Extended BASIC programming capabilities on the TI Home Computer. The subroutines are easily invoked with the LINK subprogram. In essence, it is now possible to access the raw power of assembly language with only a knowledge of Extended BASIC and the 76 page reference manual provided with the program. All SXB subroutines are invoked with the following format:

CALL LINK (subroutine-name[argument-list])

Subroutine names are a maximum of six characters in length. Except for the six miscellaneous subroutines, the first two characters of each subroutine name are a prefix representing the SXB category the subroutine falls into. Price includes a six month subscription of update information about SXB which will fit into the custom made 3-ring binder. A provision is available for acquiring a backup copy at a reasonable cost.

Requires: Extended BASIC, 32K Memory

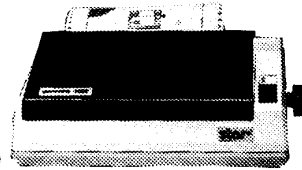
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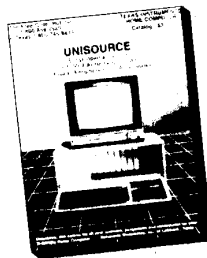
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CATALOG—

(Continued from Page 15)

```

R$(A):: OPEN #1:"DSK1."
,RELATIVE,INTERNAL,INPU
T
190 DISPLAY AT(14,3):"I
nsert Disk In Drive # 1
" :: DISPLAY AT(16,8):"
and press 'ENTER'"
200 CALL KEY(0,K,S):: I
F S=0 THEN 200 ELSE IF
K<>13 THEN 200
210 DISPLAY AT(14,1):""
: : "" :: INPUT #1:A$(A)
,L(A),L(A),M(A)
220 FOR B=1 TO 40 :: IN
PUT #1:PRG$(A,B,1),N,O,
P
230 IF LEN(PRG$(A,B,1))
=0 THEN 280
240 PRG$(A,B,2)=STR$(O)
:: PRG$(A,B,3)=TYP$(AB
S(N)):: IF ABS(N)=5 THE
N 260
250 B$="" "&STR$(P):: P
RG$(A,B,3)=PRG$(A,B,3)&
SEG$(B$,LEN(B$)-2,3)
260 IF N>0 THEN PRG$(A,
B,4)="" ELSE PRG$(A,B,4
)="Y"
270 NEXT B
280 CLOSE #1 :: NEXT A
290 TSET=3 :: DISPLAY A
T(8,3)ERASE ALL:"Is Pri
nter Ready ? (Y-N)"
300 CALL KEY(0,K,S):: I
F S=0 THEN 300 ELSE IF
K<>89 THEN 300
310 IF NR=4 THEN 360 EL
SE DISPLAY AT(10,3):"St
art Tab ? (1-30)"
320 CALL KEY(0,K,S):: I
F S=0 THEN 320 ELSE K=K
-48 :: TSET=K*10
325 FOR A=1 TO 50 :: NE
XT A
330 CALL KEY(0,K,S):: I
F S=0 THEN 330 ELSE K=K
-48 :: TSET=TSET+K
340 IF TSET<=30 THEN 35
0 ELSE 320
350 DISPLAY AT(10,22):T
SET: " Correct ? (Y-N
)"
355 CALL KEY(0,K,S):: I
F S=0 THEN 355 ELSE IF
K<>89 THEN 290

```

```


360 DISPLAY AT(14,6):"P
rinting Catalog !" :: P
RINT #2:CHR$(15)
370 XNR=0 :: FOR A=1 TO
NR :: PRINT #2:TAB(XNR
+TSET);DN$;A$(A):: XNR
=XNR+34 :: NEXT A
380 XNR=0 :: FOR A=1 TO
NR :: PRINT #2:TAB(XNR
+TSET);AV$;M(A);US$;L(A
)-M(A):: XNR=XNR+34 ::
NEXT A
390 XNR=0 :: FOR A=1 TO
NR :: PRINT #2:TAB(XNR
+TSET);HD$:: XNR=XNR+3
4 :: NEXT A
400 XNR=0 :: FOR A=1 TO
NR :: PRINT #2:TAB(XNR
+TSET);UL$:: XNR=XNR+3
4 :: NEXT A :: PRINT #2
410 FOR X=1 TO NR :: FG
(X)=0 :: NEXT X :: FOR
Y=NR+1 TO 4 :: FG(Y)=1
:: NEXT Y
420 FOR A=1 TO 40
430 IF FG(1)=1 THEN 440
ELSE IF LEN(PRG$(1,A,1

```

```

))=0 THEN FG(1)=1
440 IF FG(2)=1 THEN 450
ELSE IF LEN(PRG$(2,A,1
))=0 THEN FG(2)=1
450 IF FG(3)=1 THEN 460
ELSE IF LEN(PRG$(3,A,1
))=0 THEN FG(3)=1
460 IF FG(4)=1 THEN 470
ELSE IF LEN(PRG$(4,A,1
))=0 THEN FG(4)=1
470 IF FG(1)+FG(2)+FG(3
)+FG(4)=4 THEN 570
480 IF FG(1)=1 THEN 500
490 PRINT #2:TAB(TSET);
PRG$(1,A,1);TAB(12+TSET
);PRG$(1,A,2);TAB(16+TS
ET);PRG$(1,A,3);TAB(27+
TSET);PRG$(1,A,4);
500 IF FG(2)=1 THEN 520
510 PRINT #2:TAB(34+TSE
T);PRG$(2,A,1);TAB(46+T
SET);PRG$(2,A,2);TAB(50
+TSET);PRG$(2,A,3);TAB(
61+TSET);PRG$(2,A,4);
520 IF FG(3)=1 THEN 540
530 PRINT #2:TAB(69+TSE
(Please turn to Page 27)

```




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LOTTO PICKER

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INFOSOFT has assembled top professional programmers to deliver the best possible software for your system. Most of the software we offer requires a fully expanded TI99/4A system. If you see what our software can do you'll understand why. INFOSOFT recognizes that a TI99/4A with Extended BASIC, 48K and a Disk Drive is one of the most powerful and convenient systems ever offered on the home market. Unfortunately, most of that power was never tapped. We also recognize that there are many TI99/4A users that need software to utilize the full power of their systems and perform many of the tasks their computers were designed to fulfill. With this in mind, we have concentrated our efforts on delivering useful applications that tap the full power of your system, power that you thus far probably haven't realized is packed inside the state-of-the-art processors that your system is based on. INFOSOFT will continue to design and offer software that justifies your investment by utilizing the entire system you've paid for.

Try our software and see what your system can do.

Graphics Construction Kit

The "Graphics Construction Kit" is an integrated graphics package. It is also a program generator. It allows you to create your own customized characters, and using these characters, create any type of graphics display. The final product is a stand-alone program, complete with line numbers, character definition statements, and screen formatting statements that will reproduce the screen (or screens) you've created using the "Graphics Construction Kit." Yes, THIS IS A PROGRAM THAT WRITES ANOTHER PROGRAM! It's actually two separate programs in one.

First, there's a full-featured Character Generator that allows you to create, save and edit customized characters for later use in the Screen Generator. Features of the Character Generator are:

- *ROTATE characters 90 degrees
- *FLIP characters upside down or sideways
- *MOVE characters a specified number of pixel locations
- *see characters with any combination of FOREGROUND and BACKGROUND COLORS
- *create characters in INVERSE VIDEO
- *SAVE characters to disk
- *LOAD characters from disk for editing at any time

All of these tasks are performed with the ease and flexibility of your joystick.

The Screen Generator displays the characters you've created with the Character Generator and allows you to put them anywhere on the screen using your joystick. You simply position a cursor on the desired character, select it, then move the cursor to the desired screen position and place it there. This is a fast, efficient and organized way to build an entire graphics display. YOU CAN EVEN MIX TEXT WITH GRAPHICS USING THE KEYBOARD. Screens can then be saved to disk for later editing. When you are satisfied with what you see, the "Graphics Construction Kit" will create a program on your disk that will reproduce the screen display you've created. This program can then run "as is," or be MERGED into an existing program.

IF YOU PROGRAM AT ALL, the "Graphics Construction Kit" is one utility you won't want to be without. It will save you hours of valuable programming time by allowing you to create and modify graphics and text displays in minutes. It will give you the freedom to experiment with many ideas in a fast, efficient, organized manner, and when you're sure you have EXACTLY what you want, the "Graphics Construction Kit" will essentially do the programming for you. You can even use it to add your own customized title screens to someone else's programs—the possibilities are endless. IF YOU DON'T PROGRAM, the "Graphics Construction Kit" can be used by itself for design work (architectural, electronic, etc.), art work, or just plain fun.

We know of no program available for any computer with the capabilities of the "Graphics Construction Kit." INFOSOFT is offering this powerful package at an introductory price of \$29.95.

REQUIRES: TI99/4A computer, Extended BASIC, 32K Memory Expansion, Disk Memory System, and one Joystick Controller.

There's a great deal of children's educational programs available for the TI99/4A Computer. Unfortunately, if your children are unable to identify the letters and numbers on the computer's keyboard then they cannot use these valuable learning tools. THAT IS THE PURPOSE OF "THE FIRST STEP." Captivating your children with colorful graphics, music and speech. "The First Step" teaches your children the numbers 0 through 9 and all of the letters in the alphabet while teaching them WHERE TO FIND these letters and numbers on the keyboard. This program has been tested on many children. It has been found to be both highly captivating and successful. In not time at all, young children have gained a thorough knowledge of the computer keyboard while having lots of fun.

Let your children take "The First Step" for just \$19.95
 REQUIRES: TI99/4A Computer, Extended BASIC, 32K Memory Expansion and the Disk Memory System. (Speech Synthesizer is optional. The program utilizes speech if this peripheral is attached.)



The Quest Beyond

Here's a game that couldn't be done on a 16K console. If you think you're tired of games—try this one. "The Quest Beyond" is a 20-SCREEN action/graphics adventure sequel to the highly acclaimed "Cavern Quest". Find the keys that unlock the gates to Fantasy, Action and Adventure on your quest for the King's Ransom that only time and perseverance will reveal. Even the most serious users need to have fun once in a while, and this game is more than just fun—it's an experience...

Treat yourself to "The Quest Beyond" for just \$19.95.

"The Quest Beyond" is the only authorized sequel to Moonbeam Software's "Cavern Quest." "Cavern Quest" and "Moonbeam Software" are trademarks of Moonbeam Software Inc.

REQUIRES: TI99/4A Computer, Extended BASIC, 32K Memory Expansion and Disk Memory System.



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** MASTER CARD OR VISA ACCEPTED **

Super Extended BASIC

Really Super Extended BASIC

By C. BOBBITT

I bet everyone who has the memory expansion card or peripheral remembers the day when he or she first plugged it in. Recall your surprise when you discovered that the "32K" that you bought gave you only 24K through Extended BASIC. Oh, of course, you have the 12K of "stack" memory, but that's only what's left of the original 16K that came in the console.

Where is the missing 8K? Well, if you have the Editor/Assembler manual, or a knowledgeable friend, you may well have discovered that you got everything that you paid for even though the "missing" 8K appears to be rather useless, separated as it is from the other 24K. (The 24K segment is called "high memory" and the 8K segment is called "low mem-ory.")

This "hidden" or unused 8K has a lot of assembly language programmers pretty excited. Where else should you put assembly language subroutines for Extended BASIC without taking up program memory? Whether TI did this by design or not, this has turned into a real blessing. On practically every other computer on the market assembly language routines take up memory that would otherwise hold part of a program. With our machine, the assembly language programmer gets 8K of otherwise empty space with his name on it, so to speak. James Hollender, of J&KH Software, must have realized this potential before he began work on his Super Extended BASIC package.

Performance: Super Extended BASIC is a collection of over 100 assembly language subroutines that can be called from Extended BASIC like a command or a program statement. These subroutines are "programming aids" in that they are to be used by the Extended BASIC programmer to write better programs. Included are routines for graphics, data base handling, string and string

Review

Report Card

Performance: A
Ease of Use: A
Documentation: B
Value: A
Final Grade: A

Cost: \$99.95 (diskette)
Manufacturer: J&KH Software, 2820 S. Abingdon St., Arlington, VA 22206, (703) 820-4131
Requirements: Extended BASIC, 32K memory expansion, disk drive and controller

array handling, and mathematics. A lot of these routines could be duplicated in Extended BASIC, but you couldn't get them to work nearly as fast, or in so little space with such ease of use. Also, you would have to actually write them, something J&KH Software has already done for you.

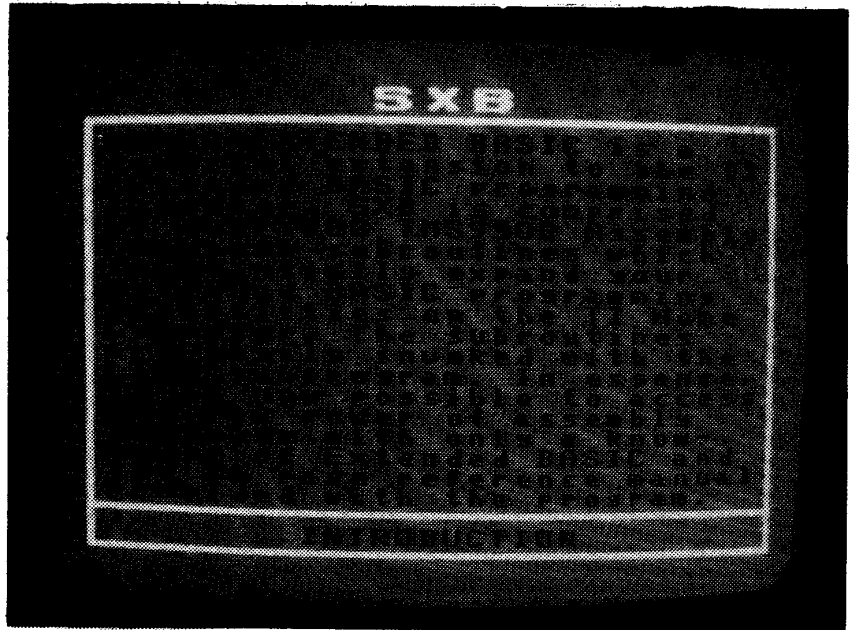
All of these subroutines are cram-

med into that little 8K segment called low-memory. Several of these subroutines—mostly the ones that involve lots of data, such as the array handling and data base routines—require the use of one or more 256-byte blocks of high-memory. Unless you are writing a really large program, you should never even miss the memory.

The routines take about 30 seconds to load from disk. The program includes a loader program, which I assume you have to run before you load your program, or actually merge into your own program. Each of these subroutines is accessed, like other assembly language subroutines, with the CALL LINK command in the following format: CALLINK("SUBROUTINE NAME", (VARIABLE, VARIABLE,...).

The subroutine name can be up to six letters long. Each of the variables contains data which the subroutine is to act upon. These variables are collectively called the "argument list." The variables can be arrays, so even though the argument list can't have more than 16 vari-

(Please turn to Page 21)



SXB—

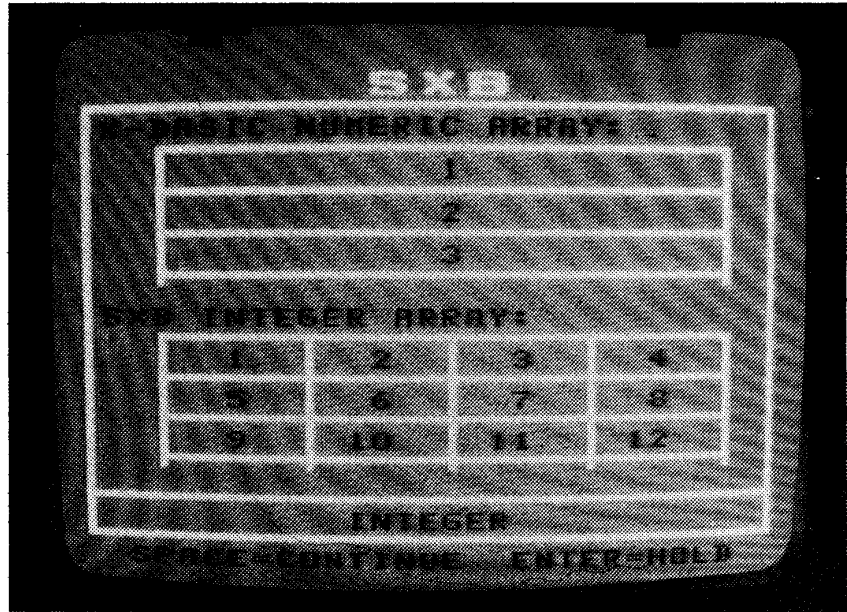
(Continued from Page 20)

ables in it, with arrays (both string and numeric) you have effectively as many variables as can be stored in the computer.

Collectively, all the routines are divided into six categories: Data Base, String Array, String, Integer mathematics, Graphics or VDP (Video Display Processor), and Miscellaneous. Eleven routines are devoted exclusively to data base handling. I believe it is possible to write an entire database management program comparable to the Personal Record Keeping cartridge, out of just these routines. Included are routines that let you set up the data base so it accepts only data of a certain length, or of a certain type, and moving, changing and sorting the data in the database. Practically all the work has already been done for the programmer. He just has to figure out the order in which to put the routines.

There are 10 routines devoted exclusively to handling string arrays. A number of these should have been commands in Extended BASIC, like the routine which tells the programmer how many elements of an array contain data, or the routine which copies every element of one array to another array. There are routines for encrypting the data in an array so no one can read it, reversing the encryption, deleting every item in a string array at once, and finding the particular string item with the longest length in an array.

The next routines should really be counted along with the string array routines but the manual makes a distinction, so I will describe them separately. These are the eight string routines. A number of these routines also should have been included by TI as Extended BASIC commands, among them the routine which fixes a string to a particular length by either adding spaces or deleting characters, and the routine which swaps the values of two strings. There are also routines which delete the specified number of characters off the end of a string, convert a binary string to a hexadecimal string and vice versa, and for compacting and uncompact-



ing a string to save memory.

The Integer routines, to me, seem the least useful. Other than the fact that they allow you to cram four numbers into the space usually reserved for one (as long as they are between $-32,768$ and $32,767$) they have little use in most programs. Unless a program is a spreadsheet (with no decimals), or something that doesn't require much in the way of computing power, I don't have any notion as to how useful these would be. However, the great majority of routines are integer mathematics routines, about 70 altogether. There are routines that allow you to perform the basic operations (add, subtract, multiply and divide) on these integers in any way to obtain any conceivable answer.

I believe the graphics (or VDP routines, as they are called) are about the most useful in the whole package. These 28 or so routines are collectively worth the \$99.95 price tag. All of these routines operate within a user-defined "window" on the screen. The window can be of any size, up to 24 rows by 32 columns. Any of the graphics routines executed take place within the window. This allows you to isolate the graphics portion of a program from the text. The window is defined with the subroutine called "VMWNDW," by indicating the coordinates of the upper left and lower right corners of the window within the argument list.

Some of these routines let the programmer clear the window instantly without disturbing anything around the window, read in all the characters in a window into string variables (sort of like a CALLGCHAR statement), and allow the user to type anything, anyplace in the window using a full-screen editor (the cursor can be moved up, down, left and right). Other routines let the programmer place or get strings in the window in any one of eight directions, redefine up to 31 characters instantly, or, in reverse, get the character patterns of up to 31 characters at once, change the colors of all the sprites and all the character sets at once to the desired color for each, redefine all the lower-case letters to typewriter-style, and redefine some unused characters as lines for creating boxes and objects on the screen. All in all, my only complaint is with the routine that lets you type in anything you want anyplace in the window—the keys are not auto-repeating.

The last category of routines, Miscellaneous, is well named since the routines do not fit into any other category. The first routine I find absolutely useless, but interesting. This routine, named "BANNER," turns a string into a banner where each regular-sized character is represented by a character eight aste-

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SXB—

(Continued from Page 21)

risks high and four asterisks wide. The routine called "KEY1" is very useful, since it is basically a CALL KEY statement that responds only to the keys specified, and then returns a different integer (appropriate for use in a GOTO statement) for each key pressed. There are two routines that allow the programmer to transfer data between two programs without using a data file, and a routine called "USRSUB," which allows the programmer to include one of his own assembly language routines. The last routine in the package allows the program to quit back to the master title screen from a program. (There is a CALL LOAD address for this one, by the way.)

All the routines seem to work well, and most of them are very useful. With this package the user can create programs that will rival regular assembly language programs. Unfortunately, we will not see a lot of software using this because J&KH Software, like most of the companies that create assembly language routine packages, requires a royalty for each program that is sold that uses the routines from SXB.

Ease of Use: All in all, the package is very easy to use. It is logically

designed, with not exceptions. All the CALL LINK commands follow a particular pattern. Routines in the first five categories of this package have, as the first two letters of their name, a prefix to indicate the category that they belong in. This is useful when writing and debugging programs. The package functions well, and because the subroutines take the place of ones the programmer would have had to write in Extended BASIC, they don't have to be debugged (saving a lot of time).

The manual is also very easy to use. Each category of routines is covered in its own section, and each section is a different color from the others. Finding a particular routine is very simple. Included in the back of the manual is an extensive index for looking up by page and section number each routine, as well as definitions of important terms. There is no table of contents, but because each section is color-coded, a table of contents is not needed. The manual is tough reading, though. More on that later.

Documentation: The manual comes in an attractive, professional-looking, black three-ring binder. Each page is about the size of a half page of legal-sized paper. The binder is not cheap or shoddy, and the pages snap in an out well. It is about the best looking documentation I have

ever seen accompanying a third party product for the TI99/4A.

Using the manual is a different story. It is difficult to read, up there with the Editor/Assembler manual. Even the examples are none too clear. It seems as if every word in the manual is polysyllabic. The explanations aren't very well written, and may be confusing to both beginning and advanced programmers alike. The best way to discover how a routine works is to judge it by its name, which usually indicates what it does, and by trying it in a short program. Then read the short summary in the manual.

Value: This is one of the most valuable programming tools for the Extended BASIC programmer. Granted, the programmer gets few of the enhanced graphics routines found in other packages, but in their place he gets routines that do more "meat and potatoes" chores, such as string-handling and sorting. Like Extended BASIC itself, the SXB package is not specific to one task. It is a COMPLETE enhancement package in that it makes every programming task simpler, not just those involving graphics or data handling alone. It would be great if many of these routines could have been included in the Extended BASIC cartridge itself. That enough is indicative of how valuable I think this package is.

SXB author responds

First of all, I would like to thank MICROpendium for the opportunity to respond to its review of Super Extended BASIC.

You are correct that it takes approximately 30 seconds to load SXB (as we like to call it)—but once the subroutines are loaded, you can remove the SXB disk and begin loading and running your own programs. Under normal conditions SXB will remain loaded and ready to use until the machine is turned off or a CALL LINK ("QUIT") is invoked. You can even do CALL FILES (1) followed by NEW and SXB will still be there!

The reason for the distinction be-

tween STRING and STRING ARRAY subroutines is because only STRING ARRAY subroutines act on entire arrays with a single LINK.

With respect to the INTEGER subroutines it should be pointed out that their sole purpose is to free up PROGRAM SPACE (part of the 24K). Generally, they are not any faster. If you have a lot of small numbers to keep track of, this will free up to 75 percent of your numeric array space—which amounts to six bytes per number. Our new master catalog program, the Multi-Disk Informer (a sizeable upgrade from Super Cataloger), can only keep track of as

much information as it does with the use of these INTEGER subroutines.

True, the INTEGER subroutines cannot deal with decimals—but they can handle numbers in the range -32768 to +32767, substantial enough for most counting functions.

False, there are not 70 INTEGER subroutines—only 44. Most of these are taken up with eight each for adding, subtracting, multiplying and dividing. Please note that although there is a substantial number, they occupy only a very small portion of the total storage space for SXB. The reason for the large number is to

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RESPONSE—

(Continued from Page 22)

provide as much flexibility as possible for integration with numbers in Extended BASIC. This way you don't have to exclusively use SXB INTERGERS but can have the best of both worlds.

Concerning the VMATYPE command which allows freeform typing within the active window, yes we do not have the auto-repeat feature. It's not that we forgot about it—it just took up too much space. So to compensate we included some even better features, like editing (delete/insert), erase and move to: home (upper left), left, center, right and left on next line (like a carriage return).

The BANNER subroutine does have some uses. If you ever want to print banners on your output listings and didn't have this subroutine, it would take up a considerable amount of program space. This subroutine helps make the TI99/4A's output look like it came from a mainframe computer. Also, we used BANNER in the Multi-Disk Informer. It makes looking for a particular version of the report a lot easier. Note also that combining BANNER with VMW-NDW and VMREAD in a loop can provide an easy method of producing a giant-sized screen dump!

The reason for the absence of a table of contents is that the user is allowed to rearrange the color-coded sections of the manual to his or her own liking and the index still remains valid. This is mentioned in the introduction to the manual.

The manual itself was designed more as a reference manual than a tutorial. It is definitely something that you would not want to read from beginning to end with the exception of the introduction. When you need to use a particular subroutine, that is when you want to read its particular page or pages. We have also included on the SXB disk several programs as examples. The one that has been found to be the most useful by our customers is the SXB-TEST which also verifies that SXB is working correctly on your own particular computer (a few people have had

problems with bad memory—portions of which are being flexed for the first time). This program includes most of the examples used in the manual so you can see just how the CALL LINK statements interface with the TI Extended BASIC coding.

No, J&KH Software does not demand a royalty for each program that is sold which requires SXB. Actually, just the opposite is true. We will pay a royalty to anyone writing programs which use the SXB subroutines as long as they have the programs published by us (assuming the programs meet our high standards of quality). Anyone is allowed to publish programs using SXB. **What we do not allow is inclusion of the SXB subroutines with the published program.** SXB must be purchased separately just as TI Extended BASIC must be purchased separately from programs which are written in TI Extended BASIC. We anticipate publishing some SXB programs within the next few months. At that time we will be making available a special version of SXB which will only include the subroutines and instructions on how to load them. This will provide an avenue for the person who wants to use programs written by others that use the SXB subroutines, but does not want to spend the extra money for all the documentation and other authoring aids. This special version of SXB, to be called SXB RUN-TIME OPTION, will be priced at \$54.95. Persons wishing to upgrade to the full version at a later date will be able to do so for an additional \$49.95 (only with proof of purchase, of course).

One thing not mentioned is the fact that SXB is the only software for the TI99/4A which has an option for extending SXB. I am referring to the SXBrief Newsletter, a monthly publication solely about SXB. It consists of four pages to add to the three-ring binder each month. In fact, the first six issues (January-June 1984) are included with the full SXB package. A subscription to SXBrief is available to registered purchasers of SXB at a cost of \$10 per year (plus \$5 for overseas delivery). Subscriptions always start with the July 1984 issue so you won't miss a single issue not matter when your subscription starts.

J&KH Software is committed to publishing the newsletter through at least June of 1986. One of the things included in almost every issue is a new USRSUB which can be invoked in your own programs with the CALL LOAD instruction. The USRSUBS published during 1984 include VMFILL, SADEL, DBFND2, GRAPH, SA-INS, VMSCUP, VMSCDN, SMCNTR, VMRECT and DBMARK.

James B. Hollender
President
J&KH Software

Reviewed in MICROpendium

Listed below are the products that have been reviewed in MICROpendium and the issues in which the reviews appeared.

B-1 Nuclear Bomber	February
Tandon TM-100 Disk Drive	February
Void	February
Beanstalk Adventure	February
Microsurgeon	February
On Gaming	February
Database 500	February
Star Trek	March
Escape From Balthazar	March
Garkon's Getaway	March
Sky Diver	March
Mail-Call	March
Prowriter 8510 Printer	March
Monthly Budgets Master	April
Budget Master	April
Home Budget	April
Thief	April
Donkey Kong	April
Khe Sanh	April
Companion Word Processor	May
Q*Bert	May
Mad-Dog I&II	May
Programs for the TI Home Computer	May
Creative Expressions Accounts Receivable/Accounts Payable	June
CDC 9409 Disk Drive	June
Starship Concord	June
Lost Treasure of the Aztec	June
ASW Tactics II	June
Theon Raiders	July
Introduction to Assembly Language for the TI Home Computer	July
Game of Wit	July
Pole Position	July
TE-1200	August
Tower	August
Galactic Battle	August
Galaxy	August
Wycove Forth	September
99/4 Auto Spell-Check	September
QUICK-COPYer	September
Wizard's Dominion	September
Anchor Automation Mk XII Modem	September
Killer Caterpillar	October
ZORK I	October
Defender	October
9900 Disk Controller Card/Manager	November
Super Bugger	November
Transtar 120S Printer	November
Floppy-Copy	November
Data Base-X	November
Gravity Master	December
Data Base Manager System	December
Learning 99/4A Assembly Language Programming	December
Super Sketch	January
Foundation 128K Memory Card	January
PTERM-99	January
TI-Runner	January

Beginning Assembly Language for the TI Home Computer

Assembly language made easier

By JOHN CLULOW

Two years ago I wrote an article for 99'er Magazine called "Magic Crayon: Learning Assembly Language the Hard Way." At that time there were no assembly language texts available for the Home Computer. So I learned the hard way — by reading the Editor Assembler manual five or six times until I somehow absorbed enough to write a simple program.

Since then I have had the opportunity to work with many TI enthusiasts interested in learning 9900 assembly language, and it has become clear that the nature of assembly language dictates a different sort of learning process than we are used to with other programming languages. A language such as BASIC can be learned using a "building block" approach. Knowing a few simple rules for PRINT and INPUT, the learner can start to write programs. Thus the rules learned have some meaning. New elements can be added one at a time, the utility of each being immediately recognizable to the learner. The order in which new rules are learned is not as important as that each new rule be related to what the learner already knows.

Assembly language, on the other hand, seems to require a "spiral" learning process. People who have just begun often have the paradoxical notion that learning assembly language presumes a prior knowledge of assembly language. That is because the learning process is different from the "building block" approach that can be used with BASIC. Construction of even the simplest assembly language program requires a relatively extensive knowledge of three content areas: (1) binary and hexadecimal numbering systems, (2) assembly language syntax and instruction set, and (3) the TI-99/4A environment.

At the outset the learner is faced with

Review

Report Card

Performance: A
 Ease of Use: A—
 Documentation: B—
 Value: A
 Final Grade: A

Cost: \$19.95

Publisher: D&D Publishing Co.,
 3177 Bellevue, Toledo, OH 43606

lots of facts, facts which more often than not seem to be unrelated to one another:

what is a register, how does VDP RAM differ from CPU RAM, what is the program counter, how do you take the two's complement of a signed binary number. Moreover, the learner often fails to see what bearing any of these facts have on the process of constructing a program. The beginning student lacks a perspective from which the relationship among all of these facts can be seen.

However, the student who does not give up at the initial frustration soon does succeed in constructing that perspective. It really does not matter if it contains some inaccuracies and oversimplifications. What's important is that it works for the learner, allowing him to write some simple programs and feel that he is beginning to understand how things fit together. Ultimately, though, this perspective is just the first level of understanding as the learning process proceeds in a continuing spiral. I believe writing programs is the best way to proceed once the groundwork has been laid. There is a point at which reading books may make you a better reader but will not do much for your knowledge and skill as a programmer.

While it is possible to develop an

initial perspective "the hard way" using only the Editor Assembler manual, there is also a much easier way: Beginning Assembly Language for the TI Home Computer, edited by Edward York and Timothy Inzana (D&D Publishing). Of all the books I have seen, I feel this one will be best for the beginner who has no prior knowledge of assembly language. Beginning Assembly Language is the book I think most people would have preferred to find in the Editor Assembler package.

In one sense, Beginning Assembly Language is like an Editor Assembler manual written for someone with no prior knowledge of assembly language. It provides sufficient information to allow the student to construct that first overview essential to "making sense" of the basic information, and it does so in a conversational, easy-to-read style free from unnecessary technical jargon. In another sense, however, the book is a tutorial. The organization makes sense; concepts are presented in a reasonable order. Early chapters are concluded with study exercises designed to reinforce the preceding material. Study exercises were not included for the last half of the book. Perhaps the authors felt that the reader would be supplying his own by that time, but it would have been nice to use study exercises throughout the book. The 200 pages of text are followed by an index and 20 pages of appendices. However, the index is only five pages long. I feel an expanded index would improve the utility of the book as a reference.

Chapter organization is logical. Following the Introduction, Chapter 2 is a discussion of "How Computers Count," and covers binary and hexadecimal number systems. Chapter 3, "The Assembler," explains just what assembly language is and why it is used. This chapter explains the most important aspects of the TMS 9900

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ZORK II

The adventure continues

By JIM WRIGHT

So you've mastered ZORK I, "The Great Underground Empire," and are feeling pretty smug about your adventuring skills? Well, welcome to ZORK II.

Subtitled "The Wizard of Frobozz," ZORK II starts where ZORK I ended—in the stone barrow. You don't have to complete the first adventure to try your luck with the second, but I recommend that you do so. It will sharpen your wits for the coming challenge, and you'll need all the help you can get: ZORK I is called a moderately difficult adventure, but ZORK II is ominously—and correctly—billed as "advanced."

"The Wizard of Frobozz" takes you into an underground labyrinth of rooms and passages, peopled by mythical creatures, living plants and a feisty little wizard with a straggly beard. He'll bedevil you constantly with magic spells. As with ZORK I, you'll need to map the wizard's territory as you explore it, and it will help if you can print out your game for reference and later study. Help is also available from the hint books mentioned in the ZORK I review (October 1984). You may not like having to get outside help—I know I didn't—but I predict that you will need it.

Performance: The early stages of ZORK II aren't difficult. You start in the stone barrow where you find your old friends, the elvish sword and the battery-powered lantern. Working your way from the barrow to the central area of the wizard's domain is a simple matter. Enjoy it. You won't find much else in this game that is so easy.

As with any quality adventure game, you will have to be alert and creative to make progress in ZORK II. There are very few obvious clues to be found, and the Oddly-Angled Room maze is a real toughy. You will have to exercise some lateral thinking (and even some tricks you learned from old-time TV myster-

Review

Report Card

Performance: A
Ease of Use: A-
Documentation: A
Value: A
Final Grade: A

Cost: \$49.95 (diskette)

Manufacturer: Infocom, 55 Wheeler St., Cambridge, MA 02138

Requirements: console, monitor or television, memory expansion and disk system, Extended BASIC, Mini-Memory or Editor/Assembler (printer optional)

ies) to find and acquire the treasures. Don't expect them to be lying around waiting to be picked up. Also, be careful: the grues from ZORK I are here, too, and the skull-and-crossbones warning isn't to be taken lightly.

You'll find a helpful robot in ZORK II, but his skills are limited. A neuter gnome from Zurich may store your treasures in a vault, and you will have to find a way to get them out. And, as I mentioned, the resident wizard—a puckish fellow—will periodically cast a spell on you. You can find yourself unable to move, floating in midair, or too weak to carry everything you want to.

As you explore the formal garden with its living hedges, the mysterious bank building, and the spinning Carousel Room, you will come across a variety of objects. There is a teapot, for example, and a placemat, a wooden club, a newspaper, several delicious-looking cakes, and much more. Keep careful track of these items. Most of them are useful, but you won't know right away which are essential and which are useless.

ZORK II accepts English sentences as commands, unlike most adventure games for the 99/4A. There

are several important one word commands, however: DIAGNOSE, to determine your condition; WAIT, to allow time to pass without moving; SCORE, to see how you're doing; and SCRIPT, to dump the screen text to your (serial or parallel) printer. The only way to really appreciate the Infocom commands is to try them and then try the cryptic two-word commands demanded by a Scott Adams adventure. Trying to find the correct two words to accomplish something in a Scott Adams game can be amazingly distracting and frustrating.

Another major feature of the Infocom ZORK II adventure can be described as "scope." There seems to be an endless number of rooms, and every one is described in exquisite detail, down to the dust on the floor. You are in a panoramic world here, and you can "see" it all clearly.

There seems to be only one significant problem with the programming itself. Generally, ZORK II seems to be crashproof, but one situation confuses it badly. You will find a red crystal sphere and a blue crystal sphere. If you have both spheres in the same room, you may not be able to do anything with either one. No matter how specific you are, the program sometimes can't tell them apart. If this happens, try taking INVENTORY or using some variation of the TAKE ALL command; this usually clears up the problem.

A lesser problem occurs in the Small Room. If you find yourself there and give several treasures to the gnome at once, ZORK deals with them individually. The transfer works, but you will be popping in and out of the room, and the screen will flood with tedious and unnecessary text. This is harmless but annoying.

Ease of Use: Once booted, ZORK II is easy to use if you are at all familiar with text adventures. You can INVENTORY your possessions, LOOK at your surroundings, and

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ZORK II—

(Continued from Page 25)

travel around with one letter direction commands. Complex tasks are made easier by the plain English commands that ZORK allows.

The loading instructions that come with the game are complete and readable. On-screen prompts keep you up to date on the loading process and, during play, ZORK tells you if it can't do what you want it to or if it didn't understand a command. In fact, the biggest problem I've found in playing ZORK is that it lives on both sides of a floppy disk. I hate having to flip the disk to finish loading the program.

Documentation: Infocom supplies a generic ZORK manual with the program disk. It describes the ZORK trilogy and how to play in clear, concise text. In addition, a machine-specific insert is provided. The TI insert gives detailed instructions for loading, SAVEing a game position (useful if you want to slap the dragon around but don't want to start over after he fries you for it), printing out your game and troubleshooting.

Value: There aren't any standards for placing a value on recreation, and this applies to computer games as well. ZORK II is worth whatever value the user places on high-quality programming, an intellectual challenge, an absorbing fictional adventure, and a whole lot of fun. ZORK II lists for \$49.95, but I got my copy at a discount by mail. I've never enjoyed \$35 worth of anything any more.

LEARNING—

(Continued from Page 24)

microprocessor, and the syntax of an assembly language statement. Chapter 4 covers the five general addressing modes and the 9900 instruction set. The instructions are clearly explained with easy-to-follow examples. Chapter 5 contains an excellent discussion of the assembler directives. Chapter 6 covers the built-in utility routines which can be accessed through assembly

language. This chapter concludes with a program that demonstrates how to use the RS232 interface within an assembly language program. Upon completion of this chapter, the reader is ready to begin writing some simple programs.

Chapter 7 is devoted to graphics, one of the strong points of the 99/4A. All four graphics modes are discussed in detail (including bit-map mode). The information covered in this chapter is illustrated with many program segments and the chapter is concluded with a program that draws a rectangle on the screen when given the two points of its diagonal. Chapter 8 continues the graphics theme with a thorough explanation of sprites. This chapter is concluded with four program examples. Chapter 9 covers the music and sound capabilities of the 99/4A. It ends with a program that plays "Home on the Range" on the computer.

Although the book is primarily aimed at readers using the Editor Assembler system, Chapter 10 provides the necessary information for those using the Mini Memory Line-by-Line Assembler. The information presented will enable readers using Mini Memory to modify the program examples in the earlier chapters so that they may be entered with the Line-by-Line assembler.

Chapter 11 will be of interest to all readers who want to make use of their knowledge of BASIC. Assembly language source code is provided to simulate the following BASIC and Extended BASIC commands: CALL CLEAR, CALL SCREEN, DISPLAY AT, CALL CHAR, CALL HCHAR/VCHAR, CALL KEY, CALL JOYST, DIM, FOR-NEXT, FOR-NEXT-STEP, and IF-THEN-ELSE. All readers will probably be familiar with these BASIC statements and studying their simulation in assembly language is a great learning tool.

I feel Chapter 12 is one of the most important chapters in the book; it covers the linking of assembly routines to BASIC programs. In virtually all cases, BASIC is easier to write and to maintain than assembly language, but assembly language is of use (1) when BASIC is not fast enough and (2) when

a machine resource is not available from BASIC. The best of both worlds is to write the backbone of an application BASIC using custom assembly routines where exceptional speed or unusual access to the machine are required. This chapter covers all of the fundamentals required for this very common sort of assembly language programming.

Finally, Chapter 13 covers the use of the built-in "floating point" math routines in an assembly language environment. These routines allow the assembly programmer to easily achieve the high degree of mathematical precision for which TI BASIC is famous.

Value: In summary, if you're thinking of getting involved in assembly language I would highly recommend Beginning Assembly Language for the TI Home Computer. I feel that it provides a lucid, thorough, and easy to understand approach to this unusual learning task. But whichever introductory book you choose, remember that learning assembly language is different from learning BASIC — it will take a while before the seemingly endless stream of independent facts fit together and make sense as a whole. But if you stick with it, you will find the rewards immeasurable.

99/4A AUTO SPELL-CHECK

* for TI-WRITER *

Quickly check your text
for unsightly spelling
errors.

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MC/VISA: Include card #,
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Freeware (or nearly so)

This page is a regular feature of MICROpendium. MICROpendium makes no claims as to the validity of any Freeware offer nor is there any guarantee that any software will be suitable for any purpose.

Freeware requirements:

- disks sent for freeware should be initialized;
- unless otherwise stated, you must include a stamped, self-addressed return mailer to receive the freeware;
- be patient (those offering Freeware are not doing it for a profit);
- report any problems you have to MICROpendium.

Software updates

MICROpendium is offering file updates for TI-Writer and Microsoft Multiplan. Also offered at no charge is Super Bugger and an Extended BASIC loader for TI-Forth.

The TI-Writer enhancements offer new printer defaults and true lowercase letters. Multiplan enhancements include an auto-repeating cursor that speeds up program operation. The Forth loader allows TI-Forth to be used with Extended BASIC rather than the Editor/Assembler. Super Bugger is an improved version of TI-Debugger.

TI-Writer and Multiplan updates all fit on a single-sided disk. Super Bugger will fit on a single-sided disk. All three will fit on a double-sided diskette. The Forth loader requires a single-sided diskette. To order any of the above, send the appropriate number of diskettes to Freeware, c/o MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

TI-Forth is also available. The cost is \$20 and includes the 232-page manual, the system disk with screens, a demo disk, postage and packaging. Purchasers are asked to include two initialized single-sided diskettes. MICROpendium will supply a third disk containing the source code for TI-Forth at no extra charge.

To order, send check or money and two diskettes to Forth, c/o MICROpendium, P.O. Box 1343, Round Rock, TX 78680.

Free access library

Amnion Helpline is offering TI users its Free Access Library of public domain software. The library consists of 104 diskettes filled with programs for the TI99/4A.

The library is operated as a non-profit entity by Dr. Guy-Stefan Romano, director of Amnion Helpline. The helpline is a free information service for TI users who have questions about products and other aspects of home computing.

The library provides "volumes" of programs. There are 37 diskettes, or volumes, of games; 10 diskettes of graphics-oriented programs; 16 music-oriented diskettes; 14 diskettes of learning materials in many categories; eight diskettes of financial and business programs; seven diskettes of technical, scientific and statistical programs; six diskettes of personal and home use programs; and 6.5 diskettes with miscellaneous programs ranging from baseball statistics to programming utilities. There are also a limited number of Pascal and Forth programs available.

Volumes are \$5 each. The cost includes the single-sided diskette, mailer and postage. Users may send their own diskettes and return postage and mailer and obtain volumes for \$2.50 each.

Volumes on double-sided diskettes are \$8, \$4 if the purchaser sends a diskette, mailer and postage.

All programs may be copied and redistributed freely as long as no charge is made for them.

The library also will supply particular programs to fit specific purposes to any user who sends an initialized diskette with return mailer and postage. Enclose a note describing the type of program desired. Amnion will return the diskette with programs that fit the description.

Users are encouraged to donate programs to the library. There is no payment. Include a note stating that the program submitted is to be placed in the public domain.

Order forms for software volumes are available from the library. For more information, contact Amnion Helpline at (415) 753-5581 from 9 a.m. to 4 p.m. (Pacific time) or write to 116 Carl St., San Francisco, CA 94117.

Free screen dump

Danny Michael, of Route 9 Box 460, Florence, AL 35630, has a Freeware screen dump program. The program is written in assembly language and is unprotected. It requires X BASIC and works with Epson/Gemini-type printers. The program includes instructions and fully commented source code. Send a diskette with a stamped, self-addressed return mailer. Or, send \$5 and he will provide the diskette, mailer and postage.

Michael is also offering Neatlist, an assembly language utility for Extended BASIC programmers. Neatlist produces an orderly listing of programs that can be a time-saver in debugging and modifying programs. The program allows the user to

set margins for program listings as well as starting and ending line numbers. Listings include easy to read program lines and a

list of variables used in the main and sub-programs. If you like it, he says, you may pay him for the program, but not more than \$10. If you don't like it, "you keep it anyway," he says. He asks that you give copies of the program to others. Send an initialized disk, postage and return mailer.

Free craps game

Ramssoft Enterprises, 1501 E. Chapman Ave., Suite 338, Fullerton, CA 92631, is offering its Computer Craps game as Freeware. The game formerly sold for \$14.95. The game requires X BASIC and expansion memory. Instructions are included as a file that can be read by TI-Writer. Users are encouraged to provide free copies to others as well as long as the dedication screen is not removed. Send an initialized disk and \$2 to cover shipping and packaging.

CATALOG—

(Continued from Page 18)

```
T); PRG$(3, A, 1); TAB(81+T
SET); PRG$(3, A, 2); TAB(85
+TSET); PRG$(3, A, 3); TAB(
96+TSET); PRG$(3, A, 4);
540 IF FG(4)=1 THEN 560
550 PRINT #2: TAB(105); P
RG$(4, A, 1); TAB(117); PRG
$(4, A, 2); TAB(121); PRG$(
4, A, 3); TAB(132); PRG$(4,
A, 4);
560 PRINT #2 :: NEXT A
570 PRINT #2 :: DISPLAY
AT(4, 1) ERASE ALL: "Want
to do some more ? (Y/N
"
580 CALL KEY(0, K, S) ::
IF S=0 THEN 580 ELSE IF
K<>89 THEN 590 ELSE 60
0
590 CLOSE #2 :: STOP
600 FOR A=1 TO NR :: FO
R B=1 TO 40 :: IF LEN(P
RG$(A, B, 1))=0 THEN 620
ELSE PRG$(A, B, 1)="
610 NEXT B
620 NEXT A :: GOTO 150
```

Newsbytes

Adventure editor

Exclusive American rights to a program which allows TI users to create professional quality games using the Scott Adams Adventure cartridge have been acquired by Tex-Comp.

Adventure Editor, a program from Germany, is available on disk or cassette for \$29.95. The program requires either Extended BASIC, Mini-Memory or Editor/Assembler. An extensive manual is included.

Jerry Price, vice president and general manager of Tex-Comp, says that the company plans to hold a contest for persons who write adventures using the program. Winning entries will be marketed by Tex-Comp, which will pay authors royalties on their games. Details will be announced by the company at a later date.

Tex-Comp also holds exclusive American rights to the adventure game Knight Ironheart, written in Germany.

Ug tapes interview

The Los Angeles 99ers users group has taped a lengthy interview with Craig Miller of Miller's Graphics. Miller was formerly an executive with CorComp Inc. and helped develop the company's double-density disk drive controller card. The VHS tape is being made available to user groups throughout the country at a cost of \$15. For more information, contact the LA group at P.O. Box 3547, Gardena, CA 90247.

80-column update

Foundation Computing raised the price of its 80-column card to \$309.95 as of Feb. 1. The card sold for \$159.95 to those who ordered it during January. Those who purchased the company's Z80A card for \$349.95 in January were permitted to reserve an 80-column card for future purchase at \$159.95.

According to Foundation, "Our costs to manufacture the 80-column

card have increased and we are forced to raise its price."

For more information, contact Foundation at 74 Claire Way, Tiburon, CA 94920, (415) 388-3840.

Spell-Check update

Dragonslayer American Software Co. has issued Version 1.1 of its popular 99/4A Auto Spell-Check program. The proofreading, spelling checker program operates with TI-Writer.

Thomas W. Kirk, author of the program, says Version 1.1 is considerably faster than Version 1.0. While Version 1.0 checked a 100-sector document in about 21 minutes, Version 1.1 checks the same document in about 6.5 minutes. Purchasers of Version 1.0 may obtain Version 1.1 for \$3 by returning their distribution diskette A to Dragonslayer. Dragonslayer will return the diskette with the update. For more information or to obtain the update contact Dragonslayer at 2606 Ponderosa Dr., Omaha, NE 68123.

DB-X revised

Western-Ware Inc. has produced revision 2.0 of its Data Base-X program. The revision results in the following four improvements, according to the company: sort and print now allows the user to preset the print format so that any categories may be printed in any order across the page; the user may set print tabs for each category; a printing format may be selected for each category (alpha and numeric with or without decimal representation); and the user may now have the sum of any column printed at the bottom of the appropriate column.

Owners of Data Base-X may obtain the revised program by mailing \$5 to Western Ware Inc., P.O. Box 53042, Lubbock, TX 79453.

Damaged ports?

Though this has not been fully verified, TI may not honor warranties on consoles that have been dam-

aged by use of side-loading cartridges. These cartridges do not work by plugging into the GROM port and are plugged into the peripheral port instead. Apparently, when these cartridges are not inserted properly the I/O port connectors are bent. Users subsequently find it difficult to insert the speech synthesizer or PEB cable into the port.

The word is that dealers are being notified by TI that consoles that show this type of damage to the peripheral port may have their warranties voided.

Side loading cartridges were marketed by several companies to be used with consoles manufactured with a 1983 copyright mark. TI modified the GROM port on these consoles so that only TI cartridges could be used.

New RAM disk?

A California company, Sci Tech, is reportedly working on a RAM disk for the TI 99/4A PEB. The card is expected to be expandable from 64K to 256K. An optional 32K may be plugged in for those who do not already have a memory expansion. Preliminary information indicates that the card will hold up to 127 files or programs at one time. A disk manager will be included with the card to format it.

According to Miller's Graphics of San Dimas, California, the card will include a CALL DIR command which will allow users to generate a catalog of any disk without losing the program or data in memory. Pricing and release date are not known at this time.

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

Screen dump

John R. Witham of Prospect Park, New Jersey, submitted a brief routine that serves as a simple screen dump in BASIC or Extended BASIC. He notes that it will dump a 24-row X 32-column screen to a dot matrix printer in about 60 seconds. It can be used as a GOSUB with a CALL KEY in a loop by pressing a designated key to GOTO the screen dump. Here is the routine: 100 OPEN #1: "PIO"
110 FOR R=1 TO 24
120 FOR C=1 TO 32
130 CALL HCHAR(R,C,D)
140 PRINT #1: CHR\$(D);
150 NEXT C
160 PRINT #1: CHR\$(13)
170 NEXT R
180 CLOSE #1
190 RETURN

Line 130 assigns the ASCII value to D and line 140 prints the ASCII value. Line 160 is a carriage return to release line 140. Be sure to configure line 100 to match your printer's requirements.

Double-sided Forth

Rod Cook of Newark, Ohio, offers a tip that will allow Forth users to initialize double-sided diskettes with TI-Forth. It can be entered either in the command mode of TI-Forth or defined as a word for easy access and execution. The statement follows: HEX 2 8350 ! DECIMAL 0 DISK LO !

0 FORMAT-DISK HEX 1 8350 !
DECIMAL

Notes Cook, the integer before the FORMAT-DISK word determines the disk drive the disk is formatted on: 0 is drive 1, 1 is drive 2 and 2 is drive 3. The .8350 is the address at which the number of sides to format is stored.

The initialization routine in TI-Forth does not test the sector integrity of the disk after initialization, as does Disk Manager II. Cook cautions that those using old disks or single-sided disks may want to use DMII to make sure that the disks have no bad sectors.

More on CRs

Roger Biddle of Northwood, Ohio, finds that TI-Writer is more than sufficient when it comes to removing unwanted carriage returns, linefeeds and other printer control characters from text.

He writes: "When you want to get rid of the control characters, load the file into the editor after it has been put into Dis/Var80 format. Then all you have to do is select the PrintF (Print File) command. Type C and space once. Then type the devicename. Press Enter to execute the function. All control characters, such as linefeed, carriage returns, page feed and other control characters entered in special character mode (ASCII/Hexidecimal .0 to .1F, decimals less than 32) are removed before the file is printed. This command is found on page 77 of the TI-Writer manual.

"Now you can use the LoadF (Load File) command to load your new file that has been stripped of all the control codes back into the editor. Now you can edit your file to exactly what you want to save to the printer in any printed format you desire.

"I use this little gem of a routine all the time when using TE-1200, and it works great."

Sound effects

The following program, by David Enterline of New Waterford, Ohio, allows users to create a variety of very strange sounds using the speech synthesizer and Extended BASIC. The program follows:

```
100 REM *SOUND EFFECTS*
110 REM BY DAVID ENTERLINE
120 CALL CLEAR
140 FOR L=1 TO 9
150 DISPLAY AT(L,2): "S"
;L; "-->"; I$(L)
160 ACCEPT AT(L,9) SIZE(-20): I$(L):: IF LEN(I$(L))=1 THEN 160
170 S$(L)=CHR$(96)&CHR$(
```

```
(0)&I$(L)
180 CALL SAY(.9#(L),S$(L))
(L))
190 NEXT L
200 FOR R=1 TO 9
210 CALL HCHAR(R,9,42)
220 CALL SAY(.9#(R),S$(R))
(R))
230 CALL HCHAR(R,9,45)
240 NEXT R
250 DISPLAY AT(20,1): "HEAR AGAIN (Y/N) Y"
260 ACCEPT AT(20,18) SIZE(-1): Q$
270 IF (Q$="Y")+(Q$="y") THEN 200 ELSE 140
310 END
```

At the prompts, enter any alphanumeric string, including lowercase letters. Press enter after entering each line. After nine lines have been entered, the entire list of weird sounds will be replayed.

Time saver

Perhaps the only disadvantage of writing to a cassette recorder is the time it takes to get the job done. But never fear, Jim Wright of Corpus Christi, Texas, has a suggestion that cuts the time by 80 percent.

He writes: "The 99/4A writes file records to cassette tape in one of only three lengths: 64, 128 or 192 characters. A FIXED specification in the OPEN statement merely causes the computer to select the shortest standard length that is still long enough to meet the specification. Any unused space in these standard-length records is filled with binary zeroes. Thus, the cassette data storage process can be streamlined by replacing those zeroes with as much information as possible.

"The following subroutine condenses five fields in record number X into one 'accumulator string.' Only one recording cycle, not five, is then needed to put the complete record on tape, resulting in an 80 percent saving in recording time:

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User Notes

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```
100 FOR Y=1 TO 5
110 A$(X$)=A$(X)D$(X,Y)CHR$(30)
120 C(X,Y)=LEN(A$(X))
130 NEXT Y
```

"Cursors—CHR\$(30)—are used to separate the D\$ data fields, and their locations are stored in C(X,Y). These values can be recorded, or they can be reset later by reading the A\$ accumulator until a cursor is found, noting its location, reading to the next cursor, and so on.

```
"The following subroutine disassembles the accumulator for record X into separate data strings, using the C(X,Y) values. Note that it starts at the beginning of the A$, not at the first cursor, so Y=0 to start:
200 FOR Y=0 TO 4
210 D$(X,Y)=SEG$(A$(X),C(X,Y)+1,C(X,Y+1)-C(X,Y)-1)
220 NEXT Y
```

"Remember that the 99/4A uses once character in each record for a length tag, so keep accumulator strings to 191 or fewer characters (or 63 or 127 for shorter records)."

Wrong address

Several readers have notified us that the address we published recently of the Forth National Information Center was incorrect. The Forth center is being conducted via the Milwaukee Area Users Group. The address is 2007 N. 71st St., Milwaukee, WI 53213. The address we originally published was 1007 N. 71st St.

More GROM RX

This comes from the Upper Pinellas 99'er Group of Largo, Florida, and has to do with yet another fixup for GROM-related lockups and crashes. The Floridians picked up the information from the KCR Corporation.

To define the symptoms, the problem starts with the main title screen that has extra or misplaced characters after a cartridge is inserted or removed. The Floridians note that even "small amounts of contamination on the contacts can cause a loss

of data," and that the problem is greater with cartridges that have numerous GROMS, such as Extended BASIC.

Cleaning the cartridge contacts with rubbing alcohol and a lintless swab is recommended. It is recommended that the cartridge connector in the console be cleaned by a qualified technician. The use of TV tuner cleaner on contacts is not recommended because the lubricant attracts dirt.

The module connector plugs into the main computer board. Each time you insert or remove a module, the connector shifts very slightly. A qualified technician should remove the connector from the board, burnish the metal contacts and reassemble the console. Since TI did not use gold-plated connectors for this part of the computer, it may be necessary to burnish (remove oxidation by rubbing) the contacts on a regular basis, perhaps yearly.

Users may want to replace cartridge connector plugs. They can be ordered from TI. The part name is GROM Ext. Assembly. The part number is 1049693-1. The cost is \$5.94, plus \$1.50 shipping and handling. The address is Texas Instruments Inc., Dealer Parts Dept., P.O. Box 53, Lubbock, TX 79408.

The Floridians say it is not very difficult to replace the plug.

CALL TRACE

The TRACE command can be very useful when debugging a program, but did you know you can call it up from within a program? Well, you can.

The command to turn it on is CALL INIT :: CALL LOAD(-32699,16). Enter the line as a numbered program line at the point in the program you wish the TRACE to begin. To stop the TRACE command enter CALL LOAD(-32699,14) at the point you want the trace to stop. You may enter the CALL INIT prior to running the program and thus not have to include it before the first CALL LOAD.

Try entering (-32699,15) in place of

the CALL to turn off the trace. When the program stops the NUM command is activated and the next line in the sequence of program line numbers will appear at the bottom of the screen awaiting input.

CALL LOADs require Extended BASIC and memory expansion.

Typing tutor

The following one-liner serves as a very basic, but effective, typing tutor. The program comes from the TI99/4A users group in Perth, Australia. It requires Extended BASIC and a speech synthesizer.

```
100 REM XBASIC TYPING TUTOR
110 REM SYD MICHEL
120 REM TI*MES AUTUMN 1984
130 CALL CLEAR
140 CALL KEY(0,K,S) :: IF S <> 1
THEN 150 ELSE CALL SAY(CHR$(K))
:: PRINT TAB(16);CHR$(K) ::
GOTO 140
```

Instructions are very simple: just RUN and press a key.

DF MMM

Ron Castleton of Richardson, Texas, notes that Foundation Computing's 128K memory expansion card can produce a directory through TI-Writer.

He writes: "I told Foundation last fall that you can access the Disk Emulator directory by DF (Delete File) out of TI-Writer (i.e. DF MMM) and return by FCTN 9. The staggered line wrap is still readable, if not esthetic, on the TI-Writer MMM. Also, Delete MMM will get a directory out of Multiplan, but FCTN 9 is already assigned, so you get into an endless loop and can't return to Multiplan. Multiplan also only recognizes DSK1-3, so DSKX can be used only for "printing" to disk from Multiplan.

User Notes is a column of tips and ideas designed to help readers put their home computers to better use.

The information provided here comes from many sources, including TI home computer user group newsletters. MICROpendium will pay \$10 for any item sent in by readers that appears in this column. Mail tips to: MICROpendium, P.O. Box 1343, Round Rock, TX78680.

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