

JULY - 1985  
**CLEVELAND AREA 99/4 USER GROUPS  
NEWSLETTER**

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GROUPS' NEWSLETTER ED. - MARK WOODWARD ((561-2967)

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**Executive Notes - Solon**

Last month's presentation these covered various printers and their operation. Several members exhibited and demonstrated their printers...and discussed the strong and weak points of their machines. Print quality,, ease of use,, speed and switch settings were among the topics covered on each presentation. Once again good group involvement and discussion livened the presentation. Thank you all who shared their time, hardware, and knowledge with the rest of us.

July's program will be on speech synthesis. Then, in August, we'll see and hear the MUSIC MAKER module.

Many of you present at the last meeting saw our new "Monitor"; a rebuilt 19" color TV (with remote control). After much shopping Frank Jenkins purchased it (for a sum somewhat under our authorized price of \$200). We (and specifically Jon Lucas) can feel more at ease now, because we no longer have to borrow a monitor or TV from a member.

We have decided to move our P.O. Box from Solon to Shaker Heights, in order to facilitate easier access to our mail. Editor, Mark Woodward, will be able to check the box easily since the P.O. is only a block from his home. This change will take place within the next several months to allow an overlap between the expiration of the old box, and mail directed to the new one. We'll publish the new box number as soon as it is acquired.

It is now becoming apparent within the Solon group that we are getting down to a basic core of 20 to 30 meeting attendees. It is unfortunate that membership and interest has dropped off, but I think this is a reflection of the home computer phenomena as a whole. A computer is an inter-active tool that requires more than just a passive response from the user to make it truly useful. It requires a fair amount of time and energy to get it beyond a fancy video machine or, at worst, a dust collector. I'm afraid that many purchased their computers as toys, and found the effort to go beyond that stage not worth the time. (Look at the survey results in the May Newsletter...games were low on the list). ED. NOTE: I think the acquisition of hardware such as a printer, disk drive, 32K memory...and a few of the sophisticated software programs available will open up a whole new world for

a user, as it did for me.

It is with considerable regret that I must announce that Bill Shannon will be leaving our area. Bill has been transferred to Galion, Ohio. We're going to miss him! Bill did a very fine job as our past librarian, and has helped greatly in his current capacity of Program Chairman. Fortunately, he has promised to return to conduct several programs he planned, for which we're extremely grateful. Best wishes to Bill and his family, and thanks for your devoted service to our group.

See all of you July 13th....Steve Weinkamer, President

SOLON GROUP MEETING... JULY 13th, AT:  
Solon Public Library, Inwood Drive, Solon, Ohio  
Education Session-10:30 A.M. ++ General Meeting-11:A.M.

### TI-Chips Executive Notes

We had another great meeting in June. Attendance has been good at our meetings, so we hope people are getting what they want. Please check your membership cards, though, to see if your membership has expired and renew if necessary. We now have about 61 members.

Steve Latza gave another in his series on FORTH, it was about editing discs in FORTH. Rich Polivka informed us on how to change a program from keyboard controlled to joystick controlled. Thanks Steve and Rich! We look forward to your presentations each month.

Tom and Judy Thalner of Edu-Comp went to the Computer Show in Chicago. Tom advised that there were not many computer hardware people there, mostly software and robotics. He filled us in on the show. It sounded exciting. I also gave us a demo. of Navarone's "Paint and Print" cartridge. It really looked like fun. Thanks Tom!

Our library committee would like to split the library into two sections...disc and cassette. Anyone interested in helping with the cassette section should contact Bernard Gallagher at 351-1265.

Don't forget our picnic in August. We need a few people to plan this event, i.e. location, games, sport equipment, whatever. Please call Bernard Gallagher if you can help organize this our 2nd annual Family Picnic.

Our July meeting will be held at the North Royalton Public Library on July 20th at 10:A.M. See you all there! - Jan Fedor, Secretary

#### -FOR SALE-

WICO Command Control - Trackball...\$25.00  
Call 226-1251 (After 6:00 P.M.)

#### Some Editorial Comments -

Coincident with the Solon groups' June meeting on printers, Consumer Reports (available at many newstands and at your local library) ran an article on computer printers. They followed this up with an article on computer monitors in their July issue, which I recently received. Their approach to the subject is somewhat more objective than that of a computer magazine. As you may know they do not accept advertising, and therefore claim that their judgements are not swayed by their reliance on the almighty advertising dollar. Anyone considering the purchase of the above hardware may find their articles helpful.

Rich Polivka, of TI-Chips, has sent us information on the use of the Joystick port, for other than that for which it was designed. (See below) He has some novel ideas. Chuck Marino, president of the Golden Crescent group, includes information of interest from other group Newsletters, in his report.

I now regret that we didn't ask our membership what TI related publications they subscribed to. In MICROpendium's June issue they have a full-blown review of GRAPHX, (a program Chuck Marino discussed in a recent Newsletter). Assuming that the majority of you do not receive MICROpendium (and you should), I plan to republish it here; and next month, at Frank Jenkins suggestion, we'll include an article on transliteration for the TI Writer, from the same publication. Regarding GRAPHX, I'm going to research my retirement budget for an extra fifty bucks and send it along to the Aussies...maybe it will help jazz up this Newsletter.

A day before I was to take a week vacation, my disk drive (a stand alone original TI unit) went haywire. It wouldn't initialize, or output any programs. I disconnected it, called TI for a trade-in (to no avail), then went on vacation. On my return I called Ken Gladyszewski, of Northcoast, who had offered personal help. Awaiting his arrival, I hooked it up, reversing the connection, which as you may know started it running without a command. Lo and behold, when I corrected my error, the darn thing worked. So-o-o-o, if it hangs in there we'll have a July Newsletter.

All of the above leads to a suggestion from Ken, to the effect that some members have replaced the single drives in their PE boxes with two half-height drives. Thus, someone out there may have a PE box drive handy, that they want to sell...to me, of course. If so, please call 561-2967 and sell me some insurance for the continuance of our Newsletter.

#### CHIPS TIPS

##### PIN FUNCTIONS FOR JOYSTICK PORT

1 2 3 4 5

6 7 8 9

PIN 1- \*NOT USED  
 PIN 2- JOYSTICK 1  
 PIN 3- UP  
 PIN 4- FIRE  
 PIN 5- LEFT

PIN 6- \*NOT USED  
 PIN 7- JOYSTICK 2  
 PIN 8- DOWN  
 PIN 9- RIGHT

BY BUYING A 9 PIN FEMALE D-SHAPED PLUG, YOU CAN BUILD YOUR OWN "INPUT DEVICES". IF YOU CONNECT PIN 2 TO PIN 5, THIS IS THE SAME AS PUSHING JOYSTICK #1 TO THE LEFT (PIN 7 TO PIN 5 IS THE SAME AS PUSHING JOYSTICK #2 TO THE LEFT).

TO BUILD A SMALL BURLAR ALARM, ALL YOU HAVE TO DO IS ATTACH A SWITCH TO ONE OF THE JOYSTICK PINS AND THE DIRECTION PIN OF YOUR CHOICE, AND WRITE A SMALL PROGRAM USING 'CALL JOYST', OR 'CALL KEY' (IF YOU USE THE FIRE PIN RATHER THAN A DIRECTION PIN).

YOU MIGHT WANT TO TRY DIFFERENT SWITCHES, OR A PHOTO CELL SO YOUR COMPUTER CAN WAKE YOU IN THE MORNING WHEN THE SUN HITS IT. I HAVE ATTACHED A FOOT PEDDAL TO MY COMPUTER TO TAKE THE PLACE OF A KEY THAT IS USED OFTEN IN ONE OF MY PROGRAMS.

NOTE: I CANNOT GUARANTEE THE SAFETY OF YOUR COMPUTER IN ANYTHING I HAVE MENTIONED. DO NOT INTRODUCE THE PINS TO ANY CHARGE (STATIC OR OTHERWISE). PROCEED AT YOUR OWN RISK.

# NO JULY MEETING FOR GOLDEN CRESCENT group

by Chuck Mareno

There will be no JULY or AUGUST meeting for the GOLDEN CRESCENT users group. HOWEVER, we will have a MEMBERS PICNIC at MILL HOLLOW PARK on JULY 21st at 1:00 P.M. We will meet at the NATURE CABIN area. so look for us. Those of you who attended last year know we had a good time. We will look forward to seeing you there. Again, we will supply the charcoal for cooking. Come on out and meet some other members and hear the latest information about our fine computer.

## NEW PRODUCTS INFO.

by Chuck Mareno

Judy Thalner of EDU-COMP tells me that CorComp has a new Stand Alone UNIT due for release soon. The new unit will be a Clock/Calendar with a Load Interrupt switch. price to be about \$80 - \$100.

Also, from CorComp, another unit will be available soon, this is a 128K Clock/Calendar Card with a 64K Buffer, also you will be able to remove the speech chip from your Speech Synthesizer and place it in the card

As you can see from the above many exciting things are happening at this time.

Also there will be a very interesting piece of new Equipment on the Market soon, Maybe as soon as August.

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place to put the routines and will adjust the pointer accordingly. After the routines are loaded, a LINK statement starts the first routine and off we go.

If that's not enough for you, you can also use the MINI-MEMORY for 4K more of storage of assembly routines! Now that's 16K of program space, 12K of assembly routine space

The above is taken off the boards by Scott Darling  
72366,714

4.

make  
a note  
of this



## 24K OF DATA STORAGE

by Chuck Mareno

If you need to work with quite a bit of data or would like to change programs, but save the data after you press CALL QUIT then you can set up the 24K of High Memory in the PEB as a single data file called "EXPMEM2", you open this file just as you would a disk file with one exception - you must PRECEED the OPEN statement with a CALL LOAD to the location -24574 as follows:

For INT/VAR files - 24  
For DIS/VAR files - 16  
For INIT/FIX files - 8  
For DIS/FIX files - 0

Here is an example:

If you want to open up the Expansion Memory for Display, Variable 80 files this is what you do:

```
100 CALL INIT
110 CALL LOAD(-24574,16)
120 OPEN #1:"EXPMEM2",RELATIVE,UPDATE,DIS
PLAY,VARIABLE 80
```

Then continue on as you normal would.

If you want to store both data and assembly language routines at the same time do this:

```
100 CALL INIT
110 CALL LOAD(-24574,-16)
120 OPEN #1:"EXPMEM2"
130 CALL LOAD ("DSK1.ASSM1")
140 CALL LOAD ("DSK2.ASSM2")
150 CALL LINK ("START")
160 REM CONTINUE REST OF THE
PROGRAM
```

In the above example the 24K of high-memory was saved for use as a DATA file (DIS/VAR 80 format) then the assembly routines were loaded. The computer will look for the best

## NEW ITEMS

by Chuck Mareno

**EXPLORER!!!!!!!!!!!!**

**YOUR WINDOW INTO THE 99/4A**

Have you ever wondered how CALL SOUND, CALL SAY or the GPL Interpreter actually works? Or how Parsec sets up and scrolls its bit mapped screen? Or exactly what Extended Basic is doing when you type in LIST or RUN and it executes a program? Or how about the Interrupt Routines?

Imagine what else you could LEARN if you had an instrument that gave you total control over the microprocessor in your computer and you could stop and start it at will, at any point in a program or module and it allowed you to examine and change memory, or any of the registers or Cru Bits

Well stop imagining because the Explorer turns your 99/4As into that powerful Instrument and Learning Tool! The heart of the Explorer is a machine language interpreter that thinks its a 9900 microprocessor. This allows you to be in TOTAL CONTROL of the application program so You can watch the Explorer's Main Screen with all of its dynamic information or flip to the ACTUAL Program Screen running in slower motion under YOUR control.

Along with ALL the other items on the Main Screen, You can also track up to 3 Dynamic Memory Windows for any area of CPU Memory, VDP Memory or GROM/GRAM Memory, in any one of 4 sizes. You can also Track, Display, Edit and Search any area of memory in Hex, ASCII and in ASCII with Basic Bias. This powerful interpreter also allows you to lock in Break Points for ROM or RAM, Any VDP Write or Read and Any GROM or GRAM Memory access. And, at any time, You can easily modify any of the items on the Explorer's

Registers Screen, the GPL Status and VDP Registers.

The number converter on the Explorer's Options Screen uses the same mathematical logic as the 9900 microprocessor. It will Add, Subtract, Multiply, Divide, AND, OR, XOR or NOT numbers in all three, Decimal, Hexadecimal and Binary, number bases at the same time so you can easily calculate what's going to happen next, before it happens. And, Yes, it will convert negative numbers into their CALL PEEK or LOAD addresses.

To further assist you, and help explain what is going on, the actual 9900 source code for the next instruction to be executed is displayed. Also, the ENTIRE Main Screen is Dynamically updated after each and every instruction is executed, so you can examine, learn and control it step-by-step or TURN IT ON and watch it GO!!

This is an extremely easy utility Instrument to use with its Function and Control Keys, Binary Switches, and its Full Screen Edit Control fields. It also includes a function key strip and an extensive 100 pages of documation complete with Step-By-Step Explorations, Memory Maps, Register Information and Cru Bit Assignments.

The ABOVE is information from Miller Graphics.

Expanded System Requirements  
Extended Basic or Editor  
Assembler or Mini Memory  
Merory Expansion and a Single  
or Double Density Disk  
Controller System

Price 24.95

Available in July 1985

A big thank you to Dan Davenport for conducting the June meeting in my absence. I took my own advice and attended another TI club's last meeting before summer adjournment. It just so happened that our meetings coincided that month.

Chuck Mareno and I went to see and get information about some of the things that we had heard about. These are:

- 1) addition of 8K RAM to the editor-assembler module (featured in the June issue of MICROPENDIUM--now a publication of 40+ pages)
  - 2) addition of 32K RAM to the console thereby eliminating the need for a memory expansion card
  - 3) demonstration of a RAM disk card (disk drive emulator--will allow much larger programs to be run by chaining them together through Extended Basic)
- Everything we had heard was true and more! All of the above are possible due to a fairly new memory chip which has dropped significantly in price (from \$50 to under \$10 and still falling). A limited number of copies of information about items 1 and/or 2 will be available at the next meeting or by sending me a SASE.

Another big thanks to Martin Smoley for his clever Chinese puzzle system enclosure. We are now trying to do it justice by staining this beauty and should have it soon for all to see!

The bulletin board has been running fine for close to a month and I have made many small improvements to it with many more to go; I welcome all suggestions. This is a great way for us to exchange the latest information. Some of the current messages include: buys on disks and flip & game boxes (for cartridges). Those of you with RS-232 for printers should seriously consider a modem. Not only can you access bulletin boards but you also can exchange programs by phone! I do it all the time--saves a lot of gas and postage.

Tom Nellis (475-4067 after 6 PM) is interested in starting a special interest group for the mini-memory. I think this is a great way for any of us interested in machine language to get started--most of us know little about this and we would all be at the same entry level.

Those interested in building the super cartridge expander--please be advised that I discovered that the schematic is not complete. Please call me before proceeding. We do have a working model thanks to Joe Prikockis. It will be improved and re-done by me for the next meeting, Saturday July 20th at 1:30 PM.

Library news--the catalogs have been printed and are available thanks to the Zupkos. Due to time constraints I have asked Larry Prikockis to take over the library at least for the summer. He is busy pulling it all together and sorting the new material for cataloging. Already cataloged programs will be available for copying at our next "meeting" which will be a software/hardware swap session.

Many of us have been busy taking advantage of the freeware available. This is a chance to give and get some of these great programs. I encourage our members to bring these programs, their computers, and some initialized disks. Please call John Murcer (845-8817) or myself if you would like to reserve a table for your computer and/or sales items by Tuesday, July 16th.

Lastly, for those interested, I have Robert Van Etten and Jim Cline's new addresses.

(Continued from Page 4)

The program is also exceptionally enjoyable to use, letting even those of us who can't even draw a straight line create exceptional quality pictures in 15 brilliant colors. For a mere \$50 this program exceeds the specifications of MousePaint (\$135) on the PCjr, and many other programs. If you have a professional or casual interest in graphics, this program is for you. Next to TI-Writer, I personally use no other program more.

Ken Gladyszewski (357-7274)  
President

P.S.: WE ARE IN NEED OF A USED INEXPENSIVE  
PRINTER FOR THE BULLETIN BOARD....AN OLD  
THERMAL JOB WOULD BE JUST FINE. - KEN



# A full-service graphics package

By CHRIS BOBBITT

For better or worse, there aren't very many truly useful programs available for the 99/4A.

This is really a shame considering that before most people bought the machine, they had some particular purpose in mind—a productive task that could be made simpler with the use of a computer.

Most, even those with the best of intentions, have ended up using the computer solely for entertainment. This is usually because most people can't locate software that enables them to do something on the computer that they can't do elsewhere much easier.

Fortunately, there are a few exceptions. TI-Writer, Multiplan and a number of third-party word processors, mailing list programs, terminal emulators and database programs are excellent tools that make computers productive. These are tools that make your machine more than just a sophisticated Colecovision by turning it into, for a time anyway, a true "productivity tool."

In the area of computer graphics, the category of "productivity tools" is nonexistent. Most other machines have programs that are useful for creating business graphics, incorporating graphics into text or performing even more esoteric but useful tasks. The TI99/4A, in part because its graphics are harder to manipulate, hasn't inspired similar applications programs, at least until now. I'd like to introduce GRAPHX, which is truly, as the subtitle states, "The Ultimate Graphics Software."

This Australian import is different from the myriad of other drawing programs and peripherals available for the 4A. It can be used for something other than creating pretty pictures, even though it can do that too. This program can be easily used to make near typeset-quality text in an infinite number of fonts, create logos and advertising material (even whole ads)

## Review

### Report Card

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

Cost: \$50

Manufacturer: R.L. and C.P. Davis,  
P.O. Box C568, Clarence Str., Sidney,  
Australia, 2000

Requirements: Console, monitor or television, expansion memory, Extended BASIC or Editor/Assembler, disk system, Epson Mx-80 or compatible printer recommended

and create detailed scientific and business graphs and charts.

Performance: GRAPHX comes on a single disk, and can be loaded through either the Editor/Assembler or the Extended BASIC cartridge. It takes about as long to load this program as the others. (In other words, count on sitting around for about a minute or so

until the program is ready to go.)

After loading, the program draws a fantastic title screen, consisting of a detailed drawing of a 99/4A console and monitor, and an ever-changing monitor "screen." If you could sit and watch, you would see 16 different pictures, from a furry koala bear to a fine drawing of the Space Shuttle, displayed on the drawing's monitor. The program continues to display these pictures until a key is pressed.

After the user presses any key, the screen clears, a star-shaped cursor appears and a little help message is displayed at the top of the screen, indicating to the user that he or she should press any of the program's function keys. The 10 most often used functions of the program are accessible by pressing any of the number keys. The remaining functions are available through a series of pull-down menus that can be accessed by pressing the "=" key. After the menu key is pressed, the menu scrolls down (while carefully preserving your picture underneath it), and an option of the menu is highlighted in a different color

(Please turn to Page 8.)



MADE ON GRAPHX IN LESS  
THAN 3 MINUTES FROM  
STORED CLIPBOARD FILES  
AND A LITTLE WORK!

# MICROpendium

(C. BOBBITT)

## POWERFUL 'ZOOM' OPTION—

(Continued from Page 36)

(green). To choose an option, highlight the appropriate choice by moving the joystick up or down, and then by pressing the "fire" button. The program uses no other keys; one never has to touch the FCTN, CTRL or SHIFT keys while this program is running. Most input is by joystick, except for those 11 keys at the top. Except for Super Sketch, this program probably has the least complicated of any of the drawing programs.

GRAPHX has a lot of features that set it apart from the other graphics programs. However, the whole genre carries some similarities. Like all graphics programs, it permits the user to use a joystick or other input device (keys, etc.) to draw on the screen in any of the 15 available colors. Like most graphics programs, it can be used to change the color of objects, change the screen colors, fill shapes and erase objects. Like some, it can be used to draw lines and other mundane shapes, and it can save and load pictures from diskette. And like a few, it contains a built-in, Epson-compatible screen print option. However, this particular program contains some features never seen in a program like it for the TI99/4A.

First of all, the program has a powerful "zoom" option. When the "6" key is pressed, a little window-shaped object appears on the screen. The window can be moved to any place on the screen simply by pulling the joystick in the appropriate direction. When the "fire" button is pressed, the portion of the drawing in the window instantly becomes four times larger, and fills the television or monitor screen. This option is excellent for fine, detailed work where a single extra pixel may throw off an entire picture. In the zoom mode, the cursor can be set to any of the five available speeds, and one can draw or erase pixels with the joystick at will. To leave this mode, simply press "6" again, and the screen becomes normal, with all changes implemented. The speed of this routine is spectacular.

GRAPHX also has one of the best line and circle drawing functions ever. Lines and circles are created with a "rubber-banding" method. In other words, a line or circle appears on the screen after "8" or "9", respectively, is pressed, and the shape can be stretched, flattened, made smaller or made larger by moving the joystick in the appropriate direction.

To choose, and thus draw, the desired shape, simply press the "fire" button. An added feature; circles, once their shape has been decided upon, can be moved anywhere around the screen before being placed permanently. This is useful for creating complex figures. The shapes and sizes of the circles and lines are for all purposes infinite.

This program has two features that every graphics program should have but none else do, the ability to move or copy any portion of the screen in either black and white or color. It's very simple to operate. After the "9" key is pressed, a short menu appears. After any of the four available move or copy options is selected, a 16x16 pixel box is displayed on the screen. The box can be made larger or smaller simply by moving the joystick. The user has a choice of four box sizes, 16x16 pixels, 32x32 pixels, 48x48 pixels or 64x64 pixels.

After a size is chosen, the box chosen becomes mobile. It can be moved anywhere on the screen simply by pushing the joystick in the desired direction. After it's on the desired portion of the picture, simply press the "fire" button. A black shadow of the portion of the picture to be copied or moved appears in place of the box. Depending upon the option chosen at the short menu, one of two things happens. If in the copy mode, when the shadow is moved with the joystick, the original remains. Using the joystick and the "fire" button (used to drop the picture), one can place an infinite number of copies of the shadow all over the screen before returning to the short menu. If in the move mode, after

the shadow is moved a blank area remains where the portion of the picture was removed. To drop the shadow in its new location, again press the "fire" button. These two functions are extremely utilitarian and have a distinctly useful purpose.

The features already listed would be enough for almost any graphics program on the market today, and with the exceptions of the move and copy options, there are graphics programs that duplicate each and every one to some degree. However, this program wouldn't be a true productivity tool if it lacked the last, but most important set of features: the "clipboard" options.

The clipboard, simply put, is an alternate area of memory where many small pictures, even special alphabets and clip art, can be stored until needed, separate from the picture seen on the screen. This file of pictures can be saved and loaded separately from the screen. Thus, the user can build up a library of thousands of fonts and pictures that can be copied anywhere onto other pictures at any time.

All the clipboard features are accessible through a sub-menu of the main menu. Every conceivable option was included. The user can save or load clipboard files from disk, view clipboards without disturbing the picture, put copies of the pictures in the clipboard file any place on the screen, put pieces of the picture on the screen into the clipboard file and delete certain pictures in the file or the entire file. The program is provided with a number of example clipboard files, including computer, gothic and normal letter fonts, and two animation sequences (more on that later). Letters or pictures are placed on the screen simply by selecting the desired picture by leafing through the clipboard, and then by moving the selected object to the desired destination. Shades of MacPaint!

With the clipboard the user can even experiment with computer anima-

(Please turn to Page 9.)

## SHADES OF MACPAINT—

(Continued from

tion—not the sprite variety but instead that used to make movies; in other words, one frame at a time. After drawing each frame in the screen, simply remove them to the clipboard in the desired order (they are placed sequentially in the file from the first removed to the last), and use the “see” option of the clipboard menu to look at them. You can leaf through the frames at a constant rate of about three or four per second by simply holding the joystick pushed forward. The clipboard will hold about 64 16x16 pixel pictures, 16 32x32 pixel pictures, seven 48x48 pixel drawings or four 64x64 pixel ones. Of course, you can save pictures of various sizes in the same file.

GRAPHX has a number of miscellaneous functions worth mentioning—a typewriter mode where you can move a cursor any place on the screen and type uppercase letters anywhere (great for labeling), a print option that allows screen dumps in two sizes and two densities, the five-speed cursor, an option to turn off the ever-present help lines temporarily, an erase option that puts grey blocks in a checkerboard pattern all over the screen and much more.

I've been using this program for two months now, and except for one minor bug, every function seems to work perfectly. The bug? In zoom mode, the eight pixels in the upper right corner are always transparent, even though they are really another color in the regular mode. It's not a disabling error, just mildly irritating. I have only one other minor complaint which really isn't very fair to the program. I wish it had a catalog disk option (even though none of the others do). This is mainly because clipboard files tend to proliferate like rabbits. A number of times I've had to quit the program in order to catalog my data disks to find the one containing the file I need.

**Ease of Use:** GRAPHX, unlike the grandfather of graphics programs, Draw-A-Bit (and unfortunately some of its progeny), is very simple to use.



The only keys used by the program are the 11 in the top row, the various letter keys and ENTER for such things as entering filenames and in the typewriter mode. All other functions are available through those fascinating pull-down menus and the joystick.

The documentation of the program recommends that the user make a function strip for the top row—and even gives a sample diagram of what it should look like. With this function strip and a good joystick, and by following the multitude of “help” prompts, this program is exceedingly simple to use. Despite the program's simplicity, you can create some really complex graphics scenes the equal of the best made with other graphics peripherals or programs. With the addition of the numerous functions and menu options described, this program is a first class drawing program, almost as versatile and nearly as sophisticated as the \$1,000 Auto/CAD program for the TI-Pro. It's also a heck of a lot cheaper and so much easier to use.

**Documentation:** The manual provided with this program is almost unnecessary. Despite this, it's probably one of the best manuals for any program on this computer or any other. The manual provides instructions and exercises for learning how to use the program, and it's very useful as a

detailed reference source on the operation of all its options.

For the first-time user, the manual contains numerous diagrams and printouts from the program itself to explain options. It includes very understandable descriptions, and even lists possible uses of options, yet remains completely comprehensible. For the technical user interested in adapting pictures or clipboard files into his own assembly programs, the documentation includes a considerable amount of pertinent information. The program disk even includes the assembly language source code for a program to read and display saved picture files. The manual is professionally done.

**Value:** As mentioned, this program is the first “productivity tool” for graphics for the 99/4A. If you own a business, work in an office, or need to prepare reports for school, this program will meet and perhaps exceed your graphics requirements. It can create beautiful charts and graphs, fine title displays suitable for photocopying, quality text in any conceivable font, diagrams and pictures suitable for business and school as well as scientific work. If you are a professional artist, it may not meet your total graphics needs, but a suitable system for an artist may cost thousands of dollars.

(Please turn to Page 6.)

**NEWSLETTER SUBSCRIPTION ONLY:**

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