

TANDY

The CoCo Column

by Dan Robins

It's hard to believe that another year has passed by, and to some rather quickly. All in all, it was a good year for the Color Computer. Many vendors released some fantastic new software for the Color Computer 1, 2, and 3, and we got a look at the awesome power of OS9 Level 2. Some may think that software development was slow, but I always reflect upon the early days of the CoCo, where we waited nearly two years for some fantastic software to surface. With Radio Shack discounting the Color Computer 3's price by nearly one hundred dollars for the Christmas season, I think we will see the number of users increase significantly, and 1988 being a banner year for the CoCo. In this month's ar-

title, an interview with a teenage CoCo whiz and a look at some of the software he has written, some reviews of RSDOS software, and some OS9 programming hints.

The Whiz Kid

There was a television show called "The Whiz Kids," featuring one teenage boy who was quite computer literate. As a matter of fact, in nearly any episode, he usually got them out of some predicament with the use of a computer. As the author of many CoCo programs, 16 year old Chris Babcock reminds me of that lad, and amazes me at his knowledge of the Color Computer and the 6809 microprocessor. He began programming in BASIC around 1981 on an Apple computer. He then progressed to

a Radio Shack Model 1 and a TI 99/4A. In 1983, his father purchased him his first Color Computer, and he spent many hours behind the computer using EDTASM (the CoCo assembly language editor/assembler), looking at other author's assembly language source code, and reading books on the subject. Chris also hinted that if you would like to learn the "insides" of what makes the CoCo tick, you should also go this same route. Included with this month's article is the source code for Chris' HIRESCOM commands, three new commands for the Color Computer 3, which allow you to save and retrieve high resolution pictures to disk. Another command will allow you to switch between screen modes without clearing the picture screen (which will occur if you use the normal HSCREEN command). Our thanks go to Chris (and his father, Don) for allowing *Computer Shopper* to publish this source code.

The Whiz At Work

For Chris Babcock, it was his first commercial piece of software for the

Color Computer 3, and Basic Freedom gives you exactly what its name implies. After installing Basic Freedom you enter the full-screen edit mode by typing "EDIT ON" or by pressing the "F2" function key. Once on, you may take the cursor anywhere on the screen with the use of the arrow keys. You can delete portions of a basic program line by pressing the "SHIFT" and left arrow key, and expand the line with the "SHIFT" and right arrow key. Merging lines is very simple, too! One of the unique and nicest features of Basic Freedom is the listing facility. Let's say I want to list line numbers 10, 100-150, and 30, and in that order. With the editor on, the command line would be "LIST 10,100-150,30." I have yet to see any other editors with this ability. Basic Freedom is a steal at \$27.95 for the tape version, and \$29.95 for the disk version, and will work on any of the Color Computer family. Additionally, there is a Color Computer 3 version available on disk for only \$29.95, and is available from Dr. Preble's Programs, 6540 Outer Loop, Louisville, Kentucky 40228. FastDupe 512 (also known as Backup Lightening) is one of the fastest backup utilities I have ever used. Chris must have had the customer in mind when he wrote this program, not only for speed but for ease of use. As you being this program, you may read in file which has all of your duplication specifications already preset, or you may answer a series of specifications on what you would like done. FastDupe 512 will read in either one or two sides of the diskette into memory for the duplication. You are not limited to one backup, as there is a setting for multiple backups. Additionally, the program formats each disk before it places the information in memory onto the diskette. FastDupe 512 is available for \$19.95 from Spectrum Projects. If you use your printer quite often, and it lacks a buffer device, then you are well experienced in twiddling your thumbs waiting for the job to finish printing. Along comes Big Buffer! Chris wrote this utility for the 512K Color Computer 3, and once installed, it gives you a printer spooler of 437,888 bytes. That works out to around 200 pages of text! This means that you can send the information to be printed to the spooler, let it do all the work of printing your document while you go on to something else. Also available from Spectrum Projects, Big Buffer is only \$19.95. I have seen several attempts at utilizing the 512K CoCo 3's memory to add RAMdisks to this system, but none came even close to the job Chris did with RAMdisk. Once you have installed the RAMdisk program, you may use your normal disk drives (Drive 0 to Drive 3), and then add TWO 68 granule ramdisks named Drive 4 and Drive 5, respectively. The program allows you to rename your drives into whatever configuration you wish. Although I did not try the two together, the documentation indicates that you may use RAMdisk and Big Buffer together. At \$19.95, RAMdisk is a bargain. RAMdisk is offered by Spectrum Projects, and for more infor-

TEXAS INSTRUMENTS

TI Forum

by Ron Albright and Jonathan Zittrain

The first column of the year usually presents itself for at least a brief recap of the events of the past year. All in all, 1987 was a good year for the TI user community. Continued interest in the 99/4A computer spawned the largest number of regional and national gatherings in the history of the machines. Fairs were held, admittedly with varying degrees of success though usually good, in Seattle, Washington, D.C., Boston, Milwaukee, Los Angeles, New Jersey, Delaware, Pennsylvania, and, of course, the father (or mother, depending on your perspective) of them all, the 5th Annual Fair was held in Chicago. The long-awaited Myarc 9640, dubbed the "Geneve," was on the market in the spring. Initial reviews have been mixed. Criticisms have primarily centered on the lack of a complete software package to support the machine. As of this writing, version 0.9 of the MDOS software is out and about and appears to be quite near completion, with abilities to do many of the functions familiar to MSDOS users—batch files, DIR, ERASE, TYPE, etc. The software developers, headed by Paul Charlton, are to be congratulated on a monumental achievement in programming. When one considers the immense resources MicroSoft had at its disposal in writing the first versions of MSDOS, and compare those to what Myarc is working with, the accomplishment assumes an even more remarkable stature. Regardless of what criticisms may remain about the Geneve, even the detractors seem to agree that the potential of the Geneve is significant. The nagging question

often debated is to what extent this potential will be realized. If Myarc can attract additional third-party software houses to write or convert existing software to run on the 9995 command set and make use of the machines unique graphics capabilities, then the computer can be a wide success. Only time will answer the question. Several other hardware and software developments were also seen in 1987. Most notable was the Triton XT (see review in the December *Computer Shopper*) and the Rave keyboard upgrade, which freed the TI user from the confines of the 2/3 size keyboard. The major software houses, Asgard, dataBiotics, Genial ComputerWare, and others, continued to produce new, primarily productivity packages for the TI. Few games ("High Gravity" from Asgard being one exception) made their debut in 1987, a sign that the TI user has matured to the stage of using the 99/4A for word-processing, database applications, and other traditional work applications. Notable in Fairware was Travis Watford's "Omega" terminal emulator package which, for the first time, allowed TI telecommunicators the luxury of viewing "run-length encoded" (RLE) graphics online, as well as programmable keystrokes. Communications networks continued to be a major resource in 1987. CompuServe's TI Forum and GENIE's TI Roundtable remained hotbeds of information and program exchange. The *Computer Shopper* opened an online shop on Delphi and Jeff Guide and Art Byers spearheaded a revival of the TI Information Network on that system. Both the CompuServe and GENIE networks opted for "free uploads" (no charges are incurred while uploading

programs to the system) and opened the doors for an increase in the availability of "Fairware" and public-domain programs on these systems. Electronic conferencing on these national systems greatly enhanced the flow of information across geographic boundaries. The major TI-specific publications—MICROpendium in print form, and Genial's "Diskazine" on disk—continued their support for the 99/4A. User Groups held onto their role as the life-stream of the TI user base. Though membership roles saw some declines (See JZ's "Insight: The Users Group," in the August TI Forum), the activity and output maintained a high level. The newsletters that pour into the TI Forum clearly reflect that standard of excellence. User groups are the driving force behind the continued existence of the TI community. Without their hacking, programming, and newsletter output, things in the "orphanage" would come to rather abrupt halt. Their unshakable dedication chutzpa is a source of wonderment and respect.

There were a few notable and sad passings in the TI world in 1987. Most noticeable was the discontinuation of, perhaps, the only true "institution" we have. After 4 years of monthly publications and free circulation to user groups, Jim Peterson's "Tips from the Tigercub" was ended. The old Tigercub (Jim) decided it was time to do a little fishing and relaxation and let the newsletter, whose monthly programming pearls were reprinted more often and by more newsletters than any other source of TI information ever, lapse. While we understand,

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Jim, we still miss the challenges, the one-liners, and the programming tutorials. Enjoy the fishing and may your line always be taut with one that can't get away. The meteoric life of the "Gram Kracker" from MG was another sad passing. Bursting on the scene as the first device to allow the user to reprogram the entire console chip set and cartridges as well, including GROM-based ones, the ingenious "Kracker" shot into the TI marketplace with a flurry of activity

and hacking. Then, due to rising chip prices and other concerns, the little wonder was taken out of production. The hopes of many that its production would be picked up by another firm have remained unfulfilled. But, for that one brief moment, the "Kracker Hacking" was thrilling to watch, as the "innards" of the whole 99/4A machine was opened for all the world to see and change.

1987 was a shakeout year for the /4A user. The predictable decline in

numbers of machines in use was compensated for by the activity and productivity of those that remained. There is a sense of watchful anticipation on the future development of Myarc's Geneve. If the TI community is to receive an infusion of new users, there must be a major upgrade. If its potential is nurtured, the Geneve may fill that role.

Starting 1988 With A Bang!

To give 1988 a proper start, the annual "TI Fest West" will kick off the New Year with a new location and an extended schedule. According to John Martin of the Southern Nevada User Group ("SNUG"), this Fest West

(dubbed "TI-XPO-88") will be held in Las Vegas on February 27 and 28 at the Palace Station Hotel and (get this!) Casino. Planned are guest speakers, hardware and software demonstrations, a programming clinic, door prizes, and more. The XPO organizers are doing it up right by providing reduced rates for rooms at the Palace (\$42/night for single or double occupancy) and reduced fares on Pacific Southwest Airlines to and from Las Vegas. It should be a blast. It is my understanding that the XPO is being cosponsored with the Los Angeles User Group and that group's expertise will

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ATARI

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disk drive. I want to hook all my computer components to one main power switch so that I can turn everything on with one flick of a switch (all the power switches of each component would be left "on"). This would mean that I would need to place my disk in the disk drive before I turn the power on, or else the computer would start—"BOOT ERROR...BOOT ERROR...BOOT ERROR" etc. Now my question: I have heard conflicting stories that it is either safe, or unsafe, to turn the power on when a disk is in the drive. What's the story? My friend swears that she destroyed a disk by doing just that. At work, though, I've been doing that for years with no problems. I would appreciate your advice.

S. Markman
Norfolk, Virginia

Leaving a disk in an Atari 810 or

1050 disk drive and turning the power on and off is NOT RECOMMENDED. Atari drives (as well as some others) when turned on or off often send enough of a surge to the engaged read/write head to damage a portion of the disk. Whether or not the diskette will then be usable depends upon how much of a surge the read/write head received and the location of the head with respect to the disk when the power is turned either on or off. I have received numerous letters from readers who have suddenly found one of their diskettes or a commercial diskette wouldn't load, and in many cases these readers admitted to leaving diskettes in the disk drive. Also, I have personally had programs damaged or destroyed after power outages. The disk does not need to be spinning or "busy" for damage to occur (although leaving power when

the drive is writing is almost certain to be damaging).

You can go ahead and plug all of your components into one power switch, but just be sure the disk drive is on before you insert your diskette, and not vice versa. Even if the screen begins to show "BOOT ERROR" (when the power switch is initially turned on and the drive has no diskette in it) you can insert your diskette at this point and it should commence to load normally. Better yet, continue to use the power switch on your computer in addition to your main power switch (which would send power to your disk drive, printer, modem, monitor, etc.), insert the diskette into the drive and then turn on the computer itself. This practice may even make it more convenient or easier to remember when you have to hold down the OPTION key.

Dear Jeff:

I sent for and received information for the Ramcharger from Future Systems (formerly Indus). I am still deciding whether or not to buy it. I have not seen any reviews on the Ramcharger. I would like your opinion of Ramcharger. (The Ramcharger is a CP/M emulator for the 8-bit Atari computers with Indus disk drives.)

Cal DeGroot
Rock Falls, Illinois

I have not used the Ramcharger, but if any readers are using the product and want to comment on it, I'd be glad to lend some column space.

Newsletters

The PACUS Report is the newsletter of the Packerland Atari Computer Users Society (\$15/yr, 2714 South Eleventh Place, Sheboygan, WI 53081.) The October 1987 issue contains an informative article on the features and bugs of the Atari BASIC, a player/missile graphics tutorial, game reviews, and an article on SPRITES in GFA BASIC for the ST.

RUNES is the newsletter of the Midwest Atari Group, Iowa Chapter (\$15/yr, P.O. Box 1982, Ames, IA 50010-1982.) The September issue contains Atari news, a review of Ace of Aces, and an article on a 1050 repair.

The September 1987 issue of JACG, the newsletter of the Jersey Atari Computer Group (\$25/yr, 8 Crescent Road, Pine Brook, NJ 07058), contains game reviews, Atari news, a review of the

UPRINT interface/buffer and a light-pen project.

The Sourcerer's Apprentice is the newsletter of the MAGIC, the Michigan Atari General Information Conference (\$15/yr, 28111 Imperial Drive, Warren, MI 48093). The August 1987 issue contains a machine language string utility, articles on choosing software and on Atari controllers, plus ST section.

The September 1987 issue of POKEY, the newsletter of the Western New York Atari Users Group (\$15/yr, P.O. Box 59, Buffalo, NY 14216) contains a tutorial on ACTION!, and book and software reviews.

Hard Disk Newsletter

The Hard Disk User Group newsletter is a unique publication for 8-bit and ST owners who use hard disk drives (\$18/yr, quarterly issues, Network: HDUG, 5831 Sun Bay, San Antonio, TX 78244). The October 1987 issue (volume II) contains articles on ICD's "ST Host Adapter," interviews with BBS Express' professional author Keith Ledbetter and Z-Magazine editor Ron Kovacs, a hard disk question and answer section, and a comparison of 8-bit BBS software. The hard disk advertisements are interesting as well.

Daisy-Dot II

The Command Headquarters BBS, ([216] 758-0284) has improved upon Roy Goldman's Daisy-Dot program to produce Daisy Dot II, an even more exciting public domain printer utility. Daisy Dot II lets you print in near-letter-quality with your Epson, Gemini, ProWriter, or compatible printers and supports underlining, double width, incorporating picture files, using multiple fonts, etc. See Figure 1 for a sample printout.

Next Month


We'll have more reader mail, Atari news, and some surprises, too. Stay tuned.

Readers' questions, comments and contributions are welcome. Please enclose a self-addressed, stamped envelope for a personal response. Due to volume of mail, only a selected number of personal responses can be answered each month. Address all correspondence to: Jeff Brenner, "Applying The Atari 1/88", c/o Computer Shopper, P.O. Box F, Titusville, FL 32781.

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Figure 1

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be included in organizing as well as running some of the tutorials and demonstrations. With the likes of Tom Freeman, George Stefan, and others, that expertise is extensive. For more information, contact John Martin (702-647-1062) or Bob Bieber (702-878-3167) or use the SNUG BBS at (702) 648-1247 (24 hours, 300/1200 baud). What a great start for the year! If you have memory expansion and

the Extended basic cartridge, type in the following and type "RUN."

100 CALL LOAD(12296, 2, 0, 3, 240, 2, 1, 48, 0 2, 2, 0, 8, 4, 32, 32 36, 4, 91)::CALL LINK ("CURSOR")

Meow!

Listing 1 is a much-published program to print mailing labels for diskettes. There are no warranties that it will lead to any different handling in the mail, but, if you have occasion to use the post to exchange diskette software, you might find this useful. It

serves as a nice example of how to send printer codes to your Epson-compatible printer.

The Mailbag

We received several new (at least to the TI Forum) newsletters from user groups. The "CC99'er" from the Corpus Christi User Group (534 Vaky Street, Corpus Christi, Tx 78404), the "ROM Newsletter" of the User Group of Orange County (17301 Santa Isabel Street, Fountain Valley, CA 92708), the "MAD HUG" newsletter from the

Minnesota and Dakota Home User Group (509 Reeves, Grand Forks, ND 58201) and the "SMAUG/99 Newsletter" of the South, Mobile, and Alabama Users Group (Rt. 4, Box 23, Brewton, AL 36426) all found their way to the TI Forum mailbox. Thanks for sharing your fine publications with us at the Forum.

Winding Down

No software prizes this month as the coffers are, finally, bare. Hopefully, there will be a continuation of the giveaways in the future. Again, if you want information on any of the products or services mentioned in the TI Forum, be sure to send a stamped, self-addressed return envelope. Due to the volume of the mail, that is the only way we can make individual replies. In future columns, I hope to begin a series on the mechanics of telecommunications—how modems and systems work—as well as the usual product news and reviews.

JZ's Part

Genial Computerware Introduces "Remind Me!"

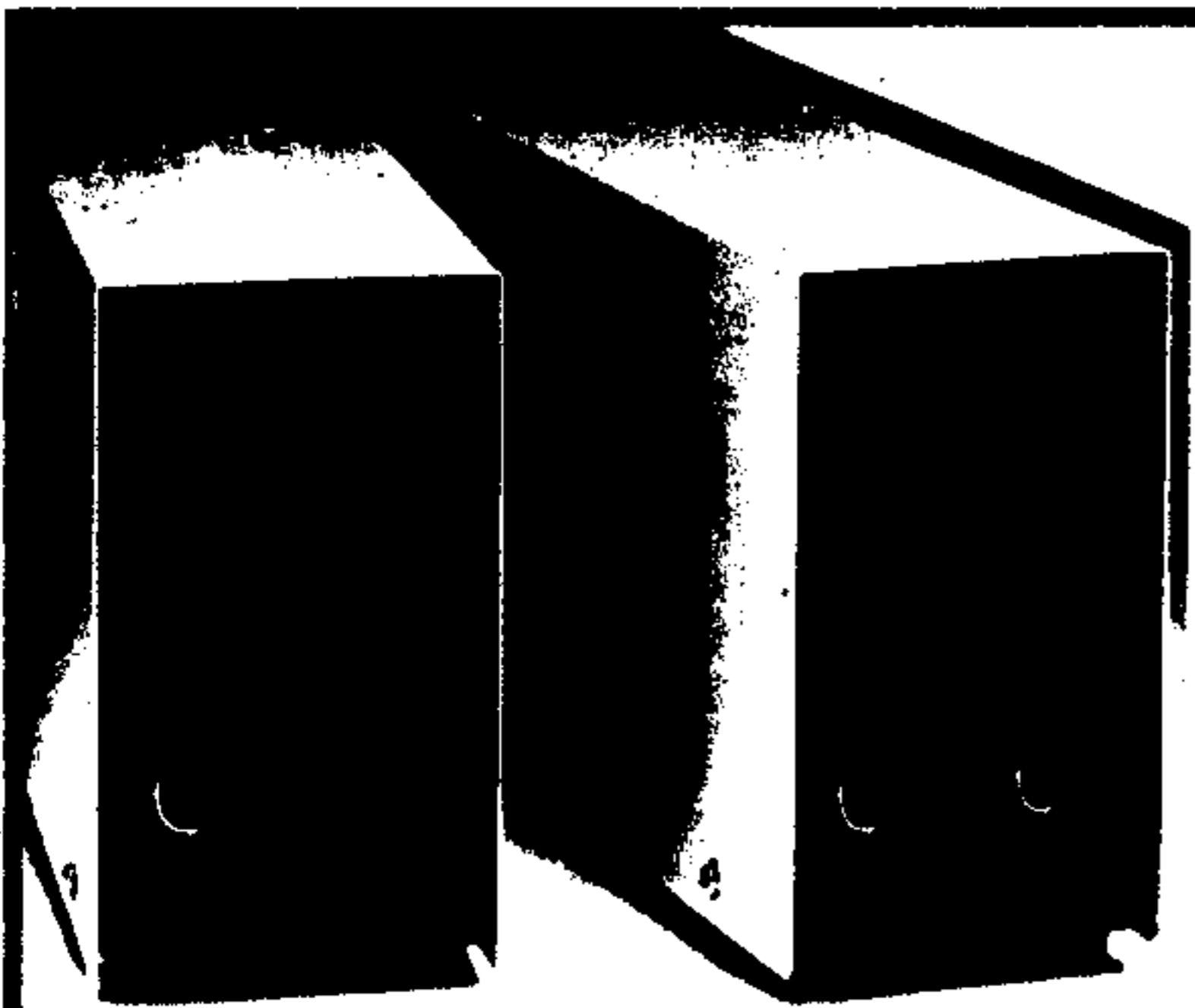
Genial Computerware (Box 183, Grafton, MA, 01519) is offering a new program called "Remind Me!"

The program, written by John A. Johnson, stores calendars representing various months of the year on disk and allows the user to enter information for each day.

The program's best assets are speed and user-friendliness. Disk access is kept to a minimum (only as a new month is called in is the disk used) and the code is assembly language.

Remind Me also interfaces with most of the available clock/calendar cards for the TI-99/4A or Geneve so that the date and time need not be manually entered for each run. Supported cards include CorComp's Tri-

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Figure 1

**DO NOT BEND
FLOPPY DISK ENCLOSED
DO NOT XRAY**

```

100 *****
110 *
120 * DON'T LABELS *
130 * BY: Ron Rutledge *
140 * Central Iowa UG *
150 *
160 *****
170
180 ESC$=CHR$(27)!
ESCAPE CODE
190 EMP$=ESC$&"E" !
EMPHASIZED PRINT
200 NOR$=ESC$&"W"&CHR$(0)!
NORMAL PRINT
210 ENL$=ESC$&"W"&CHR$(1)!
ENLARGED PRINT
220 UON$=ESC$&"-"&CHR$(1)!
TURN UNDERLINE ON
230 UOF$=ESC$&"-"&CHR$(0)!
TURN UNDERLINE OFF
240 OPEN #1:"PID"
250 PRINT #1:EMP$&ENL$&UON$&
"DO NOT BEND"
260 PRINT #1:NOR$&" FLOPPY D
ISK ENCLOSED!"
270 PRINT #1:ENL$&UOF$&"DO N
OT XRAY"
280 PRINT #1: : :
290 CALL KEY(O,R,S)!
ARE YOU PRESSING A KEY?
300 IF S=0 THEN 250 !
IF NOT THEN PRINT ANOTHER
310 CLOSE #1
320 END
    
```

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ple Tech and standalone clock, the MBP clock, and the clock designed by John Clulow. The Myarc 9640's clock is also supported.

Upon running, a particular month may be selected for viewing, or a predefined default used. A calendar is displayed on the screen with bullets next to the dates that contain reminders or other notes. Using the cursor keys various dates can be selected to zoom in on to view and edit respective notes. An overall notepad, unassociated with any particular date, is also supported.

To link to another month is relatively time-consuming, since the month number and disk drive location must be specified and the new month's data loaded in. If the user forgets to save the current month before loading in a new one, any changes or additions are lost on the current month. The <S>ave option is admittedly visible, but a sort of "Save current month?" prompt before the loading of another month might prevent lost data.

For the entering and changing of data a TI-Writer-like editor is available; the insert, delete, and erase keys all function flawlessly. There is even a line duplicate function for the moving of reminders from one date's notepad to another.

The program easily interfaces to all printer/RS232 combinations, and defaults as well as special printer control codes can be saved through a configuration file. Issuing <CTRL>P while viewing one day's notes will print those notes, and a <P>rint command allows for an intra-month summary of notes and reminders.

A <F>ind feature is also included that will place checkmarks next to each date in the given month whose notes contain a specified string (upper/lowercase is not considered in the search).

Remind Me is also provided in a "super cart" version for those users with RAM cartridges.

For the \$15 retail price, Remind Me is an excellent value. The over 400-character notepad for each day on the calendar allows for ample notes and reminders, and the files are in DV80 format for convenient interface to other 99/4A programs.

The speed and ease of use (as well as ease of learning) make Remind Me feasible as a daily calendar program, with or without a clock/calendar card. The documentation is clear, concise, and accurate. Remind Me remembers to include the most convenient and necessary features for an electronic calendar.

Howe Offers Look At Myart

Walt Howe of the Boston Computer Society has offered an insider's summary of the features of Myart, a drawing program for the Myarc 9460.

He writes the following:

Here is a quick rundown on the features of Myart, which I have become intimately familiar with in writing the docs for it. It has two graphics modes—the medium resolution 256 dot, 256 color one that many

people have seen demonstrated at shows (it produced the power-up swan), and a high resolution 512 dot mode with your choice of any 16 colors. In the latter, you can adjust the RGB values of each of the 16 colors, giving you choice of any colors the 9938 can produce. The speed of the mouse is adjustable when drawing, so you can trade off speed for control. It has the usual (by now) Box, Rectangle, Circle (2 different ones), Fill, and Line commands. It has a very powerful Zoom function with many levels of magnification. It has two cut and

paste commands, which let you duplicate any rectangular area on the screen in another same-sized rectangular area on the screen—one command copies the image and the other moves the image, blanking the area left behind. It lets you add text in various sizes—all in a single block font at present. There is no clip art or instance capability to import portions or drawings from elsewhere. The speed of all these functions is very, very fast. It runs from power-up mode, not 4A mode. It supports the following disk functions: Catalog, Load, Save, and


Initialize (you won't use it very often, but it's a life saver if you spend an hour or so on a drawing and then realize you didn't have a disk ready). Commands are selected by pressing a key, and the various graphics commands are each represented on screen by a different icon (pencil, teapot for fill, scissors and pastepot for cut-and-paste, etc.). There are Help screens available throughout (assuming they use them instead of the original ones).

The mouse is a three-button type

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SEIKOSKA PRINTERS

SP 1200 AI	120 CPS	\$219.95 ea.	2 for \$199.95 ea.
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Tour de Forth

by Glenn Davis

All Loaded Up And No Where To Go

Now that you've entered the Forth-83 compatibility code, your computer's memory could be just about full—enough space to work problems from books, but not enough to do serious programming. That is a big

problem. You can't do much with any language without RAM to put more code in.

It Dices, It Slices!

Those with a SuperCart (an Editor/Assembler with 8K of RAM added into the address space occupied by ROM in other cartridges—the E/A

has no ROM. MICROpendium has published plans for a homebrew SuperCart and they are also available from various vendors) had only two choices until now: either buy the DataBioTics Super4th package or have that RAM sit there uselessly. Fortunately for the SuperCart users, even standard Forth can be encouraged to use it. This article will demonstrate

two uses of a SuperCart with Forth, the Cuisinart of languages.

Forth loads each new definition at the top of the current dictionary. The address of this location is put on the stack by the word Here, which simply returns the contents of the user variable DP, the dictionary pointer. So to change where the Forth words are put, only the value of DP needs to be updated.

However, if it were that simple, there wouldn't be a problem! I'd just tell you to execute HEX 8000 DP !. Unfortunately, it is a bit more difficult. The real problem is getting the code into the >6000 - >7FFF address space, BSAVing it and then reloading the code when booting to save the time taken to compile all of that code. The normal BSAVing process stores everything between the address provided on the stack and HERE. Storing from >6000 to HERE would store about 24K worth of code in 25 disk blocks, a terrible waste of disk space since the >8000 - >9FFF space is not

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and the program makes use of all three. Generally, the left button toggles the color palette on and off, the righthand button selects a color or initiates a draw function, the center button erases (and brings back if you change your mind) the last entry, and the two righthand buttons together cancel a function in progress. Needless to say, the mouse is far, far easier to draw with than a joystick. What doesn't it do? There is no presently documented or programmed method of exporting artwork to other programs, although it is obviously quite possible to do so (some are doing so now). There is no present capability to change fonts in the on-screen text. I expect both of these will be attended to—if not by Myarc or the original programmer, then by users.

IFF Graphics Format Standard?

Warren Agee, a TI guru of CompuServe's TI Forum, has pointed out the special relevance October's *Computer Shopper* cover story has for the Myarc 9640 and the Myart program. The story dealt with graphics protocols and the attempts being made by many manufacturers to standardize them to facilitate the exchange of graphics files among various computer brands and models.

"Amiga developers have adopted the IFF standard for graphics files," Agee said. "Atari developers...are now trying to adopt the standard as well. For the Amiga there are programs that convert Macintosh files to IFF format...Imagine having the libraries of Macintosh clipart available for the 9640!" The IFF specifications are in the public domain, so Myart could conceivably include IFF protocol translation.

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RAM. It would also read all of the memory-mapped device I/O addresses in the process, which could mess up video RAM, GROM, and disk access. So the plan must be to load and BSAVE the portions of RAM separately.

The method to compile Forth to the SuperCart and BSAVE it is given as screen #89. This screen follows the -CRU definitions on a standard TI Forth system disk: it should be blank. In general terms, the screen causes the system to "forget" all definitions loaded from disk and start from scratch. After saving the dictionary pointer (DP), the new code is compiled into the SuperCart. When about 7800 bytes (this is approximate, because a good number of "custom" TI Forth disks exist that may use more space—for example, my assembly language floating point routines use a few dozen more bytes than the original—but the increased speed justifies it. I have also modified the Forth assembler, and I'll relate those changes in a future article) is loaded, the SuperCart RAM is BSAVED. The DP is restored and compiling proceeds in the "normal" Forth space. When Forth is done compiling, this too is BSAVED. More specifically, here is a line by line analysis of the code:

Line 0 is the comment line, of course. Line 1 forgets everything back to and including the standard TI Forth word MENU. Here >R puts the current dictionary pointer on the return stack. HEX 6000 2000 ERASE clears out the SuperCart RAM to get rid of any extraneous code. 6000 DP | tells Forth to place new definitions in the SuperCart RAM, which begins at 6000 (hex) and runs up to 7FFF. The second line loads screen #20, redefining MENU (which we "forgot" above), and creates the user variable VDPMD (for Video Display Processor Mode—adding an "O" wouldn't have taken any more memory so I'm at a loss to explain why it was omitted) and sets it to text mode. The original screen #3 provided with your TI Forth system defined the

words like -SYNONYMS and -FLOAT. Lines 3 through 10 of screen #89 define them as a convenience since they were also forgotten in line 1. For practical purposes, the words themselves are not needed and the dash-loads could be replaced by their literal loads. Some software may require those names be defined, however, so keep them for "complete" compatibility. The tricky part comes in deciding how much code (in terms of words) to load into the 8K space. You may decide to load things differently than I did. In this version about 7800 bytes of the 8192 are used. With some extra work, you could improve this. See warning notes below, though. Lines 11 and 12 load the SuperCart RAM with 11 of the 20 utilities TI provided. The most important ones to load are on line 11.

The "missing" utilities are -Multi, -Trace, -64SUPPORT, and -CRU. None will be sorely missed and they can always be loaded later (but always before the Forth-83 compatibility code since some functions in Forth-83 are quite different from TI-Forth and will cause incompatibilities). The other five utilities are loaded as a prerequisite to one or more of the loaded utilities so listing them explicitly is unnecessary.

Line 13 does the actual BSAVE for the SuperCart RAM. HEX 6000 puts the address of the first byte of RAM in the SuperCart on the stack (1st parameter for BSAVE). DECIMAL (scr#) 330 puts the block number at which the binary image is to be saved (2nd parameter for BSAVE). The number 330 is the one to change if you want it BSAVED to a different place (quite likely). Single and small-capacity drive users will want to put it somewhere else since block 330 may not exist on your systems. DUP CR | prints the block number to the screen so you may add a BLOAD with this number to screen #3 later. These numbers may be difficult to find on the screen, so look carefully—each one is on a separate line. The BSAVE creates a binary image on the disk beginning at the block number specified, in this case 330. BSAVE leaves the next free block number, which we'll use to save the next part.

Provided no error has occurred up to this point, the next line is executed too. The instructions R> DP | on line 14 remove the dictionary pointer from the return stack (put there in line 1) and restores the pointer to its former value so we can add definitions in the "normal" Forth memory space again. The remainder of line 14 loads -GRAPH (the graphic drawing utilities) and -EDITOR, the 40 column editor. Loading the editor last allows it to be forgotten in the event you need that memory. DUP CR This is the second number to be BLOADED on screen #3.

Line 15 then proceeds to load the Forth-83 compatibility screens published in the last two months of *Computer Shopper*. You may comment this out if you do not wish to use Forth-83 or want that memory (3.5K) for TI Forth. The next character is the "tick", an apostrophe. The phrase "TASK SWAP BSAVE" saves the binary image of high memory from the work TASK to the top of the dictionary. Since BSAVE puts the next free block's number on the stack, DROP is necessary to clean up the stack.

Exit the editor and type FLUSH to be sure screen #89 is saved on disk. Make sure you have a backup of your working TI Forth disk. Due to the characteristics of FORGET, attempting to repeat this process on a partially loaded SuperCart Forth is impossible because the addresses used are "below" the word TASK. That is, FORGET MENU on line 1 will fail (because MENU is in the SuperCart now) and you'll need to start over on your working Forth disk. Now LOAD that screen, as in 89 LOAD (if you also placed it on screen #89). Be patient—this process takes a few minutes. Once finished, you'll have nearly all the TI Forth utilities at your finger tips—important with published software if they don't specify which load options are needed.

Loading the Forth assembler is necessary because forthcoming articles will show how to interface 9900 assembly and Forth or BASIC. The code will use the assemblers. TI made interfacing very easy. They just didn't document it well!

Caution!

Once you understand how the code on this screen works, you can modify it for your own needs. Exercise caution when modifying this procedure, though. If you try to load more than exactly 8192 bytes into the SuperCart, the system will crash and you'll have to reboot from a normal Forth system disk. This screen will leave over 9K free when including the Forth-83 code.

When the Forth system is booted, a LOAD is performed on screen #3. That is, all of the code on this screen is interpreted just as if it were entered from the keyboard. Therefore, we can place any and all initialization code to, say, set the number and size of drives the system has. Additionally, and more important for our purposes, we can use this screen to BLOAD the binary image that was created by screen #89. See the included screen #3 as an example. Lines 9 and 10 are the important ones here. Use the numbers

printed on the screen by screen #89's code to know what numbers to place before the BLOADs.

Vocabulary Warning

Those of you who do want to modify this SuperCart BSAVER must be warned about one more thing. Everything in Forth is not static, especially definitions of vocabularies. Without becoming overly technical, a pointer (a cell containing an address) within each vocabulary definition points to the last word defined in that vocabulary. When the BSAVE one part (in the SuperCart, say) and then add definitions to that vocabulary in a different memory space and BSAVE that, the pointer in memory is updated, but the "image" of it on disk still reflects the "old" value of the pointer. What you will find is an "empty" vocabulary—no words at all.

One way of avoiding this is the tactic I used here: put the -CODE words (which define the vocabulary of ASSEMBLER) and the -ASSEMBLER words (which make up the vocabulary of the same name) in the SuperCart. This is only a problem with this vocabulary and you won't notice it until you reboot Forth after BSAVing. Another way to fix this is to change that pointer yourself by examining RAM and disk, loading the disk block into memory, changing the buffer to reflect how the RAM looked after loading the vocabulary words, UPDATE it, and writing it back to disk with FLUSH. Because it is a complicated process, I'll not explain it in this space.

Data Space

Some Forth programs require a good portion of RAM in which to manipulate data, whether as buffer or array space. The usual method is to ALLOT memory from HERE using something like 0 VARIABLE ARRAY 2046 ALLOT to allocate an "array" of 2K. Variables all put the address of their parameter field on the stack, and this is how such addresses get there. However, you can provide that address yourself, with a CONSTANT. Provided that you don't store your Forth code in the SuperCart as described above, this is simply achieved by the code HEX 6000 CONSTANT ARRAY. Since no "allot" is required, this is easy to use. In this way, the whole memory space is available to you. Remember, though, you've only got 8K more RAM. Don't try to use more than you have.

More Notes

All of this is not to say that you shouldn't buy the Super4th package. Super4th does provide some capabilities like hard disk support and graphics characters that are hard to duplicate without messing with the TI-Forth source a lot. It also has the support of DataBioTics behind it. Perhaps putting your Forth in the SuperCart will whet your appetite and demonstrate that you need the extra RAM.

This code also runs on the MYARC Geneve, using the "latest" MDOS available at this time. It should run on later versions too. The speed the Geneve provides to Forth is incredible.

```
SCR #89
0 ( Compile & Bsave utilities using Super-Cart RAM 17Sep87 GED)
1 FORGET MENU HERE >R HEX 6000 2000 ERASE 6000 DP | DECIMAL
2 20 LOAD HEX 60 USER VDPMD 1 VDPMD | DECIMAL ( create menu)
3 : -SYNONYMS 33 LOAD ; ; -EDITOR 34 LOAD ; ; -COPY 39 LOAD ;
4 : -DUMP 42 LOAD ; ; -TRACE 44 LOAD ; ; -FLOAT 45 LOAD ;
5 : -TEXT 51 LOAD ; ; -GRAPH1 52 LOAD ; ; -MULTI 53 LOAD ;
6 : -GRAPH2 54 LOAD ; ; -SPLIT 55 LOAD ; ; -GRAPH 57 LOAD ;
7 : -FILE 68 LOAD ; ; -PRINT 72 LOAD ; ; -CODE 74 LOAD ;
8 : -ASSEMBLER 75 LOAD ; ; -64SUPPORT 22 LOAD ;
9 : -VDPMODES -TEXT -GRAPH1 -MULTI -GRAPH2 -SPLIT ;
10 : -BSAVE 83 LOAD ; ; -CRU 88 LOAD ;
11 ( load cart ram) -CODE -ASSEMBLER -SYNONYMS -BSAVE -FILE -DUMP
12 -PRINT -TEXT -GRAPH1 -SPLIT -FLOAT
13 ( Bsave cart ram) HEX 6000 DECIMAL ( scr#) 330 DUP CR . BSAVE
14 R> DP | ( load editor) -GRAPH -EDITOR DUP CR . CR
15 ( Forth-83 load) 300 LOAD ( tick) ' TASK SWAP BSAVE DROP

SCR #3
0 ( WELCOME SCREEN ) 16 SYSTEM
1 0 0 GOTOXY ." Booting... Super-Cart disk" CR
2 BASE->R ( HEX 10 83C2 C1 ( QUIT OFF) )
3
4 002 DISK LO | ( may not write to source )
5 368 DISK SIZE | ( blocks/disk )
6 DISK SIZE @ 2 * DISK_HI | ( 2 DSDD disk drives )
7 DECIMAL
8
9 330 BLOAD
10 338 BLOAD
11 CLS MENU
12
13
14
15 R->BASE
```