

CoCo~123



April 1998 Volume XVIII Number 2

The Glenside Color Computer Club

A Glenside Publication since 1985
Your Voice in the CoCo Community

The President's /term by: Mike Knudsen

Horror stalks the wee hours of April 15th. Panic and desperation reign everywhere. The wealthiest families are about to be wiped out. The middle class wonder if they have a chance to survive. The poor immigrants are too stunned to make sense of their impending doom. No help can be expected before dawn.

But ... somehow they all manage to get their Form 1040s mailed in time. Except for some of us working feverishly towards the following weekend...setting up the CoCo Fest!

By the time you read this, the Seventh "Last" Annual CoCo Fest is ready to roll on the 18th and 19th at the good old Elgin Holiday Inn. It looks to be even better than last year's!

More vendors. More seminar speakers, featuring Mr. Games himself, the incomparable Steve Bjork. More jun### stuff at the Auction, as I clean out my basement in preparation for the move to Maine.

And our latest innovation, the CoCo Family Dinner, with musical "jam session" to follow. Yes, it's a go.

Everything is a go, thanks to YOU, our hard-working club members. Our thanks go out to all who've helped, and in advance to those who'll be helping with setup, admissions, security, teardown, cleanup, the works! Yes, we could use more volunteers. What, me drop a hint?

I expect by now we've already built enough IDE HD controllers to show off at the Fest, and to give to those who've paid off their balance in full (surely not another hint?). And more thanks to the IDE Hard Drive Interface crew -- Carl, Gene, Eddie, and all the rest.

Yet another Fest extra treat -- Sunday morning the sun will rise on the gorgeous cabinets of vintage radios, as the Antique Radio

Club of Illinois (ARCI) holds their quarterly swap fast in the West parking lot. As a member, I'll be out there selling off a few nice old sets -- hey, I did mention clearing my basement. Not much can get me up before 7:00 AM (when the trading starts out there), but radios get my blood pounding like Dungeons of Daggorath.

By now everyone knows that our GCC Club is THE leading CoCo Club in the world in terms of Fests and projects (MIDI and IDE). Are we The Unsinkable Color Computer or what? Let's keep it that way and show our pride at the Fest.

Your President,

Mike Knudsen

The IDE Project by: Carl Boll

Well, by the time this is read we will have come very close to shipping the boards if we aren't already shipping them. Right now the main hold-up is the drivers and the documentation for the boards. Documentation can't be finished until the drivers are finished and we are still working on partitioning.

All in all though we are really very close to the timeline that I set a couple of months ago, even with the setbacks. If you ordered an interface and haven't sent you balance in, please do so now. The total is \$58.00 US for the interface.

In other words, if you sent a \$15.00 deposit you need to send the balance of \$58.00. That would be \$48.00 that you still owe. Send the check or money order made out to The Glenside Color Computer to:

The IDE Project
C/O Carl Boll
6242 S. Menard Ave.
Chicago, IL 60638

---CARL

CoCo~123 Information

The Glenside Color Computer Club, Inc. is a non-profit organization whose members share an interest in the Tandy Color Computer ®. The CoCo~123 is the official newsletter of the Glenside Color Computer Club, Inc. (hereafter known as GCCC). GCCC has no affiliation with Radio Shack ® and / or the Tandy Corporation®. The opinions of the authors of the articles contained within this newsletter do not necessarily reflect the opinions of the Editor, the Executive Officers, or the actual Club Membership.

We are committed to publishing a minimum of four issues and a maximum of 12 issues per calendar year. For a fee of \$15.00, for January through December, you may become a GCCC member with full membership privileges. Send your dues to:

George Schneeweiss
13450 N 2700E RD
Forrest, IL 61741-9629

CoCo~123 Contributions

If you would like to submit an article for publication in the CoCo~123 you may upload it to one of the Club BBS's or send it directly on a disk to:

Carl Boll
6242 S. Menard Ave.
Chicago, IL 60638

.. The following formats are acceptable:

RS-DOS - 5 1/4" disk

OS-9 - 5 1/4" disk

MS-DOS - 5 1/4" or 3 1/2" disk

Email: coco123@chicoco.chi.il.us

All articles should be in straight ASCII format, not specialized word processing formats to facilitate importation into the newsletter.

Advertising is also accepted. If you are a vendor you may send an ad to the previous address. All ads should be "camera ready"* art. Please limit the size of your ad to 1/4 page. If you wish you may submit your ad on a disk in the following graphical formats:
JPEG, GIF, BMP, WPG

Reprint Policy

If you or your club / user group desire to reprint any articles in part or in whole that appear in the CoCo~123 you may do so under the following guidelines:

1. Provide credit to the Author of said article
2. Provide credit to the CoCo~123

We encourage others to copy these articles and the newsletter and distribute it at you regular meetings.

Glenside Club Meetings

The GCCC meets every second Thursday of the month from 7:30PM to 10:00PM at the Glendale Heights Library. A social get-together always occurs after the meeting at a local restaurant.

Newsletter Exchange

The GCCC is happy to exchange newsletters with other clubs / user groups at no charge. Please send your newsletters to:

Dennis Devitt
21 W 144 Canary Rd
Lombard, IL 60148

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or bod@chicoco.chi.il.us**

MINUTES BY THE MINUTE

by Bob Swoger

January , 1998

Bob Swoger was absent from this meeting and we have no official minutes. Basically we discussed the upcoming Fest and the IDE project.

February 12, 1998

The meeting was called to order at 8:10 PM by President Mike Knudsen. Present also were, Brian Schubring, Howard Luckey, Scott Montgomery, Justin Wagner, Tony Podraza, George Schneeweiss, Bob Swoger, Carl Boll, Brian Goers, Richard Bair and at the meeting after, Dr. Eddie Kuns of Rockwell International.

President Mike must get a count of the potential FEST! attendees, those that want to participate in the Glenside Family dinner and a count of vendors that are sure to come. Please send your count to Mike Knudsen at his E-mail address... gv218!knudsen@gvmail.ih.lucent.com . Carl Boll will place an article to this affect in the coming newsletters and update Justin's phone number 630-393-7072.

Brian Schubring (Schu2@juno.com) confirmed to us that Mike Cary to be present at the FEST!. Brian also gave the dining room status for the FEST!. We have full use of rooms Ivy A and B for dinner. Dinner needs to be attended by 50 minimum, 80 maximum. The dinner will cost \$15 per person. Shirt and button design has not yet begun. Ticket design has also not yet begun.

Roger Taylor's Projector3 to be demoed by Carl Boll. As yet no seminars finalized by Mike Knudsen.

Tony reported that vendors Cloud-9, SBUG, RC SMITH, StrongWare, Acadian Embedded Systems, FWD Computing, Luckey Corner, Alan Dages, James Davis (representing Rick Cooper), and Karlton Sefcik have thus far responded. Sock Master is a maybe.

Rich Bair will work out the logistics for selling the Disk of the month disks for the FEST! and Carl Boll the Public Domain disks.

Mike Knudsen has received too few inputs as to how many people will be attending the CoCoFEST! This may be because this year we have no advanced ticket sales. Carl Boll and Tony Podraza suggested putting a request in the next two newsletters for attenders contact either Tony or Mike so that we might get a head count. This is especially needed for the dinner count.

Most thought that two newsletters before the FEST! would be too much burden for the editor, Carl Boll. He has to get the IDE drive done. Bob Swoger suggested that the first request should be a post card. Cards are inexpensive and could be gotten out in relatively short time. Bob was assigned the task of getting

out post cards with their final approval by Tony Podraza. These cards will go out to the membership of the last three years.

Carl Boll will follow up with a newsletter in the middle of March to be mailed to the members of the last two years. Tony Podraza and Bob Swoger will design the 8 X 11 tear down sheet to be given to the vendors at the end of the FEST!. It will be camera ready for Carl Boll's CoCo 123 Newsletter.

Carl had news on the IDE Hard Drive project. Jim Hathaway sent in input on IDE drive terminations that needed to be made. This input had been overlooked. We need to check this information quickly. The deadline for orders of the IDE drive interface is February 19, 1998. There are 125 orders so far.

Carl announced a meeting in two weeks for the purpose of building IDE disk drive interfaces.

Tony Podraza requested \$45 to obtain a table to represent our club at the PennFEST scheduled to be held some time in August of 1998. The motion carried.

Tony stated that we would be renewing our Sam's Club membership. Two extra \$10 Sam's Club membership cards are still available. See Tony if you are interested.

The meeting ended at 9:10 PM and the Demo began... Digital 2-Way Radio was demonstrated. Bob Swoger brought two Motorola Cosmo Digital Radios to the meeting. First, the audience heard analog audio in a Radio-to-Radio transmission. Bob then switched to the frequency of a Base Station Repeater located ten miles from the meeting room. This time the signal received was perceptibly noisy. He then switched to the Digital mode through that same repeater. The signal was again as noise free as it had been during the Radio-to-Radio transmission. The only difference between Radio-to-Radio and Digital was a one second delay when going through the repeater.

March 12, 1998

The meeting was called to order at 7:50 PM by President Mike Knudsen. Present also were Jerry Geskey, Howard Luckey, Scott Montgomery, Justin Wagner, Tony Podraza, George Schneeweiss, Bob Swoger, Carl Boll, Brian Goers, and Richard Bair.

Bob Swoger reported that he had mailed out postcards to the membership to glean a response as to how many would attend the FEST! and dinner. Tony reported that only 17 cards were returned. However, many more used the e-mail address provided. As a result President Knudsen reported that we had received 48 total confirmations for the Glenside Family dinner (the CoCoFEAST!) and could expect possibly a dozen more. Also we might expect twice the total number for expected FEST! attendees.

Tony Podraza stated that the number of vendors that have so far responded was 18. Those vendors you may now look for at the FEST! are Cloud-9, SBUG, RC SMITH, StrongWare, Acadian Embedded Systems, The Luckey Corner, Alan Dages, Frank and Carol Davis of FWD Computing, CoCo Hut: James Davis (representing Rick Cooper), Karlton Sefcik, Lee Veal,

MINUTES BY THE MINUTE

Adventure Survivors, Roger Hallman, The Music Men, The Manistee Color Computer Club, MerchWare, Hawksoft, Farna Systems and , of course, Alan Dages and his wife, BABS (not Betty).

Several vendors have offered prizes for the FEST! which include a \$10 gift certificate to be used at the FEST! from R.C.Smith, a 512 Meg RAM upgrade from Cloud-9, a laser printer from StrongWare, a complete CC3 system including monitor, floppy drives and printer from the Atlanta Computer Society and more! Tony gave a list of NEW items that should be able to be found at the FEST! these include: DIGGER II from Chet Simpson, PACKMAN from Nickolus Marentes, NITROS-9 from FARNA SYSTEMS, and the IDE Disk Operating SYSTEM from the GLENSIDE.

Carl Boll reported that nearly 200 boards would be ordered for the IDE Project which included the so far 123 firm orders. Boards would be stuffed and soldered at the home of Brian Goers in Steger, Illinois, at some later date.

Right there at the meeting, folks, Tony Podraza called Nancy Myers regarding the shirt design on a Motorola ASTRO Digital hand held 2-Way Radio (can I say Motorola, here?). A few modifications were suggested, but we are again depending on Nancy's fine talents to give us another great shirt to wear at and after the FEST!.

It was Nancy's design seven years ago, in which she missed spelled ILLINOIS, that was the most poplar sought after shirt, even to the point of becoming a classic.

Nancy had a little trouble on her end with that type of 2-way simplex communication but Tony had no trouble with our end of the radio operation. We all heard her clearly and she seemed to understand Tony clearly.

Tony mentioned to us that we had renewed our Sam's Club membership and that two extra \$10 Cubs membership cards are still available. Again, see Tony if you are interested.

The meeting ended at 8:50 PM and the Demo began. Justin Wagner demonstrated a digital camera taking three pictures of GATOR Swoger to send to his friends and family around the country on the internet, most have not laid eyes on him in over 30 years.

"Thanks for doing that for me, Justin. You might get some of your money back for that unit if you bring it to the FEST!!!"

At 9:15 PM we retired to the Meeting After at the Springdale Restaurant.

Robert Swoger,

Secretary Glenside Color Computer Club

INPUT/OUTPUT

A letter with the CoCoFEST postcard from William Rocket. :

I received your card yesterday telling me about the 7th "LAST" Chicago CoCoFEST on April 18 & 19. I don't have a car or driver right now, so won't be able to attend. My brother gave me an AST computer, modem, monitor, programs, but no printer. [Hope you use that modem to log into the Cup of CoCo BBS now and then, Bill. We'd like to hear from you. You might even wind up with that needed printer. ED.] The CoCo is a great little computer, too bad Radio Shack had to end it. All my CoCo stuff is still working..... Thanks for the notice and HAVE FUN!
William Rocket W351 S 10247 Touhy Rd Eagle WI 53119

The following letters were received from people who paid their balances on the IDE interface:

Hi Carl,

enclosed is a \$60.00 Money Order for the Balance due on the IDE Interface I ordered. I appreciate all the time and effort you've spent on this project. See you at the Fest!

Thanks,
Jim Davis

gearboxed@geocities.com

Mr. Richard E. Crislip

1 CoCo IDE Controller Board
\$15.00 Deposit
+ 43.00 Balance
58.00 Total

Hope this won't be your last project.

Cheers

Dear Carl,

Congratulations on nearing the completion of a most worthwhile project. You and your fellow project team members deserve thanks for the many hours of time and labor that you devoted to this service for the CoCo community.

I am happy to enclose the balance of my payment for one (1) IDE controller for the Color Computer. The enclosed check #1096 for \$43.00 supplements my check #936 of \$15.00, dated April 5, 1997, which was deposited to GCC on May 8, 1997.

Regards,

J. David Baker

INPUT/OUTPUT

HI!

Tony - Carl - and all who work so hard to keep our CoCo alive-

I am enclosing a check for the IDE board I ordered - It is for \$60.00 50 + shipping & handling, if it's not enough let me know - if there is any left, don't send it back - put it toward the CoCoFest - your hard work is much appreciated!

Garry W. Spencer

Dear Carl,

Enclosed you will find a check for \$90.00 to cover the balance of the two CoCo IDE interfaces I ordered. Thanks for everything you and the Glenside Club have done for this project. I look forward to putting them to use.

Sincerely,
Joseph Consugar.

Carl:

Enclosed is a check for \$150, which is 3 X 60 - 30 (I didn't send deposit on the third cartridge.) If there is any excess, don't send it to me, but apply it to the next project.

Yours truly,

James Jones

Dear Carl,

There should be an overage in my payment of \$30. Please use it to support the CoCo community in whatever way Glenside feels appropriate. Unfortunately, I won't be able to attend the CoCoFest, but I hope the extra \$\$ can help support the community. BTW, thanks for all the work you & the others have put into the IDE interfaces & the Fest.

Sincerely,

Dean Leiber

Carl,

I have moved since I sent you the deposit - here is my new address:

Omitted

I am looking forward to using the IDE interface. Most of the basic concepts about computers and operating systems that I know I learned by running OS/9 on my CoCo. I appreciate all the hard work you have done on this project - keep up the good work.

Sincerely,

Jeff M. Crain

Carl:

Enclosed you will find a money order fo \$20.00 to cover any balance due.

Please send a complete IDE board to the address above. If there is any credit due please send a refund. I doubt that there will be any spare boards but, if there are then hold my refund and let me know. I may now be able to purchase a second board but, I cannot promise right now. Thanks to you and everyone else involved.

James (Jim) Cox

Thanks Carl!

Donald Loflin

It is letters like this that make the uncountable hours, frustration and hard work all worth it. It is nice to know that the hard work, hours and dedication of the IDE project team have been appreciated.

Carl

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Nickolas Marentes,

P.O. Box 2003,

Runcorn, 4113, QLD.

Internet Page: www.launch.net.au/~stauros/nickpage/

E-mail: N.Marentes@mailbox.uq.edu.au

Finally! A version of the 1980 classic that is so similar to the original that you will think you ARE playing the original. Many of the original's features and characteristics have been included to make this game as faithful to the original Namco classic as possible.

Fun, clean, violence free, 80's style entertainment for the whole family.

Features include:

- * Most of the original sound effects
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- * Keyboard and Joystick controls
- * Low price for full registered version (\$20)
- * Accurate replica of the original maze
- * Many of the originals game play elements
- * Runs at 60 fps with 2 channel digital sound
- * Reduced function DEMO version available as Freeware.

(FREE DEMO!!)

Pac-man is the registered trademark and property of Namco/Midway. Any money collected from the sale of this program will be taken as payment for the work involved in the development of the 6809 code. The author has not seen or copied any of the original's Z-80 code. Due to the small size of the Color Computer 3 market, it is the programmer's hope that Namco will realize that this program is in no way a threat to their financial status and that any revenue collected will be equally insignificant. This program has been created as a **TRIBUTE** to the original Pac-man, one of the most successful arcade games in video game history.

Thank you Namco for giving the world Pac-man.

***** ANNOUNCEMENT ANNOUNCEMENT ANNOUNCEMENT ANNOUNCEMENT *****

Well that's the sales pitch over. Seriously folks, you gotta buy this program. I have 12 starving children, bills piled up to the ceiling and I've had to mortgage my CoCo! <INSERT SYMPATHY HERE>

For more detailed information about Pac-man and even about myself, go to my web page at www.launch.net.au/~stauros/nickpage. On it you will find a screenshot of the game and even be able to download the free Demo which has features such as the animated intermissions removed and only the first (and easiest) set available.

Please support CoCo software development by buying, not just my program, but programs from other respectable and currently active CoCo programmers such as Steve Bjork, Chet Simpson and John "Sockmaster" Kowalski. The money collected from such a small market is not going to make any of us rich but it certainly will help to keep the CoCo alive and possibly encourage more programmers to create software for the CoCo.

Remember, it's Christmas season. Buy yourself or a friend a CoCo program and you will be contributing to the CoCo's growth and longevity.

Nickolas Marentes - CoCo Programmer

Installing a SMARTWATCH inside your CoCo 3

(c) Marty Goodman February 1996

Some years ago, in my CoCo Consultations column in the Rainbow Magazine, I was asked how to install a SMARTWATCH (Dallas Semiconductor part number 1216E) inside the Color Computer 3. The chap had already desoldered the ROM from his CoCo 3, and installed a socket there. He tried to just insert the SMARTWATCH into the CoCo 3's ROM socket, and insert the ROM in the SMARTWATCH, much as one normally does inside the disk controller. But the smartwatch would not work in that fashion, in the CoCo 3's ROM socket. I'm not to this day certain as to why, but it no doubt has something to do with the properties of the CoCo 3 ROM select line.

There is a strong motivation to install the SMARTWATCH inside the CoCo 3, for the thing is difficult to install in a disk controller, and anyway one might want to switch disk controllers, but still have use of the SMARTWATCH. Also, the SMARTWATCH plus ROM does not quite fit inside a normal disk controller, and so one has to cut a hole in the top of the plastic or metal shell of the disk controller to fit the smartwatch inside it. This is real pain, and looks terrible. I made some reasonable guesses about how to do that installation, based on the assumption the way to do it was to hook the SMARTWATCH to the *CTS (disk controller ROM select line), and so electrically duplicate what happened when you put the SMARTWATCH inside the disk controller. I was careful at the time to say I'd not tried out my suggestion, and requested feedback about whether or not it actually would work. I never got any response.

Very recently, I upgraded to Extended ADOS 3 with support for the SMARTWATCH, and got a smartwatch. I tested it inside the disk controller and it worked fine. I then attempted to install it inside my CoCo 3, using the technique I had suggested in my Consults column. It simply did not work. Now personally motivated, and with all the needed software and hardware to test things out, I set to work, and quickly got the SMARTWATCH working inside my CoCo 3. What follows is a description of how to do it.

NOTE 1: While it's not absolutely necessary, I **STRONGLY** recommend you desolder and socket your ROM in your CoCo 3. This makes the installation much easier to remove or service later on.

NOTE 2: IF you follow my suggestions for socketting things, you will NOT be able to close the case on the CoCo 3 with the keyboard inside of it. This is not a problem for me, for I use a "Marty Goodman keyboard extender cable". It won't be a problem for folks with a PUPPO interface, or with a Marty Goodman or Hawksoft keyboard extender cable. Or for most folks who have repackaged their CoCo 3 in some PC type of case.

(1) Locate R64, a 47 ohm 5% (yellow purple black gold) resistor. Look at the 40 pin "cartridge connector". Look at the end of that connector closest to the back of the CoCo. Just to the left of that end of that connector (left with the CoCo's keyboard nearest you) is a row of six resistors. From right to left they are designated R1, R5, R4, R3, R2, and R64 in white silk-screened notations just behind each resistor.

(2) Using a fine soldering iron and a small pick or jewelers' screwdriver, heat the pad where the end of R64 that is closest to the back of the computer is connected, and gently LIFT that end of R64 up out of its hole.

(3) I suggest at this point that you make a copy of the 27256 ROM that is the BASIC for the CoCo 3. Just read that ROM (after removing it) in an EPROM reader, and burn the data into a 27C256 200ns or faster chip. Keep the original ROM as you backup.

(I used this opportunity to modify my BASIC ROM. I replaced the 6K picture of the three clowns with a graphic screen of images of insects (what some folks call "bugs"). Now whenever I hit Control-Alt-Reset I'm greeted by a screen full of bugs, to remind me about the realities of the Basic ROM in the CoCo 3.)

(4) Take a 28 pin socket and bend out from that socket pin 20. Lay the socket on top of the copy of the ROM, so that every pin of the socket overlaps every pin of the ROM, EXCEPT for pin 20 of the socket, which is bent out. Solder every pin of the socket (except pin 20) to the EPROM. Now you have a socket piggybacked on top of an EPROM. Solder a 4 inch or so wire to pin 20 of the socket.

(5) Plug your SMARTWATCH into the socket that sits on top of the EPROM.

(6) Take another socket and solder a 4 inch long wire to pin 20 on TOP of the socket, where the IC's pin 20 would normally go IF you were plugging an IC into the socket. Plug this socket into the socket that is the top portion of the SMARTWATCH. This socket is just being used as a convenient plug to allow you to removeably plug a wire into pin 20 of the SMARTWATCH's top socket.

(7) Solder the wire from the lower socket (the one the SMARTWATCH sits in) to the freed up end of R64.

(8) Solder the wire that connects to pin 20 of the socket on top of the SMARTWATCH to the pad where the back-most end of R64 used to be connected. Keep these two wires as short as they reasonably can be.

That's IT! You've now installed the SMARTWATCH inside the CoCo, in a fashion in which it can be read by ADOS 3 Extended and by OS9, and in a fashion that allows the smartwatch itself to be removed and replaced quite easily if you need to do so. The only catch is that now, as I noted, you can't close your case on the CoCo 3 with the keyboard installed. But you CAN close the case when the keyboard is removed.


```

CLRA
JSR  GIVABF  convert to FP
PULS  X    retrieve pointer to var L
JSR  STFP   store floated LSB to var L
LDB   ,S++  retrieve MSB of N
SEX
JMP   GIVABF  return MSB to Basic

```

VARPTR can even be used to reference arrays. The address of element 0 is returned, and since elements are stored sequentially and each occupies 5 bytes, it is easy to index into Basic's arrays with assembly language.

Numeric Type Conversion

The workhorse numeric conversions INTCNV and GIVABF are great for many applications, dealing with the D register as a signed 16 bit integer. Yet there are times when a larger/smaller bit width or an unsigned integer is more useful. Several undocumented subroutines deal with such numbers. For addresses, such as VARPTR values, it is most convenient to obtain an unsigned conversion from FP into an index register. A call to \$B740 (XCNV) does just that, similar to INTCNV, with the results going to register X rather than D. To convert unsigned X to FP, \$896B (GIVXF) comes in handy. A likewise pair of subs exist for unsigned 8 bit conversions as well, using the B register. JSR \$B70E (BCNV) converts from FP to int, while \$B4F3 (GIVBF) floats B unsigned (just a CLRA instruction falling through to GIVABF). Like INTCNV, XCNV and BCNV will give a ?FC ERROR if the conversion exceeds the integer range of the destination register.

A nice shortcut exists for fetching 8 and 16 bit unsigned arguments. Both XCNV and BCNV have entry points 3 bytes early which fetch the argument first before conversion, \$B73D (GETX) and \$B70B (GETB). They do not check for parenthesis like GETARG however, which can cause syntax problems if the USR function is part of a numeric expression, so statements like $Z=USR(X)(Y)+K$ should be avoided. All of the GET/CNV subs except XCNV check the argument type and give a ?TM ERROR if it is a string. The page zero location \$06 (TYPFLG) indicates the type of argument last passed to or from Basic; 0 meaning numeric, otherwise a string. Remember that only subsequent arguments are to be fetched with GETARG, GETX or GETB; the first argument of USR is always fetched for you by Basic.

32 bit integers can also be passed to and from Basic, as well as mixed numbers, but options are fewer before things get complicated. A routine at \$BCC8 (INT32) will convert the FPAC to a signed 32 bit integer, leaving the result in the FPAC mantissa area at \$50..\$53, but it gives wrong results without error if the input is out of range ($1-2^{31}..2^{31}-1$) or non-numeric. Floating an unsigned 32 bit integer can be done by storing it to \$50..\$53 and then calling \$8812 (GIV32F). Passing other numeric representations generally requires some knowledge of the Floating Point routines. Note that INT32 does not check the argument type.

As a brief example using a few of the simpler numeric conversion subs, how about a procedure to store a character to memory (like POKE) and then read back the actual contents (like

PEEK) to check RAM at that location:

Basic: B=USR(X)(A) ' write A to memory location X, read back as B

Assembly:

```

JSR  XCNV  make X= address
PSHS  X    save it
JSR  GETB  make B= value
STB   [,S] write val to mem
LDB   [,S++] read back actual content
JMP   GIVBF  and return it to Basic

```

Remember that most ROM routines will modify a number of registers, so it is important to save any that will be needed later. Basic doesn't seem to care what the registers contain when you return to USR, except for DP which must be restored to 0 if your program changes it.

Program and Data Storage

The CoCo manual outlines the "right" way to allocate RAM for your Machine Language, using the CLEAR command to reserve space which Basic will leave alone. Many programmers like to use other methods though, each with particular advantages. The PMODE graphics pages are a popular area to LOADM to, but the FILES command in Disk Basic can overwrite them. CoCo 3 users can take advantage of unused portions of the ROM images in high RAM, such as \$FA0C..\$FDFF or \$D8D0..\$DEFF. The space between the end of Basic's variable storage and bottom of stack can be quite large, making the area around \$4000..\$6000 attractive for use (on a 32k+ machine); however an increase in size of the Basic program or variable storage, among other things, can overwrite this area. A really cool way of including ML code is to hide it inside the Basic program itself, where Basic protects it just like the regular Basic code; but the ML must be relocatable, the Basic program saved only in binary format, and a DEFUSR to the ML must compute the address based on Basic's pointers (since Basic program storage location is dynamic), and appending the ML is tricky, clearly not a method for beginners. The best place to put ML code really depends on the application and the programmer. Such decisions are the price to be paid for having the outstanding flexibility of the CoCo's RS-DOS operating system.

For data storage, nothing quite beats the stack for clean, compact, reasonably fast-executing code. Of course if more than about 30 bytes are to be used, one should either check the available stack room beforehand, or set up a local stack and restore Basic's stack pointer on return. Direct addressing is fastest, but since most of page zero is used by Basic, the DP register needs to be pointed elsewhere for this, and restored to 0 on return to Basic. Defining a data area in the same space as the program is often quite convenient (especially for static variables), only watch out for direct addressing hitting a page boundary if the program is to be relocatable. Of course for quickie programs where proper programming rules are of little concern, just sticking everything around \$4000 or so and using extended addressing is about as easy as it gets. With assembly language under RS-DOS, it's really all up to you and how well you wish

the program to interact/coexist with Basic and/or other applications.

One other note for CoCo 3 users... watch out how low you reserve memory with CLEAR, because in WIDTH 40 or 80 mode the stack gets clobbered if it grows into \$2000..\$3FFF which Basic switches out with the memory management hardware to access the high resolution screen memory. Allowing plenty of room above \$4000 for the stack and string pool is a good idea. Just add the string space (the first parameter of CLEAR) to \$4000 plus a few hundred more to get a minimum safe high mem address (the second parameter of CLEAR). Or just limit your program to WIDTH 32 mode, and CLEAR all you want.

Input/Output

Anyone who has tried assembly language can appreciate how much easier it is in Basic to handle user input, printing, and files and such. Sometimes though a simple operation can be done much faster through assembly. Take the case of a huge buffer of data in memory to be written to a disk file. Basic could PEEK each byte and write it to the file; very slow. Or the data could be copied to some strings, or a numeric array, by the program that generates it; faster, but an awful lot of work. Fortunately though it is very easy to read or write sequential data in assembly language.

The well known CHROUT routine, whose vector at \$A002 points to \$A282 in every Color Basic I have ever worked with, can output a byte to any device recognised by the system. One just puts the device code into the page zero location DEVNO at \$6F, then a JSR [\$A002] (or JSR \$A282) sends the byte in register A on its way. A 0 in DEVNO selects the screen, -1 the cassette, -2 the serial printer, and 1 or higher selects a disk file which must first be OPENED "O" for output in Basic. No error results from attempting to write a file number that is not open, but doing so can garble things in Disk Basic's work area, or even on your disk. To be sure the output file has already been opened by the calling Basic program, a quick call to \$A406 (OUTCHK) with DEVNO set up will verify that the channel is properly open, and generate a ?NO ERROR or other appropriate error exit if not. If an error occurs when CHROUT is called, such as disk full or I/O error, the proper Basic error exit is taken. Even though we are writing just one byte at a time, the transfer is fully as fast as printing strings in Basic.

Reading input in assembly language works pretty much the same way. The POLCAT routine ([\$A000] or \$A1CB) is fine for keyboard-only input. Or to flash the cursor while waiting for a keypress, GETKEY (\$A1B1) can be called, which returns the character in register A as POLCAT does. For other devices, we need CHROUT's counterpart, INCHR, at \$A176. Why this one isn't in the manuals is puzzling. Just as with CHROUT, the DEVNO location should be set with the desired device code, the file OPENED "I" if cassette or disk, and a JSR \$A176 executed to return the input character in register A. The main difference with INCHR is end-of-file detection. The EOFLG at \$70 will be cleared by INCHR if a character was fetched, else it will be set

to indicate that end-of-file was hit and register A is not valid. Note that EOFLG works slightly differently from Basic's EOF function: EOF tells whether any characters remain to be read, but EOFLG gets set only when INCHR tries to read past the last character; in fact EOFLG set is equivalent to ?IE ERROR in Basic as far as what file position it occurs at. Just as with CHROUT, INCHR has a companion routine to verify that the input file is properly open. INCHK (\$A3ED), with DEVNO set with the file number, will error out if things aren't right and prevent your program reading garbage characters.

Let's look at an example of sequential I/O in assembly language, a generic copy routine. The input is two numbers, a source device and a destination device (think of the possibilities!). It makes sure the files are open, then copies until end-of-file. The number of characters copied is returned to Basic. It would be nice to terminate if the source is keyboard and Break is pressed, but such improvements would make the code rather long for just an example. By the way, CHROUT, POLCAT, GETKEY and INCHR all preserve the CPU registers, unlike most of the ROM routines discussed so far.

Basic: N=USR(S)(D) ' copy from device S to device D

Assembly:

```
JSR BCNV make B=source
PSHS B
STB DEVNO
JSR INCHK verify source file open "I"
JSR GETB get B=dest
PSHS B
STB DEVNO
JSR OUTCHK verify dest open "O"
LDX #0 init char count
LOOP LDB 1,S input a char
STB DEVNO
JSR INCHR
TST EOFLG exit if eof hit
BNE DONE
LDB ,S output char
STB DEVNO
JSR [CHROUT]
LEAX 1,X inc char count
BRA LOOP continue copying
DONE LEAS 2,S
CLR DEVNO always a good idea to do this
JMP GIVXF return #chars to Basic
```

Note that if anything errors out like ?I/O ERROR and such, the Stack pointer value doesn't matter since Basic resets the stack anyway when an error occurs.

Conclusion

Hopefully this article will stir the interest of beginning programmers and provide some new tips for experienced ones as well. Most of the information is based on my own experience writing many combination Basic/Assembly programs on the

CoCo, and though the examples herein are tested, some inaccuracy in the text is not unlikely (there's always one more bug!). Corrections, suggestions and comments are welcome.

Included here is a summary of all the ROM calls described, in order. Assume any registers other than DP may be modified, except as indicated. The condition code F and I bits

may be cleared by some I/O routines, and all other CC bits may change. A "#" indicates routines which appear in at least some of the Tandy CoCo manuals, while "[]" means the address is an indirect one, used like JSR [CHROUT]. With practice, these entry points can greatly enhance the usefulness of assembly language programs written for Basic USR calls, even for beginners. Good luck, CoCo fan!

(continued next page)

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```

name      address  description / comments
-----
INTCNV EQU $B3ED # convert FP number to signed int in reg D
GIVABF EQU $B4F4 # convert signed int in reg D to FP number
GETARG EQU $B262 # fetch arg in ()'s from Basic code to FP or $
LDFF EQU $BC14 # unpack Basic variable at [X] and load into FP
# register X saved; variable not modified

STFP EQU $B3C5 store FP packed into Basic variable at [X]
# register X saved; FPAC not modified
XCNV EQU $B740 convert FP number to unsigned int in reg X
# no numeric type verification
GIVXF EQU $896B convert unsigned int in reg X to FP number
BCNV EQU $B70E convert FP number to unsigned int in reg B
GIVBF EQU $B4F3 convert unsigned int in reg B to FP number
GETX EQU $B73D fetch numeric arg as unsigned int in reg X
GETB EQU $B70B fetch numeric arg as unsigned int in reg B
INT32 EQU $BCC8 convert FP to signed 32-bit int at $50..$53
# no numeric type verification; no range check
GIV32F EQU $8812 convert unsigned int at $50..$53 to FP number
CHROUT EQU $A002 []# output char in reg A to specified device/file
# all registers saved
OUTCHK EQU $A406 verify that specified device/file is open "O"
POLCAT EQU $A000 []# scan keyboard, return char in reg A

```

```

GETKEY EQU $A1B1 * A=0,Z=1 if no char; all other regs saved
flash cursor, wait for key, return in reg A
INCHR EQU $A176 * all other registers saved
input char from specified device/file to reg A
INCHK EQU $A3ED * all other registers saved
verify that specified device/file is open "I"

variables:
-----
TYPFLG EQU $06 argument type flag: 0=numeric, else string
# reflects last arg passed to or from Basic
DEVNG EQU $6F # device/file number for input/output
EOFFLG EQU $70 # end-of-file-hit indicator

```

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If you want to speed up DECB easily, install an Hitachi 6309 and get RGBoost. This patch for DECB uses the extra 6309 functions for up to a 15% gain in overall speed. It is compatible with all programs tested to date! Save an additional \$5 by purchasing RGBoost along with one of my other products listed below!

EDTASM6309 v2.02 - \$35.00

Patches Tandy's Disk EDTASM to support Hitachi 6309 codes! Supports all CoCo models, including stock 6809 models. CoCo 3 version uses 80 column screen, runs at 2MHz. YOU MUST HAVE A COPY OF DISK EDTASM. This is a PATCH ONLY! It will not work with "disk patched" cartridge EDTASM

CC3FAX - \$35.00

Receive and print weather facsimile maps from shortwave! The US weather service sends them all the time! Requires 512K CoCo3 and shortwave receiver. Instructions for simple cable included.

HRSDOS - \$25.00

Move programs and data between DECB and OS-9 disks! Supports RGB-DOS - move files easily between DECB and OS-9 partitions! No modifications to OS-9 modules required.

DECB SmartWatch Drivers - \$20.00

Access your SmartWatch from DECB! Adds function to BASIC (DATES) for accessing date and time. Only \$15.00 with any other purchase!

Robert Gault
832 N. Renaud
Grosse Pointe Woods, MI 48236
313-881-0335
Please add \$4 S&H per order

speakers 33.6modem 1.66HD & 14" monitor Wings & MSPI vs custom made system. \$985. Call Douglas 847-925-1585

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PS-200 32 meg - EDO case, 3.5 floppy/KB/ mouse 2MB PCI SVGA IOX CD rom sb16 comp & 26HD + speakers 33.6 kbs modem monitor - avail. Win 95 + MS plus new. \$1695. 8 4 7 - 9 2 5 - 1 5 8 5
Hurry!

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PS-133 16 meg - EDO case PD.KB - mouse 2mB PCI SVGA 8xCDrom SB comp & 33.6 kbs modem 1.60 HD Wings+Plus 14" monitor also available. New system. \$1250. 8 4 7 - 9 2 5 - 1 5 8 5
Hurry!

RAM. 350 MB HD, 14.4 FAX/VC modem. w/color mon+bundled softw + addl games for pre-kids - \$1000. OBO. 630-690-5357 - day or eve Chris.

FOR SALE 970219

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Computer desk \$30. 55 5/8"H x 28"W x 23 1/2" d. Oak finish 4100. in stores. Wayne 847-566-6521 Mundelein.

FOR SALE 970219

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Power Macintosh 75MHz power PC, 16MB RAM, 1GB HDD, 4x CD ROM, 15 inch color display, 14.4 modem \$800. firm. 847-740-6423.

FOR SALE 970219

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486 66MHz computer 8mbram, 14.4 fax modem, sound blaster, 4X CD rom, 500 mb HD, speakers, APC pwrmgr AC line filter, software, top line 15" monitor, new mouse. \$1200.0BO 847-397-2406.

WANTED 970219

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Intel 486 66 MHz SV working condition. 847-882-4714.

FOR SALE 970219

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External CD Rom, 28.8 modem for laptop 630-820-1313

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P150 computer system, 32MB EDO RAM, 1.3 GB HDD, 512KB cache, 3D video card w/2MB, 8x CDROM, 16 bit sound card, 80 watt speaker, 14" monitor, key & mouse, 1 month old. Win 95 \$1600. 847-352-7001.

FOR SALE 961230

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COCO 2,3 - DIRECT CONNECT MODEM HARD DRIVE(20 MEG), DISTO SUPER CONTROLLER, RGB DOS, 2 DMP 132 PRINTERS. MOUSE, KOWOLA PAD, MULTIPAK INTERFACE, CARTRIDGES, DISK DRIVES JOYSTICKS, BLACK ONES AND THE COOL WHITE ONES. JOHN SLADEK (610)522-0966 VC OR (610)522-0267 BBS I DONT WANT MUCH MONEY FOR THEM

FOR SALE 961218

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Epson ES-1200C scanner w/Photoshop \$800. OBO. Epson Stylus Pro w/ PowerRIP- \$400. OBO. Apple Laserwriter Select 360 \$800. OBO. Steve 550-8619.

FOR SALE 961218

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Macintosh computers: Performa 6300CD/ 100, 32M/1.2G, 28.8 fax/modem, CD Rom, 15" color monitor, software - \$1700. OBO. LCII, IOM/8M, 14" color monitor \$350. OBO. Steve 550-8619

[NEWSLETTER ADS]

Rainbow Mags & Disks
Frank Randle
12039 44th Ave
Kenosha, WI 53142
414-694-2931
jam123@execpc.com

FOR SALE 970219

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Great starter computer Tandy 100% IBM compatible, 640K RAM, 3 1/2 disk drive, 20 megabyte, color monitor & printer - all for \$350. Call Mary 630-483-8917.

FOR SALE 970219

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Autocad software - autodeck R12-CH that contains Win & DOS ver & autovision & 3D studio. Great for students & exp users. Asking price \$270. OBO. Call 847-566-5598.

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PS-166 16 meg.-EDO case, 3.5 floppy/ keyboard, mouse 2mBPCI SVGA 8XCD ROM, SBcomp and 33.6 kbs. modem Win 95 1.66 hd monitor also avail. \$1381. New. Hurry!! Call Douglas 847-925-1585.

FOR SALE 970219

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PS-100 16 meg - EDO case 3.5 PD/KB / mouse / 1mBPCI SVGA 8xCDROM - SB16 comp +

FOR SALE 970219

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Short wave receiver DX-160 5 band \$95. 630-682-9723.

FOR SALE 970219

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Apple Classic II 10/80 with 68882 co-processor. Perfect condition, original box. \$250. Call 847-825-0209.

FOR SALE 970219

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2 computers 486SX33 8 meg RAM with CD, 14" colormonitor, modem 200mg HD 2 floppies \$600. OBO. 286 laptop 60 meg HD, modem with case & accessories. John after 8 pm. \$250. OBO 815-455-5209.

FOR SALE 970219

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Quadraflex QL-410 semi-automatic turntable w/digital series cartridge. Barely used. \$120. new, asking \$60. OBO. Call 847-272-4946 eves (6-10pm).

FOR SALE 970219

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Computer - 486SX25 w/210M HD, 4M RAM, modem, k-b & mouse. Win. 3.1, Wordperfect 6.1 more s/w Le & manuals inc. \$250. 815-895-9380.

FOR SALE 970219

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Mac Performa 6120, 60 MHz PwRPC, 24 MB

FARNA Systems

Your most complete source for Color Computer and OS-9 information!

Post Office Box 321
Warner Robins, GA 31099
Phone: 912-328-7859
E-mail: dertfox@delphi.com

ADD \$3 S&H, \$4 CANADA, \$10 OVERSEAS

BOOKS:

Mastering OS-9 - \$30.00
Completely steps one through learning all aspects of OS-9 on the Color Computer. Easy to follow instructions and tutorials. With a disk full of added utilities and software!

Tandy's Little Wonder - \$25.00
History, tech info, hacks, schematics, repairs.... almost EVERYTHING available for the Color Computer! A MUST HAVE for ALL CoCo aficionados, both new and old!!! This is an invaluable resource for those trying to keep the CoCo alive or get back into using it.

Quick Reference Guides
Handy little books contain the most referenced info in easy to find format. Size makes them unobtrusive on your desk. Command syntax, error codes, system calls, etc.

CoCo OS-9 Level II : \$5.00
OS-9/68000 : \$7.00

Complete Disto Schematic set: \$15
Complete set of all Disto product schematics. Great to have... needed for repairs!

**CHECK OUT THE NEW
LOW PRICES ON NITRO PRODUCTS!**
See editorial in this issue for details

SOFTWARE:

CoCo Family Recorder: Best genealogy record keeper EVER for the CoCo! Requires CoCo3, two drives (40 track for OS-9) and 80 cols.

DECB: \$15.00 OS-9: \$20.00

DigiTech Pro: \$10.00
Add sounds to your BASIC and M/L programs! Very easy to use. User must make simple cable for sound input through joystick port. Requires CoCo3, DECB, 512K.

ADOS: Best ever enhancement for DECB!
Double sided drives, 40/80 tracks, fast formats, extra and enhanced commands!
Original (CoCo 1/2/3) : \$10.00
ADOS 3 (CoCo 3 only) : \$20.00
Extended ADOS 3 (CoCo 3 only, requires ADOS 3, support for 512K-2MB, RAM drives, 40/80 track drives mixed) : \$30.00
ADOS 3/EADOS 3 Combo: \$40.00

Pixel Blaster - \$12.00
High speed graphics tools for CoCo 3 OS-9 Level II. Easily speed up performance of your graphics programs! Designed especially for game programmers!

Patch OS-9 - \$7.00
Latest versions of all popular utils and new commands with complete documentation. Auto-installer requires 2 40T DS drives (one may be larger).

TuneUp : \$10.00
Don't have a 6309? You can still take advantage of Nitro software technology! Many OS-9 Level II modules rewritten for improved speed with the stock 6809!

Thexder OS-9
Shanghai OS-9 : \$10.00 each
Transfer your ROM Pack game code to an OS-9 disk! Requires ownership of original ROM pack.

Rusty : \$10.00
Launch DECB programs from OS-9! Load DECB programs from OS-9 hard drive!

Nitros-9:
Nitro speeds up OS-9 from 20-50% depending on the system calls used. This is accomplished by completely rewriting OS-9 to use all the added features of the Hitachi 6309 processor. Many routines were streamlined on top of the added functions! The fastest thing for the CoCo3! Easy install script! 6309 required.
Level 3 adds even more versatility to Nitro! RBF and SCF file managers are given separate blocks of memory then switched in and out as needed. Adds 16K to system RAM... great for adding many devices!
Nitros-9 V.2.0: \$10.00
Nitros-9 Level 3: \$10.00

The AT306 OS-9 Single Board Computer

AT306 Motherboard Specs:

16 bit PC/AT I/O Bus (three slots)
MC68306 CPU at 16.67MHz
Four 30 Pin SIMM Sockets
IDE Hard Drive Interface
Floppy Drive Interface (180K-2.88M)
Two 16 byte Fast Serial Ports (up to 115K baud)
Two "Terminal" Serial Ports (no modem)
Bidirectional Parallel Port
Real-time clock
PC/AT Keyboard Controller (five pin DIN)

Included Software Package:

"Personal" OS-9/68000 Vr 3.0
(Industrial with RBF)
MGR Graphical Windowing Environment
with full documentation
Drivers for Tseng W32i
and Trident 8900 VGA cards
Drivers for Future Domain 1680
and Adaptec AAH15xx SCSI cards
Many PD and customized utilities and tools

The AT306 is a fully integrated single board computer. It is designed to use standard PC/AT type components. Sized the same as a "Baby AT" board (approximately 8" square). Compact and inexpensive enough to be used as an embedded controller! Use with a terminal (or terminal emulation software on another computer) or with a video card as a console system. Basic OS-9 drivers are in ROM, making the system easy to get started with.

HACKERS MINI KIT (FARNA-11100): Includes AT306 board, OS-9 and drivers, util software, assembly instructions/tips, T8900 1MB video card. Add your own case, keyboard, drives, and monitor! **ONLY \$500!**

Call for a quote on turn-key systems and quantity pricing.
Warranty is 90 days for labor & setup, components limited to manufacturers warranty.

Microware Programmers Package -
Licensed copies of Microware C compiler, Assembler, Debugger,
and many other tools!

With system purchase: \$65.00 Without system: \$85.00

[NEWSLETTER ADS]

FOR SALE 961218
Amiga 2000 with 32 bit 68020 CPU accelerator,

325M hard drive, 3.5" ext. & int floppy drv,
AMAXII Mac emulator, 14.4 modem flicker fixer,
joystick, \$400.
Call Kris @ 630-830-9360.

FOR SALE 961218
Memory 16 meg 72 pin Edo Simm \$85. Also 4meg
72pinEdoSim \$25.
7761870.

CoNect

1629 South 61st Street
West Allis, WI 53214
(pulland@omnifest.uwm.edu)
414-328-4043

Fast232- 16550 does serial! Port speed to 115200bps, transfers up to 5000 cps. Addressable to four locations. With OS9 and Nitros9 drivers. **\$79.95**

2nd Port Daughter Board - \$45.00

OS9 v1.2 v1.1 available!

Level2 Bundle	\$49.95
os9, b09, mvue, more! plug-n-go for 6809	
Dynacalc+Pgraph	\$19.95
Profile	\$19.95
TSEdit/Word+vi+patch	\$12.95
Epix+TriPak	\$14.95
Koronis Rift, Rescue Fractulus, Rogue	
King's Quest 3	\$9.95
Microscopic Mission	\$4.95
Sub Battle Simulator	\$4.95

Hardware

64K upgrd 2 or 4 chip	\$5.95
512K upgrd(used) . 0K	\$24.95
512K	\$44.95
decbl.1rom + manual	\$12.95
mpi upgrd sat. board	\$9.95
cable, cassette	\$5.95
cable, printer	\$5.95
cable, rs232 (100ft!)	\$19.25
colr mouse (1 button)	\$9.95
mono+composite monitor (used)	\$24.95
Orchestra90cc Pak	\$12.95

DECB

Disk EDTASM (used)	\$19.95
Disk ProFile (used)	\$12.95
One on One	\$7.95
Sands of Egypt	\$7.95

ROMPaks too! (Inquire for titles)

Parts (many more in stock!)

1488/89 .75	68b09e	6.95
1723 1.95	6821a	3.95
1773 6.95	SALT	2.25
2764 2.95	74*6	.35
6802 3.50	74ls133	.42

I've also been working on some **NEW** hardware that may be available later. One of these items is a revision of my Expander idea that actually works on most CoCo 3's, not just the occasional "right" one.

I'll keep everyone posted on any progress!

Check with me for complete disk drive systems, misc. hardware items, hardware repairs, and hard to find new and used CoCo software not listed!

Shipping & Handling \$4 US, \$6 Can/Mex, \$10 World
offworld destinations please consult local Postmaster!

VIDEO GAME MAGAZINES WANTED!

Video Games Player, Atari Age, Electronic Fun, Electronic Games, Replay, Playmeter, Blip, and Atarian. Write with what you have and what condition they are in and I'll send back a quote. Video Games, Box 9542, Pittsburg, PA 15223

STRONG WARE

Box 361 Matthews, IN 46957 Phone 317-998-7558

CoCo 3 Software:

Soviet Bloc -----	\$15
GEMS -----	\$20
CopyCat -----	\$5
HFE- HPrint Font Editor -----	\$15

MM/1 Software:

Graphics Tools -----	\$25
Starter Pak -----	\$15
BShow -----	\$5
CopyCat -----	\$10
Painter -----	\$35

—[NEWSLETTER ADS]—

FOR SALE 961218
Intel 486DX266 2 545 meg HD's 32 meg RAM, quadspeed CDROM, 28.8 int modem, mini tower case Vesa local bus both floppies runs fast need to sell! \$850. OBO. 630-372-2823 after 5:30 pm.

FOR SALE 961218
Printer Panasonic KX-P2 124 wide carriage, 24pin dot matrix color capable \$100.
Call Kim after 5 pm. 630-894 2516.

FOR SALE 961218
Computers for a young student, household - Mac+ w/40/80M Hd., 4M RAM, many extras. \$150/180. Add modem for e-mail or Telnet. Yes, they're out of date, but very lemfactional. 359-7293.

FOR SALE 961218
Computer - 486DX2-66 w/CDRom, 420MHD, 16MRAM, k-b & mouse, DOS 6.0, Win 3.11, \$565. 15" HI-RES SVGA Mon \$175. NLQpnter, \$85. All together, a great setup. \$775. 359-7293.

Meeting Location:

**Glenside Public Library
25 West Fullerton Avenue
Glendale Heights, Illinois 60172**

Directions:

The Library is located on Fullerton, about one-half mile west of Bloomingdale Road. Fullerton is about one mile South of Army Trail Road and about one mile North of North Avenue (Route 64). Bloomingdale Road is about two miles West of 53 / I-355 / the North-South Tollway.

NEXT MEETING DATES:

MAY 14, 1998

JUNE 11, 1998

MAY 14, 1998
AUGUST 13, 1998

JUNE 11, 1998
SEPTEMBER 10, 1998

JULY 9, 1998
OCTOBER 8, 1998

The Glenside Color Computer Club, Inc.
C/O Tony Podraza
119 Adobe Circle
Carpentersville, IL 60110-1101