A Hardware Analog to Digital Converter

Part I

by Richard Kottke

Have you ever noticed that your favorite programs run slower when you are using Multiview or any other mouse-based program? This is because the computer must spend a lot of time in the high resolution mouse driver's timing loop. The timing loop can take up to 9000 cycles, and is entered about 30 times a second. That's a total of 270,000 cycles per second wasted! This will slow everything down by $270,000/1,789,773 = 15\%$.

What can you do to speed up the mouse? You could disable the hires mouse adapter and deal with a 64 x 64 mouse (yuk!), or you could use the keyboard instead of the mouse (double yuk!) or (ta-dah!) you could install a true analog to digital converter and remove the computational burden from the microprocessor.

This file and the accompanying figures will tell you how to construct, install and program a true 1●-bit A/D converter. PLEASE NOTE: this would not be a good first project! Since everybody has a different configuration, I will discuss how to interface the project through a Y-cable and through a multi-pak toaster. If you are using a Y cable like me, you need to add the decoding circuit I will describe later that senses addresses $FF38 - 3B, enables the converter and pulls SLENB low; if you have a multi-pak you can either use SCS or the decoder circuit.

THEORY OF OPERATION

What is an analog to digital (A/D) converter? It is a device that takes a continuously variable analog voltage (from 0 to 5 volts in our case) and picks the digital number that best represents this voltage. For the COCO joystick port, we need digital values from 0 to 639; since A/Ds convert in multiples of 2, this means we need a 10 bit converter, which outputs digital values from 0 to 1023. We will then need software to scale this properly: 0 to 639 for horizontal, 0 to 191 for vertical, and 0 to 63 for low res. The converter I have chosen is the RCA (now owned by Harris) CA3310 CMOS 10-bit A/D converter with internal track and hold. It is capable of 150,000 conversions per second, runs off of a single +5 v power supply, uses very little power, and is relatively simple to interface onto an 8-bit bus.

The data sheet for this chip indicates that conversions take 13 clock cycles and are initiated by pulling START (pin 19) low; while START is high the converter idles in "track" mode. The converter requires that the analog power and ground (Vaa+ and Vaa-) be separated from the digital power and ground to prevent unwanted noise. Digital power should by AC bypassed to digital ground with a .1 uF ceramic cap, analog power should be AC bypassed to analog ground with a 4.7 uF tantalum cap. The converter has Vref+ and Vref- inputs, which define the max and min input voltages (ie if Vin=Vref-, output = 0000, if Vin=Vref+, output=1023); both should be AC- bypassed to analog ground with 4.7 uF tantalum caps. In our application, Vaa- and Vref- will be connected to joystick ground, Vaa+ will be connected to Vcc (+5V) via the chip's built-in 50 volt resistor and Vref+ will be connected to joystick Vcc (+5V). Vaa is protected from transients by back-to-back diodes to Vcc. The converter's digital outputs are controlled by two enable pins: OEL and OEM. Pulling OEL low causes bits 0 and 1 to appear on pins 1 and 2. Pulling OEM low causes bits 2 through 9 to appear on pins 3 through 10. Since the COCO has an 8 bit bus, these will be assigned to consecutive memory locations at $FF38 and $FF39.

Since there are four joystick values to be read, we will need an electronic "switch", or multiplexer, to select which one is connected to the A/D converter. I have selected the 74HCT4052 analog multiplexer. This chip has two four to one mulitplexers controlled by the same select inputs; we will

only be using one of these "muxs". We will need a flip-flop register to hold the digital selection bits and to control the converter's START pin. This will be a 74LS374 octal flip flop. To select the flip flop (write only at $FF38) or the converter's OEL and OEM (read only at $FF38-39) we will need a 74LS138 decoder. If you are using a y-cable and need the extra decoding circuitry, that will include another 74LS138, a 74LS133 13-input NAND gate, and a 7405 open-collecter inverter.

CIRCUIT DESCRIPTION

Figure one shows connections for the 74HCT4052 and CA3310 to the joysticks and the bus. Note that the conventional ground symbol corresponds to digital ground, whereas the triangle with an "A" in it is analog ground. *THESE TWO SHOULD NOT BE CONNECTED TOGETHER ON YOUR PROJECT BOARD.* Doing so will result in ground-loop noise and excessive jittering of the converter output. The +5V "Joy Vcc" should come from pin 5 of either joystick connector. This voltage is used as the "Vref+" for the CA3310 and is bypassed to analog ground with a 20uF tantalum capacitor (I used 20uF because Radio Shack didn't have any 4.7uF tants). Using a tantalum cap here is important because aluminum caps will not properly reject high frequency noise. The left and right joystick inputs are connected to the analog multiplexer's input pins A0-A3. This corresponds to the original order in the COCO (ie right horizontal = joystk(0), right vertical = joystk(1) ...) The mux's Vee, GND and Enable pin are tied to digital ground, Vdd is tied to +5V Vcc. The mux's output (Aout) is presented to the CA3310's Vin for conversion. Mux select lines S0 and S1 come from the octal flip-flop (U3) bits 0 and 1.

Figure 1

U1 - CA3310
U2 - 74HCT4052
All Caps 10WVDC Min

The CA3310's Vdd and DRST (data ready reset) pins are connected to +5V Vcc and are bypassed to digital ground with a .1 monolithic ceramic cap. Vaa+ is connected to

+5V Vcc via back-to-back protection diodes (1N4148 or similar) and is bypassed to analog ground with another 20uF tantalum cap. Vref- and Vaa- are tied directly to analog ground, which comes from "Joystick Ground" - pin 3 of either joystick connector. Vss is the converter's digital ground and is connected to digital ground. The converter START signal comes from octal flip-flop (U3) bit 7. CA3310 D2 through D9 are connected to the color computer's D0 through D7; CA3310 D0 is connected to COCO D6 and CA3310 D1 is connected to COCO D7. This will simplify the software implementation somewhat. The converter's clock input is rated at up to 2 MHz, so it is just connected to the computer's E signal. OEL and OEM are connected to the 74LS138 decoder (U4) Y3 and Y2. This will correspond to $FF39 and $FF38 (with my decode circuit) or $FF41 and $FF40 (SCS decoding). Leave U1 (CA3310) pins 11 and 21 unconnected. Leave U2 (74HCT4052) pins 1,2,3,4 & 5 unconnected.

Figure two shows the connections for the 74LS374 octal flip flop and the 74LS138 decoder. U3 (74LS374) is an octal D-type flip flop that is used here as a write-only register. When it receives a positive clock edge from U4, it latches d0, d1 and d7 from the data bus; the outputs of the corresponding flip flops are connected to U2 S0 and S1 (analog mux selects) and U1 START (A/D converter start signal). U4 (74LS138) is a decoder that enables either U3 (for writes at $FF38) or U1 (for reads at $FF38 and $FF39). Inputs A0 and A1 are connected to the computer's A0 and R/W* lines. A3 is unused and must be grounded. Enable E3 is connected to the system E clock to ensure proper enable timing. Enable E2 is connected either to the system's SCS* line or to Y3 of U5 (another 138). SCS* is for those who intend to use a multi-pak with this project; U5 is for those who don't want to use a multi-pak or don't want to mess with SCS. Enable E1 is unused and must be grounded. U3 pins 7,8, 17, 14 & 13 are
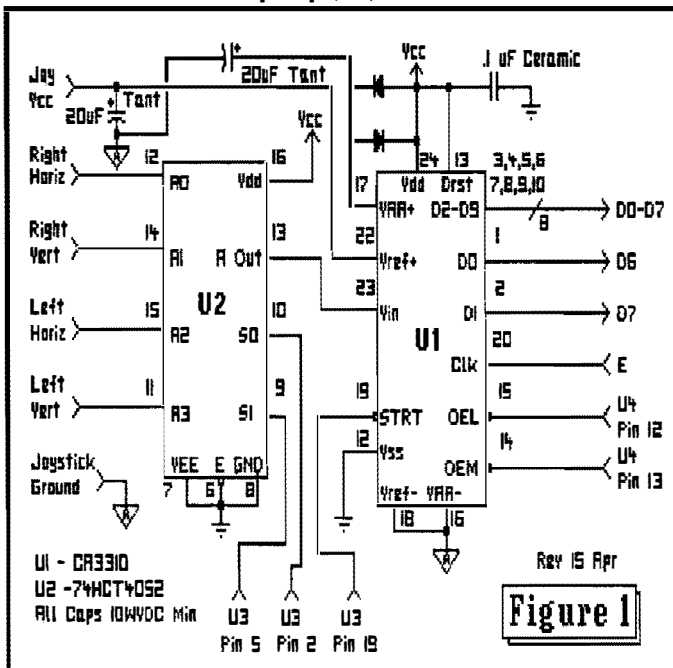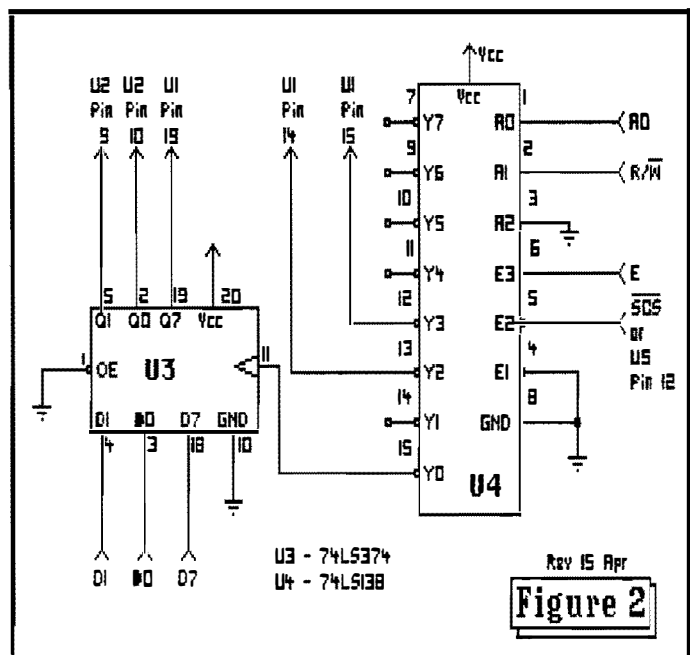

Figure 2

U3 - 74LS374
U4 - 74LS138

unused and should be either grounded or tied high. U3 pins 6, 9, 12, 15 & 16 should be left unconnected. U4 pins 7, 9, 1●, 11 & 14 should be left unconnected.

Figure three shows the extra decoding circuit for those who don't wish to use a multi-pak. U6 is a 13-input NAND gate and is connected to address lines A3 and A8-A15. A7 is inverted by U7, a 7405 open-collecter inverter, and sent to U6. The output of U6 is used as one of the negative-asserted enables for U5, the 74LS138 decoder. The other negative enable is connected to A2. The positive enable is not used and must be tied high. Decoder select lines A0,A1 & A2 are connected to A4,A5 & A6, respectively. The decoder outputs have the following memory map:

    Y0 = FF08 Y4 = FF48
    Y1 = FF18 Y5 = FF58
    Y2 = FF28 Y6 = FF68
    Y3 = FF38 Y7 = FF78

Figure 3
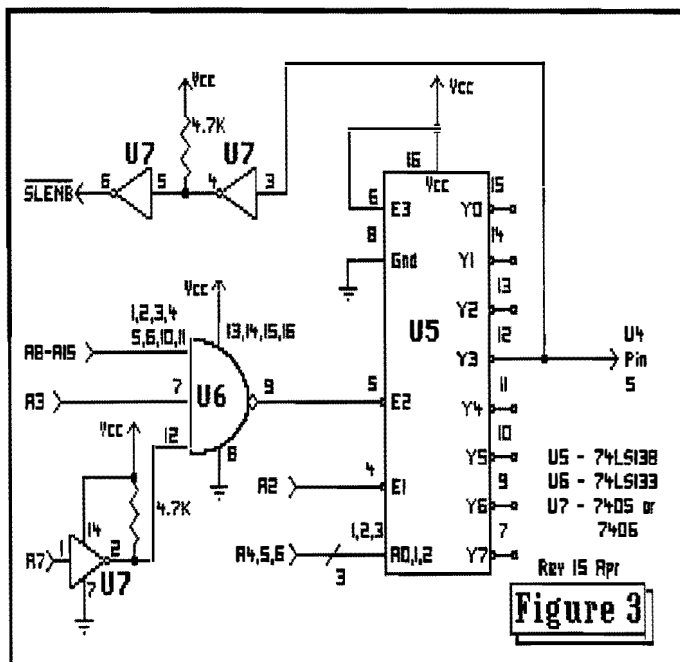
We will use Y3 (pin 12) to enable the A/D circuitry. Y3 is also connected to two 7405 inverters in series; this provides the negative-asserted open collector SLENB output which will disable all of the computer's internal memory. Since U7 is open collector, it must have its output pulled up with a resistor when used as a normal inverter. Pins 13,14 & 15 of U6 are unused and must be tied high. Pins 9, 11 & 13 of U7 are unused and should be tied high or low. Pins 8, 10 & 12 of U7 should be left unconnected. Pins 7, 9, 10, 11, 13, 14 & 15 of U5 should be left unconnected.

NOTE: Part II will include the actual software listing in assembly code for the D to A joystick or mouse driver and descriptors.

Hmmm...there seems to be a trend here. The less perceived support for our beloved computer, the more festivals we have. This festival was first offered as a rumor at the '92 CoCoFest 3 in Atlanta and it must be said that the Mid Iowa & Country CoC● Club did a great job into turning this rumor into a reality. So...let me get on with it!

WHERE:
The Travel Lodge Inn in Des Moines, Iowa (a few blocks away from the offices of Microware, creators of OS-9). Why? Because the good members of the Mid Iowa & Country CoCo Club thought it would be a good idea! How? In full 'Fest flair with complete booths with backdrops in a nice hotel with VERY affordable rates. About the only thing lacking were "real" name badges and booth signs. (At this Fest a printed square safety-pinned to your shirt served as entry badge...)

THE ARRIVAL / PRE-SHOW
We pulled up, and went inside to check in. There was a message from Joel Hegberg, my Sub-Etha Midwest partner (head of our OSK development). We got our keys then went to our room to unload. A few familiar faces greeted us. Apparently we have established a die-hard gang of Fest attendees including Lee Veal and David Wordell from Dallas, Scott Griepentrog, Paul Jerkatis and Eddie Kuns from "parts unknown" (hey, I want some of that homebrew next time Paul), Al Dadges and R.C. Smith from Atlanta, and, of course, the familiar vendors. There wasn't much to do this first night. I was a bit upset to find this Fest area providing backdrops after I spent so much time creating the "Mach II" version of our "PVC Nightmare" backdrop we used at the CoCoFest 3. (Basically, a PVC frame with black cloth for which we could suspend banners and signs...) We set this up and wandered around chatting. Not really much to say here...I spent most of the night printing out banners for the Saturday show and chatting with various Fest people (like the HAM guys next door).

THE SHOW AREA
The room was setup as follows (More or less) as shown in the display on the next page
    This made 12 vendors scheduled, but only 10 were manned. Without CoCoPro, many classic "expected" items were not there. Without Burke and Burke, Zebra, and Sundog, many other items were sadly missed... Anyway, here were the vendors:

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+----------------------------------------------------------------+
| DS-69B Digitizer  ! Sundog        !                  ! StG     |
| Photo Booth       !               !                  !         |
| ------------------+---------------+------------------+-------- |
|                                                                |
| ----------+       Most booths were at least one      +--------- |
| SBUG/     !       table in size.  Several no-         ! Glenside |
| Andy      !       shows left a few empty...           ! Chicago  |
| LaVelle   !                                           ! Fest     |
| ----------+       Seminar area was around the         +--------- |
| Sub-Etha  !       corner...                           ! David    |
| Software  !                                           ! Wordell  |
|           !       I apologize for those I have        !          |
| ----------+       left out of this map!  Please       +--------- |
| Mid Iowa  !       send corrections.                   ! T-Shirt  |
| Library   !                                           !          |
|           !                                           !          |
| ----------+       +-------------------------+         +--------- |
| James'    !       ! Atlanta Computer Society !        ! Check   |
| Ultimuse  !       !                          !        '   In    |
+----------------------------------------------------------------+
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IOWA Fest Vendors Display Setup

ACS, Inc. Used Equipment - The Atlanta Computer Society came down to check things out and see if interest would remain this year for a 4th CoCoFest in Atlanta. They sold various pieces of hardware and software including an American Made CoCo (?) and cases, etc.

Mid Iowa & Country CoCo - Taking memberships and showing off their Upgrade National Disk magazine, a real NICE looking disk-based newsletter with plenty of graphics and humor.

Sub-Etha Software - There we were with our normal line of software including Mini Banners, CheckBook+, InfoPatch, N*Johnson Software, Carl England Utilities, and the new OSK products such as Etha-GUI and the new Write-Right "what you see is what you get" word processor which was the big hit for us. (Joel, you did a great job on this and I think you left many people quite impressed!)

Burke & Burke - They didn't make it. I heard it was due to a canceled flight. It was said, though, that PowerBoost 2.0 is out that patches OS9 to run in NATIVE mode on the 6309 and is also more "stable". Pity, as I want something to take advantage of the 6309 I have in my machine.

Dave Wordell - Along with Lee Veal (proud owner of the original CoCo 1) was there with two tutorial video tapes - one on getting started with OS9 (and customizing a new boot disk) and the other on installing a 6309. This new tape was very well put together and

showed up-close how to remove the 6809 and install the new chip. Also of interest was the Planet Engine for OS9. It is a CoCo planetarium with AMAZINGLY nice graphics. If you are a star buff, BUY THIS NOW! Very professional and pretty fast, too!

Mid Iowa & Country CoCo Library Booth - Hundreds of club disks for sale at $3/each including interesting "Orphanware" items... I had no idea they had that much RS-DOS software!

Sundog Systems - The remaining premier game company for the CoCo's software didn't arrive in time, so all that was running was a demo of the much-awaited Contras game...it looked very nice. If you have seen the Nintendo version I think you would find the CoCo version quite acceptable. 2 player mode and everything. Like two-player games? Well...what are you waiting for? (Side note: the day after the end of the 'Fest all of their software arrived in Iowa...sigh.)

Zebra Systems - Also didn't make it...

Andy LaVelle - SBUG was there with new/used disk drives, Radio Shack software, carrying cases, mini-paper shredders, disks, etc., etc., etc... He will probably be selling the Sub-Etha products at the PNW CoCoFest-3 the last weekend in June. (I bought a 3.5" drive w/adapter for less than $40...) He also had some modified 12V CoCo disk controllers modified to handle the 1.44 meg floppy drives. HEY! How come no one told me we could use these high density floppy drives with only minor

modifications to our controllers?

DS-69B Digitizer Booth - A Microworks digitizer was hooked up to a laser printer and snap-shots were taken. (Apparently the old HP inkjet printer driver works fine on this laser printer). Later, M.Hawkins and T.Earls made an appearance. (There were two of the guys who worked on Super Extended Color Basic.) You could have your picture taken with them and a disk would be sent later for $3 with the file on it. This basically let you be the "third" musketeer (from the Ctrl-Alt-Reset picture hidden inside the CoCo 3...)

Glenside Club & Chicago Fest - Glenside was there with Carl Boll and his hacked CoCo in tower case and a terminal feeding off of Scott Griepentrog's MM/1 around the room. They were talking up the Chicago Fest, which promises to be one heck of a show.

Sportsware, Inc. - T.J Clemmens was there making custom Fest T-shirts on the spot. Instead of printing up hundreds of single color white shirts, Mid Iowa had a nice four color transfer made which was pressed onto the shirts as you requested. Kinda neat and a NICE looking shirt for $12! They were heavy duty gray shirts, and possibly the best shirts at any Fest in recent years.

StG Net - Scott Griepentrog and Paul Jerkatis hung around running two extra terminals from Scott's MM/1 as they worked on code for the StG BBS package version 4 to be released within the next few months. Some of the beta modules looked truly incredible. Is

it just me or were there a lot of MM/1s at this show?

THE SEMINARS

Saturday:

11am - "OS-9 & OSK Portability"
James Jones, Microware.

1pm - "RS-DOS Assembly"
Gene Lund, Sec. of MI&CC

3pm - "HAM Radio"

Ed Bassick and "a friend". This seminar was rescheduled until the next day due to their equipment not being here yet. I wish I could remember the name of "a friend". Sorry 'bout that, man!

6pm - "Town Meet"

After the shut down of the Fest, we all gathered in the seminar oom to talk about what we were going to do with ourselves. The major discussion was about all the people who got burned by past attempts at publishing CoCo magazines. A new magazine, "The world of 68 Micros", is due out soon to take up the slack that Rainbow is leaving. Let's give this one a shot as it TRULY sounds like it has much potential. Other subjects discussed dealt with keeping CoCo clubs in touch with each other.

Sunday:

11am - "OS-9 C Assembly"
Boisy G. Pitre, Microware.

2pm - "CoCoMax Graphics"
Terry Simons, MI&CC

SUMMARY

A "good" show. Small vendor participation and a basically pathetic turnout, but somehow it was still very very fun. Nothing new was shown off except seeing Planet Engine for the first time, seeing the new "Installing the 6309" video tape tutorial, Joel's MM/1 Write-Right program, and getting to see, feel, and touch a "Floptical" 21meg 3.5" diskette! (YES, it looks JUST like a regular disk. Amazing...apparently they coat the backside with a pattern that a laser reads to track it...wow!)

Money wise, we had the very best first day at any Fest we have attended (this made #5) thanks to sale of Joel's OSK MM/1 word processor. Amazing that OSK "carried" the show for us. One thing, though, is that this Fest felt good, relaxed, friendly and inviting. Unfortunately, this was the first Fest that didn't pay for being there

(except for Joel who did quite nice!!!). BUT, if I had to do it all over again I would.

RUMORS

Write-Right "add-ons" with names like "Spell-Well" and "Grammer-Hammer". A potential CoCoFest 4 in Atlanta (October) **IF** turnout is decent at Chicago, which I am sure it will. EthaSampler, the STEREO sampler for the CoCo (RS-DOS and OS9) playing back via the Orch-90 pak (hmmmm) supporting sound sequencing plus lots more... A new "pull-down" text-based interface for OS9 *('C' developers - contact me ASAP for FREE development stuff for this!)*. And, well, a few other things that cannot be mentioned. Hint: Join the OS-9 User's Group before Chicago... (It is nice to see at least one rumor from the last Fest become a "reality"...)

FAREWELLS

To say good-bye we packed up, said our final farewells, and made plans to meet in Chicago. Before leaving, Scott McGee (with James Jones in tow) allowed us to have a quick tour of Microware. We saw powerful workstations, "next generation" CD-I machines (with 3.5" floppy drives built in???), a Japanese "m68000" machine with OS9 in JAPANESE and some neat games, plus their box o' CoCos that they used to develop CoCo OS9 on... one programmer had a CoCo 1 motherboard attached to his doorway... some kind of silent tribute to the past? It was monumental. This alone was almost worth the 16 hours of driving.

IN CLOSING

What can YOU do to insure these 'Fest continue? If you cannot attend, at least support those who support the 'Fests. Become a member of as many CoCo groups as you can. Sign up with publications such as "68 Micros". Get on the mailing lists. Get on-line. Keep in touch so we have a way to tell you about new developments within the community.

It's easy. Watch for a letter of "support" coming soon for more details.

AllenC.Huffman
Owner-Sub-Etha software

CoCo Overheating?

In light of the fact you have been able to come up with new and useful ways to make improvements to your CoCo's, I thought I'd give you a little insight as to one of my pet projects.

As you well know the CoCo tends to run rather hot. At first I tried to keep the heat under control by placing a muffin fan directly over the Power Transistor and the Transformer. It helped but was unable to keep the chips as cool as I'd have liked.

I got to thinking and it came to me that there was a really a simple method. I called around to a few places and at last found a nice little 50PSI compressor. I got my hands on some Micro Copper Tubing and constructed a set of three coils to run into the CoCo Case. I loaded the Compressor and line with Coolant (same as is used in the Auto Air Conditioning units) and then built a tray system to catch condensation and run it off to he back of the desk to an old Water Bottle (5 gal so I don't have to dump it that often) I got a thermostate out of an old apartment building that was being torn down and used that to control the temperature. If the inside of the case jumps above 79 degrees, the compressor kicks in and cools the coco. Since it is a very small unit, condensation is very limited.

I've taken readings while the compressor was running and the mean temperature tends to run around 48.6 degrees inside the CoCo case. I have a relay set so that when the compressor kicks off, the muffin fan kicks back in, limiting the amount of time needed to run the compressor. If you like I can supply a list of part numbers and mesurements and a "crude" drawing (I'm no artist) of how to construct this neat unit.

==AL STIEBEL;FidoNET/OS-9 Echo==

Editor's Note: April Fool

GOTCHA

Hi Speed Modem Operation

High speed modems for the masses are here. The prices are falling, and have been in the affordable range for several months now. When Supercomm v2.1a was released one year ago, the highest speed I had heard of on a CoCo was 2400, with MNP5. For this version, v2.2, the beta test sites included two 9600's, and a 14400. This article is on how to get the most from these modems.

Not too long ago, the general opinion of the OS9 experts was that 2400 baud was tops for the CoCo running OS9 Level II. They were/are only partially right. 9600 is very doable, but you have to seriously curtail multitasking. Doing C compiles during a 9600 ymodem download is definatcly out. Allowing the system to spend most of it's time servicing the serial port will get acceptable results. There are a few things that are needed:

o- SAcia, a replacement serial driver by Bruce Isted (see patches)
o- A hardware RS232 port that supports all common control lines
o- VRN, a generic VIRQ driver by Bruce Isted
o- SuperComm (but of course :)
o- An updated Clock module, such as (edition 9) by Eddie Kuns
o- Hitachi 6309 (not needed but helps)

The Modem:

Most modems default to the correct mode. Some don't. You should have hardware flow control, modem-modem flow control, and auto-reliable enabled. For 2400/MNP modems, set the port speed at 4800 baud. For V32, set it to 9600. The system can not cope with 19.2K baud (yet!).

My Zoom v.32bis/v.42bis modem defaults to the correct settings. My Anchor 2400E5 (MNP5) does not. I use a modem init string of "at\n3\q3\j0\v1%a13&d2" for the Anchor. Interestingly, the Zoom chokes on this string. This tells us that the extended Hayes commands used by these modems are not fully standard-ized.

Therefore, the only solid advice I can give is to consult your modem manual.

The Port:

You have to have a hardware serial port. Let me rephrase that. You *HAVE* to have a *FULL* hardware serial port. This means that it must support all seven normal control lines. Txd, Rxd, DCD, DTR, DSR, RTS, CTS, and ground. The Tandy Deluxe RS232 Pack does. The various packs sold by CoNect do also. The Tandy ModemPak conversions designed by Marty Goodman do not, neither do the Disto 3in1, 4in1, etc. I do not know about the other packs out there.

The Clock:

Some Clock modules are slow. They will cause dropped chars at 9600 by blocking interupts for too long. The original Tandy issue, and the Disto RTC drivers do. This took me a long time to isolate. I now use the Edition 9 Disto driver by Eddie Kuns. No more headaches. Eddie has a driver for most every hardware setup, too. Thanks Eddie!!

The Software:

You may not see many external changes to SuperComm- definately not a year's worth of work. This is because most of the changes are internal optimizations. For instance, the guts of X/Ymodem receive are almost totally new. To get the most from SuperComm, you should have VRN with it's /nil descriptor included in your boot. If SuperComm finds VRN, it will use it for better/more precise X/Ymodem timing control, rather than constantly asking the system for the current time. By doing so, real world throughput in excess of 900 cps is possible when downloading to a ram disk.

When doing 9600 file transfers, use Ymodem batch, or Xmodem 1K. Do not try zmodem. CoCo zmodem will be *slow*, if it works at all. Since zmodem won't work, it is a good idea

to turn off auto-zmodem in the options menu. Scanning for it's init strings is wasted overhead, and we can not afford to be wasteful. Also, avoid screen scrolling if possible. If the BBS supports sending clear-screen codes between messages, use it. Screen scrolling eats up a lot of system time.

The Driver:

You need a serial port driver that supports hardware handshaking, and fairly large buffers. Currently, we only have one, SAcia. SAcia is a very versatile driver. It's only short coming is the total and complete lack of buffering on the transmit side, and that's not all that bad. The only difference the average user will see is slower transmit throughput.

To use SAcia, you must have hardware handshaking enabled. This is done by setting PAR to 02. It would also be wise to use a good sized receive buffer. I use a 8 page buffer, good enough for one complete screen of text. total command is: "xmode /Tx par=02 xtp=08".

The Patch:

In the course of developing SuperComm, I found two spots where SAcia and the 6551 serial chip don't get along very well. These are not really bugs, just little loopholes in the control logic. Little loopholes that I managed to wedge a v.32bis modem into... twice! The first problem is fairly simple, and could have been worked around in software. If you are using DTR drop to cause the modem to hang up, SAcia will not notice the change in DCD status, because the 6551 will not notify SAcia of DCD changes while DTR is off. If you leave DCD floating (not forced true), and use DTR hangup with SAcia, Supercomm will get confused the next time you use the auto-dialer. This is because SAcia is reporting bogus info, since *it* wasn't informed of the previous change. The fix is to use "+++" hangup, SAcia.

Hi-Speed Modem Cont'd.

The second problem is a little more involved. It has to do with hardware handshaking. If you attempt to send data while SAcia has RTS off (receive flow stopped), the 6551 will not send the data byte. If you then attempt to send a second data byte, everything locks up. You (the program) will be suspended until SAcia returns from the second write call. But Sacia will not return from the write call until it writes out the byte. But this wont happen until RTS is turned back on. But RTS wont be turned back until you (the program) reads sufficient data from the receive buffer. But you're suspended in a write call. Deadlock city.

For those interested in correcting this problem, I have written two ipatch files which I have included in an archived file posted on Delphi's OS-9 Sig called ***hi_speed.ar.*** One for *sacia.dr*, the other for *sacia.mpi*. These were made from the sacia files as distributed by Bruce Isted. The ipatch files cause *sacia* to look for this deadlock situation before it happens, and not enter it. It will siliently eat the second data byte instead. You lose one typed char, but this is vastly superior to having the whole telcom package freeze. You may need to change the MPI slot byte after running the patch, as per the XAcia documentation.

==Randy K Wilson==
Delphi:RANDYKWILSON
Compuserv:71561,756
UUCP/Internet:"randy@taylor.twuug.com"
*Editor's note: The **"hi_speed.ar"** file mentioned written by Randy Wilson is also available from the Bellingham OS-9 Users Group Library.*
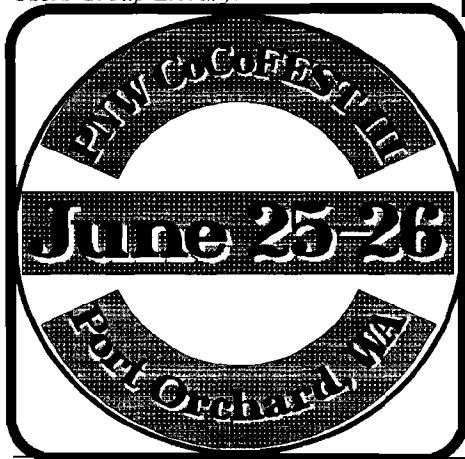
KiX\20 ...

NEW LOW COST 32 BIT COMPUTER FOR OSK!

The KiX\20 has the same 32 bit expansion bus as the KiX\30 and uses the same expansion boards. This includes the Ultra fast Multi Graphics Adaptor video board. The MGA video board adds high end graphics to the low cost KiX\20. This combination provides the end user with high performance workstation capabilities at home computer prices. If you are looking for an OSK machine that provides super fast video and low cost this is it.
The KiX\20 specs:

o   25 Mhz 68020 CPU
o   1, 2, 4, 8 or 16 Meg of RAM on the motherboard using SIMM memory.
o   On board SCSI controller (same as KiX\30)   -
o   Dual density floppy controller. Supports all formats: 360K to 1.4 Meg
      floppies.   -
o   4 Full serial ports. With modem control hardware.
o   1 KiX\30 32 bit Expansion bus connector
o   Sound port
o   8K Battery Backed Static RAM.
o   4 on board full serial ports (same as KiX\30)
o   Battery backed Real Time Clock
o   1 Parallel printer port
o   Full user manual with schematics
o   Autoboot from floppy or hard disk included.
o   4 Built in I/O expansion bus.
o   1 Built in 32 bit bus.
o   4 layer PCB
o   Small 8.7 in by 8.7 in. size drops in any PC case without
      modification.
o   Run as a terminal system now, then add a video board later.
o   INCLUDES PROFESSIONAL OS9/68000
o   INCLUDES MICROWARE K&R C COMPILER
o   INCLUDES MICROWARE BASIC!
o   INCLUDES MICROWARE MANUALS

The bus runs at full CPU speed. The bus is not a limiting factor like the slow AT bus used on most PCs available today. (The AT bus is limited to 8Mhz and is only 16 bits.) T he performance gain of this system over current systems, like the TC70, is dramatic.

In today's economy, cost is a major factor. This system is designed to start at only 699.95. That includes Professional OS9/68000, Microware K&R C compiler, Microware BASIC, deguggers and tons of utilities.

You can start out with a terminal based system and add the MGA video board later. Best yet....The introductory price for the KiX\20 is: ONLY $699.95! AND that INCLUDES OS9/68000, C and BASIC!

Frank Hogg Laboratory, Inc.
204 Windemere Road
Syracuse NY 13205
Tel: 315/469-7364
Fax: 315/469-8537
Delphi: FHOGG
CIS: 70310,317

Serial Mouse FIX
dEd patch to CC3IO

This article describes how I found and fixed the problem of using a serial mouse via the patches to the *cc3io.io* module which ,although they work with the serial mouse, also result in floppy disk accesses being locked up till the mouse is moved, including during the bootup if you boot from floppies like I do. These described patches are applicable to the .m51 and .I51 versions of *cc3io* as generated by the script furnished in the file *smouse.ar* available only on Delphi. I couldn't find the similar patch location for the .m52 and .I52 versions and didn't even look at the joy version. The same logic could be applied to solve those if they are in fact a problem.

In both the .m51 and the .I51 versions of the modified cc3io modules, the table used to initialize the interrupt (F$IRQ) will be found starting at offset $B65 as the "flip byte" of $00, followed by the "mask byte" of $0F, and a "priority byte" of $01. This mask byte value is the problem as it also includes the bit used by the IRQ service flag of the CC3Disk module generated for use with the PCDos and RSDos programs. I suspect this is fixed by the hardware's emulation of a WD-1773 floppy controller chip rather than anyone's idea who wrote the floppy disk drivers and would therefore be applicable to the "normal" versions of *CC3Disk.dr*.

I first tried to re-adjust it to $0E since that would free the bit used by *CC3Disk* as reported by *idir*. Maybe it was a good idea but I still had to play Bobby Bare's record about Madam Ruc while slowly rolling the mouse around to get that one booted. So I checked the status register pinouts in my Deluxe RS-232 manual which said only bit %00001000 was for the receive buffer full flag. It also notes that NO interrupts are generated for the three errors of farming, parity and overrun which occupy bits %00000111 of that status register. So my next fix attempt was by setting the original $0F at $B66 to $08.

I used *dEd* right on a backup of the boot disk to install the patch. Do this:

> **ded /dn/os9boot[ENTER]**

When the first sectors data is on screen do this:

> **L**

dEd will respond: Link to which module?" Enter:

> **cc3io [ENTER]**

When the first sector of cc3io is displayed (87CD0C7A for .m51), then enter an

> **s**

dEd will respond with 'SECTOR = $' you respond with

> **b [ENTER]**

dEd will advance its display to sector $0B of *cc3io*. Now enter and

> **e**   (for edit)

Disk Formats

Q: This brings up another problem I have encountered. I bought Ved and Vprint for the 68000 at the Fest. Like the good OS-9'er I am, I immediately attempted to make Backups. I got "disks not formatted alike error". Having learned that there seem to be several formats out there, how does one know or assertain the format of the new disk he buys so that he can back it up? Bye the way, I can read the two disks. I already installed the files as the instructions indicate but am puzzled by the different format.

A: I may be able to shed some light on your problem with the "disks not formatted alike error". I have found, through the same experiencies you have described above, that often-times, the software distributor will format the disk with only as many tracks as is required to fit their package onto the disk with. This (I think) may be to speed up the format/copy procedure used in creating marketable disks.

Backup will not work unless the destination disk is in the exact format (tracks, sectors, etc.) as the source disk. There is a program (shareware) out, called *AutoBackup* (I think) that will read the source disk format, call up the format command, format the destination disk to the same parameters as the source disk, then call backup to do the actual copy.

> ==SCOTT PROCTOR;FidoNET/OS-9 Echo==

EDITOR'S NOTE: XCOPY by Keith Alphonso in the TOOLS III utilitiy package will also copy disk of dissimilar format, not to mention DSAVE as well as several available versions of DIRCOPY

(8K * x) Formula for Merging Files

Q: Why did my old boot disk let ident work just fine, but not my new boot disk? The only thing that changed was to replace *cc3disk, clock,* and *sacia* in the bootfile; and to add 'date' to *stdutils*. It still remains the same number of blocks.

A: Ah ha! The light flickers on. Adding *date* to *stdutils* is what killed it. OS9 reserves the top 512 bytes of each process map. It has to. 256 bytes are the kernel code for switching task maps, and the other 256 bytes for the operating system hardware. Now, OS-9 is smart enough to load the program right up to this boundry, if it can. If it can't, that whole block gets wasted for the use of 512 bytes, and the program is loaded one block lower. This is why the magic formula is (8K * x) - 512 for merging files.

and so it coexisted in the top two blocks with the 512 reserved

Q&A

Continued

bytes. Adding *date* pushed it to 15.6K, so it wouldn't fit. One more block gone, and you could no longer ident system modules.

==RANDYKWILSON;FidoNET/OS-9 Echo==

PKZIP vs. LZH

Q: How does OS9 Unzip4.5 compare to the new LZH compression?

A: First, my only information on the 'new LZH' are the few messages that I've seen on the Fido OS9 and Ribbs echoes about LZH v1.0. So I gather that you are referring to this LZH v1.0.

Unzip45a is a decompressor only. Lzhl0 is both a compressor and decompessor based on the -lhl- compression method from what I have read. Somebody else may be able to be more accurate on the details of the compression method, but my minimal understanding is that -lhl- and the PKZIP deflate are Huffman compression schemes. The basic data structure for -lhl- is a 4K (or 8K, I forget) window on the uncompressed data while the PKZIP delfate is based on a 32K window. Huffman compression basically encodes the compressed stream with 'addresses' of repetitious or duplicate strings in the uncompressed window. On other computers, -lhl- (aka lharc with .lzh extension) has long been succeeded by 'better' compression methods like lha, arj and now PKZIP's deflate.

I sent unzip45a on to OCN for distribution as a 'hurried' release in anticipation of inevitable delays in a more polished release. At present, I have a 'basic' 92K version working with decompression times decreased by a factor of 3.5, let's say, (actually, a factor between 2.5 to 4.5 on the files tested depending on the compression method). However, other things have come up, so I cannot really say when an 'upgrade' may be completed.

==GENE KRENCIGLOWA;FidoNet/OS-9 Echo==

Software

Q: I would like to purchase some of the neat software for my CoCo that I see in *The Rainbow*, but I want to make sure I won't regret my purchases in months to follow when the price drops.

A: You ask any vendor or Coco User today why there isn't a lot of buying going on, and here are the two main reasons you will here:

1. I want to, but what if it loses support soon after?
Many people probably want to buy the new products coming out (the line up as of late is quite impressive, so I hope everyone gets their confidence up and BUYS), but they are waiting for others to buy first; perhaps to get their confidence up that the product will continue to be supported after it's initial push. That is what is hurting vendors the most right now. Vendors I'm sure will back me up here.

2. People are upset at vendors who are at least trying to break even with their sales, because they aren't competing with the Radio Shack $5 clear out prices.
Everyone is expecting prices to stay the same, yet they are forgetting that the times and software is different. Chances are, there are very few software products released by Tandy that can't be beaten by 3rd party counterparts.

People have to realize that the days of the $10 *Development Systems* and $5 *Dynacalcs* are over. CoCo/OS-9 vendors need our support, but they aren't going to get it if we keep waiting for 3rd party vendors to match or beat those obsurd Radio Shack Close-out prices.

==CHRIS PERRAULT;FidoNET/OS-9 Echo==

Serial Mouse FIX Cont'd

dEd will turn on a couple of reversed video cursors, one of which is flashing on the first byte of the display. Using the arrow heys, move the cursor to the byte at $66, which SHOULD BE a $0F, if not, start over by hitting the ENTER key and entering a 'u', then 'q' and 'y' to get out. If it is an $0F, enter a 0 and an 8 which will change that byte on the screen and advance the cursor to the next byte.

Hit the ENTER key to get out of the edit mode, then a 'w' and 'y' to write the sector permanently.

Hit the up-arrow to advance to the next sector which will not be a full display in this case. Watch the last 3 bytes, the modules_'crc'. Then enter 'v'. dEd will verify all modules in the file, fixing any bad crc's it finds, then reread the currently displayed sector from the disk. You'll see the crc bytes change at that time.

Voila! Its fixed! <Grinning like an idiot> Now you can boot without unplugging the mouse. Stick that disk in /d0 and hit the reset. You are all done. You did remember the 'v' above didn't you?

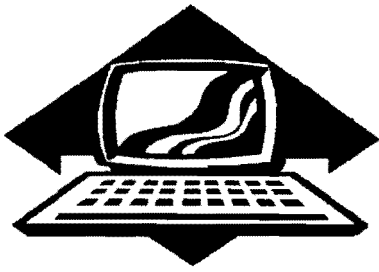You could also do it with the following modpatch scriptfile:

```
--------------------
l cc3io
c b66 0F 08
v
--------------------
```

After you run *modpatch* using the command:

modpatch <scriptfile

cobbler a new boot. For me, using '*dEd*' was MUCH easier. The mouse? Its a Logitek 'DexXa', sells for $20 at WalMart.

==Delphi;OS-9 Database==

Club Activities Report

Bellingham OS9 Users Group - Longview/Kelso CoCo Club
Mt. Rainier CoCo Club - Port O'CoCo Club - Seattle 68xxx Mug

Bellingham OS-9 Users Group

We had a very short meeting (2 hours) which we deliberated and finally came to the conclusion that our problems with the hard drive on the GIMIX can only be solved by GIMIX. Apparently the hard drive controller card is "hard wired" and appears not to be affected by modifying the hard drive descriptors. We did discover that other GIMIX machines of the same type are also configured for 15Megs regardless of what the actual capacity of the drives are. The drive that broke was a MiniScribe 3650 40Meg drive, yet it was configured as only 15Megs. What a waste!

We will be making calls to GIMIX (still in business making laptop 68K machines) to see if they can help. Whatever manuals there were that contained information about the hard drive controller card are no where to be found, probably thrown away because they were old and not about IBM or Macintosh type computers.

The second part of the meeting was writing out print routines for the PDS Database. This was the one feature left off by the Seattle 68xxxMUG group. **Wes Payne** is a wiz at Basic09 and within a couple of minutes wrote procedures for an 80 column listing of the database files, and single width mail label printout routine and a double width mail label printout. No big deal! One further improvement to the database suggested was the sort routine being written to the disk instead of RAM since the current ram routine is limited to only 100 records. How about it Seattle 68xxxMUG??????

==Rodger Alexander==

Seattle 68xxxMUG

The Seattle meeting was actually very boring because I forgot to bring a few important items for the demonstration. There had been a request to show off some OS-9 applications, so I **(Rodger Alexander)** brought along several of the **CoCoPro** programs that were featured in the recent liquidation sale: *Tools II, OS-9 Level Two Tools, Presto Partner, Disk Manager Tree* and *Multi Menu*. I also demonstrated *Multivue Canvas* and *Planet Engine*. Unfortunately, I forgot to bring a mouse and operating the software was extremely slow using the arrow keys (keyboard mouse) to manipulate the cursor around the screen.

A second demonstration scheduled didn't even happen because I forgot to bring a Laser Disk Player. The presentation was suppose to show how a Color Computer, using a terminal program and the RS-232 PAK could control the 12 inch laser disk player by sending special control codes via the serial port "/T2".

It would have been a very impressive demonstration. **Scott Honaker** and I even make up a custom serial cable to connect the CoCo to the Pioneer Laser Disk Player. Of course, the demonstration could have been achieved by any computer that had a true RS-232 serial port, but seeing the CoCo under OS-9 using Shell+ script files to execute a complete *Multimedia Presentation* would have been super cool.

Of course there is an ironic twist to this story: At the end of the meeting, when it was time to adjourn, I explained why we did not have the multimedia demonstration. **Donald**

Zongker, responded with, "Oh yeah, we have a whole bunch of those in the Universities' AV Department. If you had mentioned it earlier, I could have brought one."

There was however, one especially enlightened period in the meeting in which **Joe Pender** was introduced by **Donald Zimmerman**. Joe is an Art Major who has been using a CoCo-2 to control over 1000 stepper motors to control panels on an animated sculptor. Joe didn't bring the sculptor with him but did bring many pictures of his work and several samples of the circuit boards he designed that interfaced between the CoCo and the stepper motors using address and data lines accessed from the I/O port (ROM PAK slot). Joe will be bringing his sculptor to the PNW CoCoFEST III so we can see first hand how it works.

Speaking of the CoCoFEST, **Donald Zimmerman** gave a quick update on the new location of this year's FEST at Marshall Jr. High School. This FEST will also be in conjunction with a "PC' and "Commodore" convention going on at the same time in the same building. All three groups will actually combine for the Saturday morning Swap Meet and Breakfast. WOW! Donald requested input from those who attended last year's CoCoFEST for suggestions that might improve this year's event..........SILENCE

Meeting was adjourned on that quiet note

==Rodger Alexander==

◀━━━━━━━━▶

OS-9 Tacoma BBS

Please note that my BBS will be down for two/three months. This will give me a chance to do some personal stuff, and also to upgrade my system.

==CHRIS JOHNSON==

Port O CoCo

The April meeting of Port O' CoCo was a media event! **Gene Elliott** began the presentation by showing off our Club System. We have a couple new wrinkles. The most obvious is a matching black soft grip handle on the top of our CM-8 monitor. Now we can walk with the tower in one hand and the monitor in the other. Oh, the keyboard? Don't worry. It has a beautiful case with space for a few odds and ends. The case (a rejected typewriter case) even has the CoCo emblem on the cover! Gene also mentioned that he has acquired another rejected camcorder with a working 1 1/2 inch monitor. Eventually that will be mounted into the club's tower so a large monitor is not required. (That is, if you have 5/5 vision!)

Another impressive sight was the catalogue **Tom Brooks** has prepared of ALL our RS-DOS programs. They are all on floppies and indexed with a master printout of what we have and where it is on the disks. GREAT job, Tom! The next stage in this massive undertaking is to do the same for all the OS-9 material we have. Tom is asking for assistance from other members of the club in this segment of the project.

Gene Elliot showed the group our official calendar. All we need to do is print it out on a color printer. We will be mailing copies to everyone on our mailing list. If you have never had any contact with Port O' CoCo and would like a calendar, write us and we will be happy to get one to you. We will get these out as part of the publicity about the PNW CoCoFest III shortly.

The highlight of the meeting was our very special guest, **Chet Simpson**. He flew up from Los Vegas JUST to attend our meeting. Chet has been working with the CoCo for many years and was involved with Hyper-Tech. He may be best known for creating the graphics of the spinning ball with the reflections of the surrounding area. Oddly, enough that program was the result of a bet. He was visiting a friend who had an Atari who was showing off some great graphics

animation. "I can do that with my CoCo," Chet calmly said. He friend retorted, "$50 says you can't." Well, Chet did and put it out on the boards. Within weeks it was all over the nation. Chet is now thinking of adding shadows. variable speed and sound to his rotating sphere. Maybe when he gets the time.

Today Chet is working on a basic user platform that will be used in future programs. His goal is to have uniformity and ease in a WP, data base, terminal application and spread sheet so the user can switch between two or more applications while ALL of them are in memory. Chet is striving for the feel similar to the VIP series. This platform can be configured, like OS-9, by the user to use all available hardware, but this will all be under RS-DOS..

He's also working on a driver for the Color Max Deluxe program to be used with a laser printer. This project is just at the beginning stages. Chet is also working on a CoCo program that performs like "Flicker" on the IBM. That is a full animation program. He has some experience in this area because he wrote "Studio 29," the first fully menu-driven animation sequencer for the CoCo 3. "Studio 29" [named in honor of the studio used to tape "The Arsinio Hall Show"] can access up to 400 frames of animation data with 20 graphic images displayed on each frame, a backdrop picture and 256k of total sprite graphics data. Chet generously gave several copies of this impressive program, bundled with "Image Master 3.1" to Port O' CoCo to sell at upcoming meeting as a fund raiser for the CoCoFest III. He also gave us copies of "Digger." "Digger" is a graphics arcade game about searching for gold in the Sahara. It contains 80 levels (that are always in memory).

Before Chet could get too far we confirmed that he will be back for the CoCoFEST III and will be one of our speakers. He will give us an update on his work and will underscore the value of keeping the RS-DOS part of the CoCo community alive and well.

Chet's words of wisdom and warning

are that we no longer have Rainbow Magazine to hold the community together. So some other means of communicating is needed if we are to survive. That other means is user groups, like ourselves, and BBSs. There are lots of CoCo programs and applications on both Delphi and CompuServe. Chet personally prefers Delphi. There is great networking on FidoNet with echos on CoCo Clubs, OS-9 and just the CoCo in general. He checks these different services almost daily. One of the reasons he does "live on the boards" is that he has been unable to find ONE other serious CoCo user in a city the size of Los Vegas. He was heartened by-what he saw in Port Orchard (population 5,000). We need to keep each of the clubs in Puget Sound alive and exciting. He suggests, "You devote more time and training to teach HOW the machine works rather than just what programs are available and what they do. Since most CoCo users don't have ready support anymore, you need to understand how the machine works so when a program does act up you can begin to figure out the problem and make some educated guesses on how to fix it so you can continue to use the machine. That's the way we will keep the CoCo alive for as long as possible."

Needless to say, the program ran overtime and no one seemed to notice or care. Our next meeting is May 17th. Can we top April? Join us and find out for yourself!

==Donald Zimmerman==

PNW COCO FEST III
June 25-26 1993
Port Orchard, WA

FRIDAY, June 25

6-7 pm.   **REGRISTRATION**

7-7:45   **WELCOME**
                   PANEL PRESENTATION: "Where are we in the real world?"
                        Brief history of the CoCo, RS-Dos, Use of OS9, OS-9000 & OSK & CDI

8:45-9:15   **CONTROLLING 250 MOTORS WITH ONE COCO-II**
                        Creative Art applications - Paul Surey
                   MULTIMEDIA APPLICATIONS
                        Controlling a Laser Disk Player - Rodger Alexander

9:15-10   **68000 PROCESSORS FOR THE COCO** - Chris Burke of B&B

SATURDAY, June 26

7:30-8am.   **SET UP FOR COMPUTER SALES & SWAP MEET**

8-10   **REGRISTRATION**
                   BREAKFAST
                   COMPUTER SALES AND SWAP MEET

10-10:45   **MAKING CIRCUIT BOARDS FOR YOUR COCO**
                        Surface mount process - Scott Honaker

10:45-12   **KIX\30: Demonstration** - Allen Morgan
                   MM\1: Demonstration - Bernie Besherse

12-2 pm.   **LUNCHEON & BOB VAN DER POEL** - Keynote Speaker

2-2:45   **SOURCES OF SUPPORT (Magazines, BBS's, Vendors, OCN)**
                        Terry Laraway, Chris Johnson, Dennis Mott

2:45-3:30   **TOWER CONSTRUCTION** - Rodger Alexander & Gene Elliot
                   HOW TO GET ON A BBS - TELECOMMUNICATIONS
                        Dennis Mott, Wes Gale, Allen Morgan

3:30-4:15   **ANIMATION ON THE COCO WITH RS-DOS** - Chet Simpson
                   THE 6309 IN NATIVE MODE - Wes Gale

4:15-5:00   **PACKETT RADIO (HAM RADIO BBS'ing)** - Scott Honaker

PRE-REGISTRATION $20 or PRE-REGISTRATION + FEST MUG + T-SHIRT $30
(All costs higher at the Fest!)

CONTACT: DONALD ZIMMERMAN, 3046 BANNER RD. SE, PORT ORCHARD, WA 98366-8810