



THE EDITOR'S GODZILLA

by Lenard R. Roach

I BOUGHT ON EBAY

In the March/April, 2018 issue of "The Interface," I wrote about the cleaning up and eventual re-activation of my Commodore desktop. In that story I mentioned the acquiring the "new" Commodore MPS 802 printer. I made it look like this entire event took place in one night which, in fact, it took several days. If you don't mind, I'd like to fill in the gaps about the purchasing of that printer from what Weird Al Yankovic called, "that world wide garage sale," eBay.

Let me start right off by saying that I am not a complete novice when it comes to using eBay and, at the same time, I'm also a complete moron when it comes to using eBay. My very first purchase on the eBay website was in 2004 when Gabriel was in Children's Mercy Kansas City for his second or third round of leukemia treatments. We were buying a book that would help us guide through all the red tape of Medicare and Medicaid for a child. By using the hospital's Internet, we suspected someone started to steal our personal data and instantly tried to charge onto our debit card a \$150 eBay purchase. EBay security caught the fraudulent charge before it was completed, but we decided to close our account associated with the card just to cover our fannies. We stayed off

eBay until the end of 2017 when I was advised by other retro users that I would find parts and replacement pieces for the Commodore on eBay.

I opened a new account on eBay and have been getting on and off the website for a while, but when it came down to this revamp and cleaning of the house, I decided to pony up, get serious, and try to actually get a genuine Commodore printer. Since I had planned to reboot the desktop after I cleaned the room, I might as well as go crazy and specifically get the ever elusive Commodore MPS 802 office printer. I played it safe this time and opened a third checking account that will always carry a minimum balance of \$1.00 until it was ready to be used to buy stuff online. Then, I would pad the account with the needed monies, and wait for the funds to be removed by the merchant, bringing the balance back to \$1.00.

Now to begin: I sat down with my laptop on my lap (duh!) and went onto the eBay website. It was easy to type "Commodore MPS 802" into the site's search engine. Strangely, only about five results turned up in the search. It was good that the sellers provided photos of the products on the website showing different sides of the merchandise in question. A couple on the site had the 802 up for parts only. Another pair didn't know what the device was but were pawning it off just to make a couple of quick bucks. I made one inquiry to one of these sellers about the 802's functionality, to which they replied they had no clue. I abandoned those pursuits immediately. One seller, however, seemed to know what he had. I looked at his photos of his 802 and they seemed pretty good. I read his biography of the printer and he related that this printer was the last piece of a hand-me-down VIC 20 set up. The price for the MPS 802: \$90.00.

Oh no

I went to the "Inquire About This" section and left asked the seller (code name: "Gadgetman") if this printer was booted recently. "Gadgetman" got back with me quickly and said to me that the 802 hasn't been activated for years, so he doesn't know if it works. Fun! Well, like any garage sale, you either buy or walk away. I sat there in my lounge chair thinking if I should take the gamble. Like the other four 802s on sale, "Gadgetman" didn't know if the printer would work, but his was the best looking out of the whole group. I decided to make a bid, but in doing so I was going to severely cut his asking price a fraction past half: \$35.00. I didn't expect him to bite. In about 48 hours from my bid I got an email from eBay saying my bid was accepted and I need to pay up. What the? It's accepted? I *gotta* pay? This was getting out of control. I'm now *committed* to buy this thing? In conversation with my son, an avid eBay user, he explained to me that a bid on any merchandise found on eBay is a promise to buy. I was going to banter back and forth and see if I could bring the price down even further and it was accepted. Now I have to scramble to gather funds necessary to pay \$35 plus \$32 shipping on something that may not work.

To quote Bill Engvall, "Here's your sign."

It took a few hours to scrape up the green to pay up, but a few emptied bank accounts later (I did this form of stupid just short of payday) I had the money together and sent it via PayPal to "Gadgetman." Now I had to wait.

"Gadgetman" was groovy enough to let me know the progress of the printer's journey from his home in New Jersey to the RC4BCS in Kansas City. I was thanked by "Gadgetman" for my quick payment and he did wish that I would get good use out of it. He also shared a note with me that it was his dad who bought the VIC 20 set up and he informed his father that there was still a Commodore user in the Midwest. Nice.

The box containing the printer came about 72 to 96 hours after it was shipped. Gabriel and I opened up the package in the computer room. Before I even took the printer out of the crate I was amazed to see the device was still in its original Commodore box tightly banded to prevent harm during the shipping process. To open the Commodore box itself was almost like touching the Shroud of Turin, but I'm a gambler, and it's not the box I wanted, it was the printer inside. I took my first look inside the box and saw ...

Dear reader, this printer looked like it just came right out of the Commodore distribution center and took a 35 years journey to be delivered to my front door. Everything was packed tightly with shock resistant styrofoam, bubble wrap, and plastic. Everything was there. Not a piece was missing. I even had the original test sheet printed by the technician who did the final print test all those years ago when they packed it. Still, it's been over three decades since this printer was activated (or so it appeared) so I wanted to know if I got my money's worth or was I hosed.

Gabriel found in the outer shipping crate that "Gadgetman" was groovy enough to send along some (now bronzed) tractor feed paper. We set the printer up on a nearby stand and plugged it in. At first glance we saw the ribbon originally installed in the 802 was damaged due to bouncing around so it had to be removed and discarded. "Gadgetman" also sent along two extra ribbons that were still in the original sealed packaging. My experience in dealing with sealed ribbon packages that are over twenty years old is that they dry out just over the time, but this is what we had to work with, so we opened a ribbon package and placed it carefully into the printer. Gabriel and I acted like two archeologists working on a delicate find as we tried ever so gently to put the cartridge into the printer. It took us about twenty minutes, even with the help of the MPS 802s user's guide, to put the ribbon in correctly.

However, the mission was completed and the ribbon cartridge was installed. Now for the acid test...

Most printers back then needed to be hooked up to the computer in order to run a test print page. Commodore's built in micro processor put in each printer would allow the owner to print a test page without the use of any externals. With that in mind, we pressed and held the button on the front right of the printer while, at the same time, powering up the device. After about eight seconds the 802 was printing it's designated test page. I let the printer go on for about a minute before I shut it off and removed the paper from the cylinder.

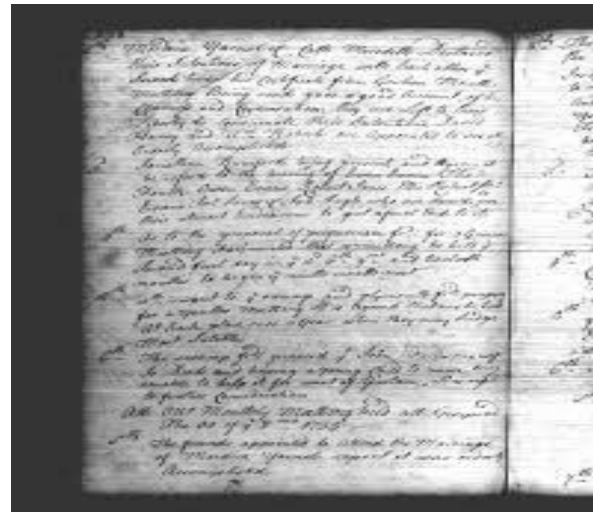
I got *way* more than I bargained for. This MPS 802 printed a clear, clean, fresh text that was well darkened for easy reading and the ribbon remained well moistened after all this time, and, most important, there was not one dead pin in the print head. I stood there in the computer room aghasted while Gabriel moved the printer onto the Commodore stand and finished running the cords and bus cables. I was starting to feel a little guilty thinking that I may have ripped off "Gadgetman" because I was expecting a poor running device. This machine was clean, mean, and pristine. I got a great deal.

I made a .pdf of the test sheet and emailed it to "Gadgetman" in my final communique to him to show him what his old printer was capable of doing. I told him he will be getting a "5 Star" review on eBay from me for great pricing, quick delivery, and above standard product. He thanked me in response and wished me well in my further Commodore dealings. I'm back in business.

Now, I'm scouring eBay for a new 1571 disk drive. For the year I let the Commodore sit with the 1571 inert, it went south. A quick Google search by Gabriel on his phone revealed that, when you put a Commodore 1571 disk drive into

any form of hibernation, even for a short time, a 5 1/4" disk must be inserted into the drive and the lever door shut or else the sheer weight of the drive heads will bend the head guides, causing the device fail when finally put to use.

Oops.



MONTHLY MEETING REPORTS

by Dick Estel & Robert Bernardo

MAY 2018

The holiday and various obligations contributed to an unusually low attendance at the May meeting – just Robert, Roger, and Dick. However, we had good conversation, ate a great lunch, and got to see an unusual Commodore peripheral.

After setting up the computer equipment, we ordered lunch. Dick mentioned that the club library did not get much use, which was fine with Dick, since he did not have to do any work as librarian. He said that he would bring a few of the educational game disks to the next meeting to see if our junior associate members, William and Charlotte, might enjoy them.

Having finished lunch and business, we moved into the hardware/software part of the meeting. Somehow, time had put the “hard” into “hardware,” as three disk drives, including two recently donated by Rolf Miller of Ventura, failed to load. Fortunately, another Miller drive was retrieved from the trunk of Robert’s Crown Vic, and this drive worked.

Robert started talking about Maker Faire Bay Area which was held the previous weekend. As usual, Robert had spent hours manning his computers at the Vintage Computer Festivalers' exhibit. As usual, hundreds and hundreds of fairgoers had gone through the exhibit, exclaiming how they used to have the Commodores, how they used to program the computers, and how they began their careers with them. As usual, there were the equipment breakdowns, like fellow exhibitors having their Apple II not powering up and their C64 burning out its SID chip.

Robert said that Maker Faire was good training for the June 9-10 Pacific Commodore Expo NW to be held at the Living Computers: Museum + Labs in Seattle. At PaCommEx, Robert planned to bring 7 to 8 Commodore and Amiga systems to display. He also talked about his fears of being the only person to exhibit at PaCommEx, the other exhibitors not responding as time grew near or even canceling out of the event. His trip will include a stop to drop off and pick up equipment for repair at Ray Carlsen’s, of course.

Robert gave us the latest on CommVEx in Las Vegas, coming up August 11 and 12. Robert is trying to get a Commodore engineer to attend who has possession of a legendary C65, serial #1.

Although we could not view it, Robert showed us the official Blu-ray release version of The Commodore Story, which has been in the works for some time. He was able to pass around the book that came with the Blu-ray.

Unlike other meetings, this time Robert stuck to the presentation agenda exactly. First, because it was the 20th anniversary of Wheels 64/128, the compatible OS for GEOS, we watched an on-line video of it in operation. Then, he showed off the relatively-inexpensive (\$42 US) SD2IEC drive from Jason Micari of Australia; it came with a 3-D printed case, plugged into the cassette port, and had a short, attached serial cable to which Robert connected a serial cable extension so that it could daisychain onto a disk drive.

We were able to see something old but new to us. Advertised as a "music synthesizer and multi-track recording system," the Music Port by Tech Sketch was software and a pre-MIDI keyboard that attached to the user port of the C64. Accessing the SID chip, it played 3-note chords and gave us a nice concert with the pre-loaded songs that came with it. It was a big hit when displayed at Robert’s table at Maker Faire Bay Area. Roger liked how using the piano-type keyboard was a more natural way to do music rather than composing music on a “tracker” with a screen full of numbers and sliders.

Lastly on the C64 front, we looked at a disk from the library of the defunct Diablo Valley Commodore User Group of Walnut Creek, California. Robert remarked that the 1990's game and utility programs were very simple-looking.

Robert tried to run the Plus/4 disk magazine, Lone News 21, in C64 mode on the club's C128. Unfortunately, the disk magazine wouldn't run, meaning that it required a Plus/4 computer so that users could view it.

Switching over to C128 40-column mode on the club's C128, we tried out newer Manic Miner 128 and compared it with older Manic Miner 64; the older version had music and animation, and so, the 128 version was not an exact duplicate of 64 version.

The C128 system was set aside, and the VIC-20 was connected. Downloaded from links at the Denial VIC-20 Internet forum, we ran the new game, Pyrotech, and the new demo/game, Dr. Ultra + Snake. The graphic of Dr. Ultra was particularly well-drawn.

Finally, we checked out the Amiga 2000 computer which Duncan MacDougall of The Other Group of Amigoids had upgraded. He repaired its 28 MHz. 68040 processor board, installed a DKB MegAChip for 2 meg Chip RAM, added 40 megs Fast RAM, attached a Video Toaster board (but didn't install its software), and upgraded the machine to the latest WHDLoad with more games. Robert and Roger played a few of those games which were on the A2000's hard drive.

Related links:

Maker Faire – <https://makerfaire.com>
The Other Group of Amigoids –
<http://togausergroup.org>

JUNE 2018

Having our meeting on Father's Day presented some challenges. At least one member who is the father of three was absent, and we assume he was having fun with the young ones. In attendance were two fathers, Dave and Dick, who had celebrated with their daughters earlier in the day/week; and two non-fathers, Robert and Roger.

The restaurant was very busy by the time we arrived, and the staff expected big crowds. We use a small banquet room at the back of the restaurant, with about ten tables available for eating and our large amounts of equipment. They asked us to limit the space we used to just two tables in order to provide for large groups expected later in the day.

We were able to do this, although we were interested to note that at 1:30 p.m. there were only

16 other customers in the restaurant's dining area and just a handful in the bar. They never placed anyone in "our" meeting room.

Over the last few years we have talked about creating a new "New Member Disk," since the old one dates back to the 1990s and definitely needs an upgrade. Robert had volunteered to take on this job and reported that he is going to try to get it ready for CommVEx in August. At the show, he will hand out copies as part of the traditional gift bags presented to each person attending.

Back in the day (way back) all the library disks were brought to each meeting. There has been little call for them lately, but Dick reminded the members that all they have to do is ask, and he will bring the desired disks (limited to one box) to any meeting.

Robert reported on the Pacific Commodore Expo (PaCommEx) in Seattle the previous weekend. Robert set up a number of systems, and to his pleasant surprise, members of the Seattle Retro-Computing Society and the Puget Sound Commodore User Group also brought in equipment. A highlight of the event was the unexpected visit of Don Elman, a former editor of Commander magazine, who spoke briefly on Sunday.

On Saturday at the show, Eric Hill spoke about making a new run of the classic Rejuvenator board for the Amiga 1000 and about A1000 Kickstart mods which combined the Kickstart and Workbench into one bootable disk.

A considerable number of people came to the museum because of the show, plus the "regular" museum visitors were surprised by some of the exhibits and amazed to learn that hardware and software is still being developed for Commodore.

The museum events' director was delighted with the success of the show and offered financial assistance for next year's event.

Before the show Robert dropped off a large number of items to be repaired by Ray Carlsen, who estimated the work would take 30 days. Robert stopped on his way home and was happy to find that Ray had completed all the repairs.

Some time ago Robert learned of a mini Maker Faire in Los Angeles and finally received an invitation to apply to present an exhibit. It will be at the public library in downtown L.A. on December 1.

Next it was time for hardware and software demonstrations. Robert received a 1541 Diagnostic Cartridge from Chris Zimmerman, who had attended CommVEx previously. It was made by World of Jani and turned out to include disk diagnostic features. It loaded up and worked fine on our 1571 drive.

Then Robert showed off Toni Westbrook's Shredz64, a C64 music game which is used with Westbrook's PSX-to-C64 adapter and a Guitar Hero guitar. Robert had last shown this in 2008 at a club meeting and had brought it back, because he had shown it at PaCommEx and was also going to show it at this year's CommVEx.

From Ryan Sherwood of the Puget Sound Commodore User Group came 3 disks with the name of "Scibax Demo". As Ryan had explained to Robert, with the 3 disks a user could learn how to create C64 demos with graphics and music. It was not as simple as it sounded. The 3 disks were full of instructions, examples, and music and graphics creation programs. However, the user would still have to learn some programming in order to connect all the pieces and complete a demo. As member Dave said, it would take a lot of study.

The meeting finished with Robert and Roger going through several of the programs on the SD card that came with Roger's SD2IEC card drive. One such program was Pinball Spectacular, a C64 game that did well in imitating the board physics of a pinball game.

Related links:

World of Jani – <http://blog.worldofjani.com>
 Pacific Commodore Expo NW
 – <http://www.portcommodore.com/pacomdex>
 CommVEx
 – <http://www.portcommodore.com/commvex>
 Downtown LA Mini Maker Faire
 – <http://dtla.makerfaire.com>
 Ray Carlsen Electronics
 – <http://personalpages.tds.net/~rcarlsen/>



GEOS: The Graphical Environment Operating System

(Part 1)

by guest contributor Kroc Camen

GEOS managed to offer nearly all the functionality of the original Mac in a 1 MHz computer with 64 Kilobytes of RAM. It wasn't an OS written to run on a generic x86 chip on a moving hardware platform. It was written using immense knowledge of the hardware and the tricks one could use to maximise speed.

1. An Introduction to this article

As we take time to look at the grand variety of operating systems available, it shows us that there is no one right way to 'do it'. With hardware already a commodity, the way we interact with our computers is taken as a standard, and a given best-practice of design. The joy of alternative operating systems, is the variety of Computer / Human interface models available.

Even now, the modern operating system is designed from the perspective of the engineer. Whilst actual human guinea-pig testing is done on new interfaces, it still does not make up the bulk of the design process. User involvement in design is almost an after-thought.

What we've come to accept as the standard way of interacting with a computer was cemented in the early days by the extremely knowledgeable and technical system engineers of the day, through a process of creating:

- a. What they felt was right
- b. What the limited hardware was capable of

So, for my article, I have decided to focus on an Operating System born in the early days of consumer-available 'WIMP' interfaces, on extremely restrictive hardware.

It is my belief that 'the restraint of hardware is the true muse of the software engineer'.

Good software does not come from being given unlimited resources; just take a look at the hardware requirements for modern PC games, for graphics that were reproducible (until recently) on a 300 MHz, 4 MB VRAM Playstation 2.

2. A Quick History of GEOS

The history surrounding GEOS and its implementation within hardware restraints unimaginable nowadays makes for the most interesting parts of the OS, rather than just the GUI itself. Below is a brief history of the Operating System, up to its heyday; where we'll then get into usage, screenshots and technical details :)

This history has been carefully gathered and researched through actual GEOS manuals, cited sources and websites.

When you think of the history of our modern day operating systems, they are either the works of individuals and volunteers based on technical ability and software beliefs, or the work of large corporations employing many programmers. Rarely is the history of an OS based in the vibrant gaming era of the 1980s.

The Graphical Environment Operating System was released in 1986, created by Berkeley Softworks: a small company start-up by serial entrepreneur Brian Dougherty. GEOS is a classic Mac like GUI running on Commodore 64 / 128 hardware, then later the Apple II, and PC.

Around 1980, Brian turned down a job at IBM to go join the games manufacturer Mattel, then maker of the Intellivision gaming system. Brian helped write games for the system for about a year, before leaving with other engineers to form Imagic, a very successful games company that rivaled Activision, before being wounded in the games industry crash of 1983. Whilst Imagic went under in 1986, Brian did not.

Dougherty formed Berkeley Softworks (later Geoworks), who in collaboration with a firm that made batteries, worked on a product for the airlines named "Sky Tray". The concept was a

computer built into the backs of the seats, and Brian and his team would develop the OS for it.

GEOS was coded by Dougherty's elite team of programmers, who had cut their teeth on the very restricted Atari 2600 and Intellivision games consoles of the time (usually 4 KB RAM). However, after the OS had been written, airline deregulation mandated that all in-flight extras were to be trimmed down to save weight and fuel, culling the Sky Tray project.

With all that time put into an OS, Dougherty looked at the compatible (6502 Microprocessor-based) Commodore 64. A few changes were needed and the OS sprang to life on the affordable home computer, complimenting the powerful graphics capabilities of the machine with a GUI.

Even though Berkeley Softworks started out small, with only two salespeople, the new software proved very popular because of low price for the necessary hardware (and of course the capability of the OS). This was due in part to the aggressive pricing of the Commodore 64 as a games machine and home computer (With rebates, the C64 was going for as little as \$100 at the time). This was in comparison to an atypical PC for \$2000 (which required MS-DOS, and another \$99 for Windows 1.0) or the venerable Mac 512K Enhanced also \$2000.

In 1986, Commodore Business Machines announced the C-Model revision of the Commodore 64 in a new Amiga-like case (dropping the 'breadbox' look), and bundling GEOS in the US.

At its peak, GEOS was the second most widely used GUI, next to Mac OS, and the third most popular operating system (by units shipped) next to MS-DOS and Mac OS.

3. An Introduction to GEOS What Role Does GEOS Serve?

GEOS is a classic Mac OS like operating system, providing a GUI for performing disk functions and running productivity software. It was targeted at the business user for in-office word processing, as well as the home user for tasks like desktop publishing and keeping records.

The original GEOS is no longer used, having died out in the early 90s due to strong competition from IBM, Microsoft, Apple and new trends in computer hardware. The history of what happened to GEOS and Berkeley Softworks will be covered at the end of this article.

3.2 Why Review GEOS?

To give balance and perspective. GEOS managed to offer nearly all the functionality of the original Mac in a 1 MHz computer with 64 Kilobytes of RAM. It also wasn't an OS written to run on a generic x86 chip on a moving hardware platform. It was written using absolute immense knowledge of the hardware and the tricks one could use to maximise speed. The closest thing to GEOS in this modern era is MenuetOS, written entirely in x86 assembly code.

GEOS came at a time before the world wide web, before home computers were PCs, before mass storage that you could afford, and long before Bill Gates and Windows were No.1.

GEOS did not pioneer the GUI; most of its features were already present in the larger OSes of the day, like the classic Mac (albeit, not Windows). What GEOS did show is that cheap, low-power, commodity hardware and simple office productivity software worked. You did not need a \$2000 machine to type a simple letter and print it. This gave some sense of perspective in the heady 'Golden Age of Computing' of the 80s

and even now, as some alternative OSES struggle to port bloated software from other platforms.

Many OSES can claim all sorts of things, and in-fight over who invented what- first. GEOS helped drive the proliferation of the newfangled GUI concept to regular users without the need for the famous Apple Hype Machine (likely one reason why GEOS is now all but forgotten).

GEOS was able to introduce home users to Point & Click, Cut / Copy / Paste, WYSIWYG Word Processing and what you expect from a GUI without having to afford an expensive Mac or PC with Windows. Before GEOS, the home user had to go to work to even see a GUI.

Then there was GEOS on the PC (more about this at the end of the article), which had the Start Menu concept two and a half years before Windows, and a PDF-like UI model 10 years before Mac OS X ;)

3.3 How is GEOS 'Alternative'?

When we speak of operating systems, the word 'alternative' is not quite as it is from the dictionary. Mac OS X is an alternative to Windows just as much as Windows is an alternative to OS X. It is simply one choice over the other. But with OSES, 'alternative' has come to mean 'niche', 'minority' and 'hobby'. How can GEOS be 'alternative', if it was at one time more popular than Windows?

OSES can change over time, even change purpose. OS/2 and BeOS are considered alternative, despite being big important OSES in their day. I believe that the same is of GEOS. At the end of this article, I will cover how GEOS has been retro-fitted by fans to add modern day functionality, as well as the OS that came after GEOS, extending the life of GEOS well into new millennium. The fact that people still boot GEOS on real Commodore 64 hardware and make real

things with them, because they can, certainly defines GEOS a hobby OS. Because those who run it on real hardware are few and far between, that makes GEOS a minority OS; and because GEOS is generally only run by core C64 fans it also makes GEOS a niche OS. :)

3.4 Hardware Requirements

Although GEOS later became available on the Apple II and then eventually the PC (more about this later), this article will be covering the Commodore 64 version of GEOS due to free availability and wealth of accessible information. I also own a real GEOS disk set for my Commodore64 and hope to make use of them in this article.

GEOS ran on any Commodore 64 home computer. Because of the popularity of the Commodore 64 as a games machine, GEOS can also be easily run on most C64 emulators on modern computers. GEOS itself is now available for free download - more details soon.

Commodore Business Machines released the C64 in 1982 at a price of \$595. Designed primarily as a home computer for playing (initially educational) games and business software, its low price and powerful features made it a runaway success. Here follows some technical details of the hardware.

- 1 MHz 8-bit MOS Technology 6510 Processor

The 6510 was a 6502-based processor, that which can be found (as variants) in the Atari 2600, NES, Apple II & BBC Micro computers. It is a RISC style processor, utilising very few registers (Just A, X, Y & a 256-byte Stack)

- 64 Kilobytes RAM (+20K ROM of which 7 KB Kernal)

- 16 Colours in 40x25 text mode (320 x 200 resolution)
- 8 Sprites
- MOS 6581 (C64rA,B) / 8580 (C64rC) SID sound chip
Three sound channels (2 MIDI like sound synthesisers, and one White Noise)
- 'Datasette' Tape Drive, later, 1541 Disk Drive Programs on tape cassette. Later a 5 1/4" Disk Drive was released with support for 170 KB per disk. Later a 3 1/2" Disk Drive was released with support for 880 KB per disk.

As you can see, this is a very tight amount of space to fit a full operating system, including user apps! The original Mac OS was 400 KB, with 128 KB of RAM to play with.

GEOS made good use of the many expansions available for the Commodore 64. As well as supporting two disk drives and many printers, you could also purchase a RAM expansion to add 128, 256 or 512 KB of extra RAM to the system. The biggest upgrade, late in the life of the C64, was the SuperCPU

- a 20 MHz upgrade module!

3.5 How To Get GEOS

GEOS is available as a free download, and can actually be purchased, as a set of 5 1/4" disks with manuals! I personally own a GEOS 1.5 disk set with manual.

In order to run GEOS on your PC or Mac, you will need a Commodore 64 emulator to simulate the hardware. I recommend these emulators for the necessary emulation accuracy needed to run GEOS on PC/Mac.

CCS64 – Windows

Has 99.9% emulation accuracy and still in active development (for over 10 years). CCS64 can emulate almost every last timing quirk of the real hardware and thus is accurate enough to run GEOS (which does contain some extremely clever hacks that can fool most emulators)

Make sure to enable the mouse by pressing F9 to bring up the menu and navigate to the input section. Also, for accurate disk speed (i.e. slow), go to the Special menu and disable 1541 Turbo speed or GEOS may fail to boot.

Power64 - Mac OS 9 / X

There are not nearly enough emulators on Mac OS X :(. Power64 is a shareware app that emulates the C64 accurately enough to use GEOS. Whilst Frodo is free it is not accurate enough to run GEOS; it hangs at the boot screen. Power64 has excellent mouse support and is ideal for running GEOS. Although it's not a 'universal binary', it runs without flaw under Rosetta on Intel Macs.

The VICE Emulator is also capable of running GEOS on just about every other alternative OS available. Configuration is much more complex, and if you are technically inclined you can compile the source code to produce an X11 app for Mac OS X for free.

GEOS was made available for free download in February 2004 by CMD, makers of modern day Commodore add-ons (like the 20 MHz SuperCPU).

Instructions on downloading GEOS and getting the disk images available here:

<http://cmdrkey.com/cbm/geos/geos1.html>

Follow the 'I Agree' link, and then the first link labeled 'go here'.

Download the GEOS 64 '1541 boot disks'.

3.6 Booting GEOS

GEOS requires no installation as the Commodore 64 has no mass storage besides a floppy disk drive, and GEOS comes on floppy disks anyway.

Attach the 'GEOS64.d64' disk image to the emulator on drive 8 (the first disk drive on a C64) and then start the emulator. Most emulators will allow you to double click, or 'open-with' the .d64 file with the emulator to attach the disk automatically.

This is the Commodore 64's normal OS. A text-mode command-driven system. In normal configuration, the system reserves just 38 KB for writing BASIC programs. The C64's architecture is incredibly flexible however, and by switching out the ROM shadows in the upper areas of RAM, you could free up almost the entire 64 KB (if you wrote your own IO drivers). GEOS itself ditches a large amount of the default system to fit into the memory available.

Type `load"geos",8,1` and press return. Don't hold shift otherwise you'll get symbols instead of letters. The C64 had a series of ASCII-like symbols printed underneath each key. When in normal mode, holding Shift and pressing a key would display the symbol, allowing you to draw ASCII art in the C64 character set. On the C64, this character set is known as PETSCII, as in PET-ASCII (The Commodore PET was an earlier education market computer).

3.7 The deskTop

You are quickly presented with the GEOS 'deskTop', the main interface where you'll do basic disk & file management, configuration and launching programs.

The Commodore 64 supported several video modes. Although the resolution of the C64 was always 320x200 in aspect, the way it interpreted

the screen data could be changed in a number of ways.

In order to produce the UI in GEOS, the C64's "high resolution" bit-mapped mode was utilised. A full 8 KB of memory had to be reserved to store the monochrome pixel data, where one byte represented the on/off states of 8 pixels. Rather than the screen data being ordered in a continuous stream from the left to right and then down each line, the screen data was split into 40x25 characters of 8x8 pixels. 8 bytes represented one character, running from top to bottom of the character and then left to right across the screen in characters.

Programmatically, this made it difficult to draw diagonal lines unless they aligned with the 8x8 characters, but it meant that large block copies of memory were easy to do. It also meant that referencing the right hand side of the screen (whose pixel locations were greater than 255, what one (1) byte allowed) was easy, because technically the screen was only 40 characters wide, each of eight (8) bytes in height.

The downside is that whilst you get full fidelity to draw the letters manually and thus fit in more than 40 letters per line - it was monochrome. The mouse pointer is blue because the mouse is created using the C64's hardware sprite support. A sprite could freely be moved around without erasing and redrawing the screen contents below. The C64 itself would not be fast enough to handle redrawing screen contents in the bitmap, as the mouse moved.

Although bit-mapped graphics ate 8 KB of RAM, it meant that the programmers could erase the 4 KB of PETSCII graphics from the standard text-mode, and better use these resources for storing the OS and freeing enough RAM for any user apps to run.

Along the top of the screen there is a "command menu". Just like Mac OS, there is only one menu bar and it displays the menu according to what app is running. Considering that there is no multi-tasking at all in GEOS, it makes little difference. The Commodore 64 has a key with the Commodore logo on it - much like the Windows or Apple key on modern keyboards.

The 'disk note pad' is the main window that shows the contents of the current disk. It cannot be moved or resized and doesn't have scrollbars. Instead, the page curl at the bottom left can be clicked either on the curl to go forward one page, or on the page behind to go back a page (also accessible with the 1-9 keys). You can have up to 18 pages depending on how many files are on the disk.

There are no file extensions and no subfolders! The disk contents are a confusing mix of utility applications, key system files, and drivers. Whilst files inside of GEOS can have their own icon, normal C64 files from outside GEOS will always show as the 'C=64' folder-like icon. Double-clicking these instantly exits GEOS and loads the C64 program.

The GEOS boot disk however is not meant to be a place to store your own files, or your productivity apps. With only 170 KB per disk, each productivity app usually comes on a separate floppy disk. Once GEOS is booted you can switch disks to run new applications. When you exit the application you must insert the GEOS boot disk so that it can load the 'deskTop' application. If you copy the deskTop application to other disks (or use two disk drives) you can avoid massive amounts of disk swapping.

The single button on the title bar is the close button. It does not close the window entirely, but rather 'eject' the disk from the system, leaving the window blank. Clicking on the disk drive symbol

on the right of the deskTop will load that disk's contents.

The 'border' (the blank area underneath the disk note pad which holds the current printer and the waste basket) can be used to place up to 8 files off of the disk note pad, so that you can change either pages or disks and move the files to the new location. Clicking an icon selects it in inverted graphics, and then clicking again turns the mouse into a ghost of the file icon, allowing you to move it to the border.

The icons in GEOS are all 24x21 pixels in size. This is because the Commodore 64's sprites are always 24x21 in size which equates to 3 characters (8 pixels wide) across and almost 3 characters high. Whilst GEOS's icons are not sprites themselves (they could be of any particular size because they are drawn dot for dot on the bit-mapped screen), 24x21 is used so that the mouse pointer (a sprite) can become a ghosted icon in drag and drop operations.

The reason for falling short of three bytes tall is so that when the 8 supported sprite images of 504 bytes each are counted it adds up to 4032 bytes, leaving 64 bytes in a 4 KB block of RAM to control the positions, visibility, order and colours of the 8 available hardware sprites.

The Commodore 64 also included a programmable Interrupt ReQuest controller (IRQ). Every 1-50th of a second, a routine in RAM was called. The programmer could tap into this in order to run instructions before the screen refresh, half way through (or even a few tiny instructions within the time it took for the electron beam to 'fly-back' to left hand side of the screen, from the right). This gave the programmer the power to redirect the pointer to the sprite data halfway down the screen, in order to produce 16 working hardware sprites. 64 simultaneous hardware sprites have been demonstrated using this method!

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-The Small Print-

The Fresno Commodore User Group is a club whose members share an interest in Commodore 8-bit and Amiga computers. Our mailing address is 185 W. Pilgrim Lane, Clovis, CA 93612. We meet monthly in the meeting room of Bobby Salazar's Restaurant, 2839 North Blackstone Ave., Fresno, CA. The meetings generally include demonstrations, discussion, and individual help.

Dues are \$12 for 12 months. New members receive a "New Member Disk" containing a number of useful Commodore 8-bit utilities. Members receive a subscription to The Interface newsletter, access to the public domain disk library, technical assistance, and reduced prices on selected software/hardware.

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Unless Some Unforseen Force Stops Us, The Next Issue Of "The Interface" Should Be Out After All The Material From CommVEx 2018 Has Been Gathered And Processed.

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