



THE EDITOR'S GODZILLA

"Stupid" Keeps Lenard From Attending The 2014 CommVEx

-by Lenard R. Roach

Only 13 more months and I should be able to attend the 2015 CommVEx Commodore Expo in Las Vegas, Nevada.

I'm as mad as a stirred up hornet's nest that I will be missing the 2014 Expo that will be happening in July, but when you do stupid with your money, it's stupid that you will pay; no ifs, ands, or buts.

I hope and pray that none of you will do stupid like I did and cheat yourselves out of attending the greatest meeting of Commodore minds and talent ever to gather in the western United States. Usually when I go, most of the demonstrators have Commodore hardware and software for sale that is WAY over this programmer's head. Heck, gang, I'm still using a stock Commodore 128 with no extra speed or memory attachments to be found. I have a CMD 100 meg hard drive sitting in the garage needing a new boot ROM chip, but with Maurice Randall gone AWOL, I don't know where to find repair parts for such devices. Maybe Robert's buddy Ray Carlson would have what I need. Time to send an email ...

I also have a 256K REU sitting in a Glad baggie

that I never use because I just don't use anything in Commodore that requires the extra expansion. I think I remember reading SOME time ago that one of our industrious Commodore brethren or sisters invented a battery back up unit for the REU so when you shut off your Commodore for a few hours, anything stored in the REU would still stay in memory until next reboot. I don't know if that was for just emergencies like power outages (which happen a lot here in Kansas due to overbearing summer heat and humidity, or blistering winter cold where ice and snow overstress the power lines to where they snap), but I'll need to research this some more and see if this BBU still exists. I still use my APC 500 Back UPS on my Commodore in case of power outages, but this smaller unit would only be able to hold a Commodore with power for about 15 to 20 minutes, which should be more than enough time to save what data I'm working on and power down the computer before battery power reaches zero.

I've been meaning to thank Robert and FCUG for sending me this neat Star Rainbow NX-1000C printer that, despite some missing parts, works fine for needed Commodore printing and other Commodore works requiring me to have a copy of hard data in hand. This printer is especially handy for when I am programming in BASIC 2.0 and I have a "bug" that I can't find by just by looking at the screen, so I print the program out on paper and stare at it until I fall asleep. One thing I haven't been able to do with the Star NX-1000C is make it cooperate with my "Check It Out" program. I think I found "the bug," but it would require me to re-write the entire print subroutine, which could possibly make "Check It Out" useless for any other 9-pin printer to use.

You see, I use an "OPEN 6,4,6" and an "OPEN 10,4,10" command, which is understood by the Commodore MPS 802 printer and some other Commodore printers, like the MPS 803, but these little "OPEN" statements is gibberish and

sometimes garbage to some Commodore printers and most Commodore compatible printers. Before I had "Run" magazine publish "Check It Out" I should have tested the program on as many Commodore printers that I could find. Back in 1992, Kansas City had access to a wonderful, funny, and all out groovy dude called "The Commodore Man." Maybe some of you readers have heard of him. Anyway, he had in his stockpile plenty of Commodore and Commodore compatible printers that, if I was just thinking ahead, I could have borrowed one for a few days at a time and tested "Check It Out" on them and see which one of the printers would have cooperated best with the program and made a list of those printers in "Run" magazine. Those of you who still have that issue of "Run" or can access it from the Internet will only read that I gave the programming code for "Check It Out" to work on the MPS 802 and MPS 803 printers. Even when I was using a Star NX10-C printer I had to make adjustments to the blank "PRINT#3" statements so that particular printer would work with that particular program. Those of you who either purchased or won via door prize a copy of "Check It Out" during my last visit the Las Vegas own the Star NX10-C version of the program. If you want the version that works best with the MPS 802 and the MPS 803 printers, then please get the November/December 1992 issue of "Run" and type in the program from page 22, or send me a letter and I will try to hook you up with the original program, which differs slightly from the one published in "Run." The good people at "Run" decided to add a "YR" designation to the "PRINT" statement containing the year data (I think it's line 990; I'm not sure) instead of having the user change line 990 to the next year and re-saving the program using the "@0:" command like I designated. That was cool, but I was trying to save the user of the program the hassle of typing in the year each and every time you wrote a check. Oh well, such is the life of a published author -- editors are always sneaking around and making things "better" despite the author's

intentions.

By the way, those of you who purchased or won a copy of the disk containing all the programs I have written over the last 15 years or so when I was at the last convention, get ready. I'm re-vamping just about every program on that disk with new program line re-arrangements, new subroutines, and a host of other (I hope) improvements. Those who have the disk, I think there were 5 in total (and Robert Bernardo I know is one of them), need to contact me so I can have your mailing address again. I promised those winners and purchasers free upgrades if ever the upgrades came and SHAZAM -- the Spirit of Upgrade kicked me on the right side of my head (with an iron boot, bloodying my ear) and gave me some stuff to add to the programs. Nigel Parker of Commodore Free also gave me the idea of treading up my old, failed (?) program, which is Version 1 of "The Ledger" called "The Obligator Coordinator," and had me look at that one again and see if there are any fixes I can do to it and make it Commodore publishable again. If the Lord and time permit over the next 12 months, I will have an almost brand new package of programs to be bringing to the 2015 CommVEx Expo. Be reminded, though, that I still have my script writing, my article writing, "The Interface" newsletter, and my 3 jobs to work all in the middle of this, so there will be days that I will be miss working on the Commodore or I'll be trying to burn the midnight oil getting things done. Again, like I just stated, I have 12 months to get this done.

To be honest, reader, I don't like going to any Commodore function without a product or book in hand for sale or perusal. Most Commodore users, like our illustrious club president, knows how to kick fanny and get all his stuff done on his regular job and work with Commodore also. Robert is making quite a name for himself in the Commodore world and I for one am proud to see him flourish under the flag of our club and

beloved computer in the 21st century. If I was to come to the 2014 CommVEx, I would be bringing the same old stuff I brought last year, and most of you who attended the last time I was there (I think it was 2012 or 2013; I can't remember) have already bought or investigated my wares and would be looking for something new.

But back to the first statement I made about doing stupid with money -- and please learn from me -- NEVER spend lots of money or buy things on credit when you are going through a serious emotional moment like a death in the family or a separation of spouses. I spent like I was in Congress buying stuff, and getting loans and credit cards to buy more stuff, wrapping myself in a cloak of debt, thinking that at least I still had my jobs and I could pay this off in just a few years and my emotional needs would be satisfied. I never suspected that six months after my divorce I would lose not just one, but both of my full time jobs in that short amount of time. My life came apart financially, so I had to file for Chapter 13 bankruptcy while at the same time I was looking for work in the middle of winter right after the Christmas holiday. Jobs were slim, but I stumbled onto some part time jobs that sustained me until I got a full time job as a courier for a small outfit in the East Bottoms of Kansas City, Missouri.

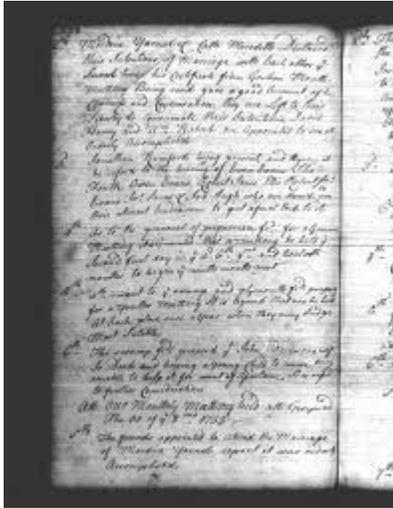
Am I financially and emotionally stable now? Let's say, that after five years of being a single guy, and a lot of support from family and friends here in Kansas City, on the Internet, and even in the Commodore universe, I may have finally got my act together and I am slowly pulling away from this money pit I have dug for myself by using a much smaller shovel to fill in the hole I have dug. I used a backhoe to dig the hole; now I am using one of those camping shovels that doubles as a pick to fill it in.

That's why I am trying to "run for the prize" as St. Paul said in one of his letters to the churches, and

keep my focus on getting to the 2015 CommVEx. Will FCUG have a 2015 CommVEx? I don't know. I pray so. The Club has been blessed for the last 10 years straight in having this wonderful symposium for Commodore and I am fully confident that there will be a 2015 show in the offing. If not, then I will do what many authors (like James Dobson) and composers (like Jeff Lynne) do and take a couple of weeks (or a weekend) in a new locale (like Las Vegas) with my trusty Commodore in hand and work on several plays, articles, stories, skits, and programs in my room. Apparently the change in venue seems to spark new creative energies and I have been dying to try this method for myself and see if it works.

But first, focus. I'm guessing I'll need about \$2,000 for me and five of my family members and friends to go by car to Las Vegas. This will include eats, hotel, fuel, and about \$500 for emergencies. Last trip to Vegas, the Pokeball colored Neon found a nail on Interstate 70 in Utah and I had to find a repair shop to fix the car up. It only cost \$35.70 for the repair, but it was an expense I hadn't planned on spending. Remember Robert's last article in "The Interface" about his poor old Crown Vic overheating. This can happen to anyone, and like most disasters, you have to plan for them, because they WILL happen. I guarantee it.

Well, thanks for reading my speil in this issue of our newsletter. As always, it is a pleasure to share with all my Commodore commrades out there, both in hard copy and cyberspace. I'll catch y'all in August where there will be reports on the events of this year's CommVEx Commodore convention.



MONTHLY MEETING REPORTS

MAY 2014

-by Dick Estel & Robert Bernardo

In case those of you following our club from a distance think our meetings are examples of organized, structured magnificence, let me set you straight. They are informal, chaotic, almost anarchic, and most of all fun and interesting.

As people arrive and bring in equipment, conversations take place on a variety of subjects, often having to do with computers but not necessarily. In May the participants in this organized mayhem were Robert Bernardo, Roger Van Pelt, Greg Dodd, Louis and Vincent Mazzei, and Dick Estel.

After we have set up anywhere from one to four computers and whatever other equipment is needed, we usually get around to ordering lunch, and a semblance of order is seen. Robert formally calls the meeting to order and makes any announcements he may have. Of course, comments, observations, and irrelevant side conversations may take place simultaneously.

Club members brought goodies to give away –

new, never-opened VHS tapes from Dick were claimed by Roger and Greg; and Roger brought a large box of tractor-feed paper. When new, it cost around \$10; now a rarity, you'll pay \$30 if you can find it.

Robert presented a film on the Internet that was produced by his students at John Muir Middle School in Corcoran. Each year there is a student film festival in the Los Angeles area, and Robert's class entered for the fourth time. The subject this year was "preventing gang violence." Robert gave his 8th grade students the basic idea, and they wrote the script, acted the parts, and participated in filming.

Robert was able to attend the festival held at Fox Studios, and came home with certificates of appreciation from the California State Senate for the students.

Robert then reported and showed video on his visit to the William Shatner Weekend in southern California, where participants could pose for photos with "Bill" and have him autograph items. Shatner recognized Robert immediately, since he has been the only person who every year brings in Commodore items to be autographed. This year it was a gigantic Commodore PET 8050 disk drive, weighing perhaps 20 pounds.

Robert presented the Commodore Vegas Expo 2014 website, found at <http://www.portcommodore.com/commvex>. This will be the 10th annual event, and there will be an emphasis on the Commodore Plus/4 in recognition of the 30th anniversary of that machine. It appeared that Louis will take on the role of Robert's "right-hand man" at the show, taking on such duties as collecting money from ticket and raffle sales. Even Roger and Greg expressed interest that they might be able to make it to CommVEx.

Some official business was conducted at this time.

We voted to establish a policy to divide any payments received for file conversion service equally between the club and the technician who does the work. (This service is explained on line at <http://www.dickestel.com/fileconvert.htm>.) The duties of equipment manager were transferred from Dick Estel to Roger Van Pelt (Dick will be available as a back-up).

Greg informed the club that he met up with Duncan MacDougall, repair technician for The Other Group of Amigoids (TOGA) in San Jose. In the past, Duncan had repaired and upgraded virtually all of Robert's various Amiga computers and had also upgraded C64 power supplies. Greg met Duncan at the TOGA meeting (held the day before the FCUG meeting), and Duncan, being a good repairman of many classic game consoles and computers, gave Greg a beautifully-working Atari 520ST computer system and did an on-the-spot repair for another system Greg had brought. With Duncan advising him, Greg felt more positive that he could now load classic Amiga OS 1.3 games into his Amiga 2000 with OS 3.1.

Robert reported that the June FCUG meeting would be moved to the second Sunday, instead of the third Sunday of the month. This was due to his traveling to Europe on June 11. If any club member wanted a Commodore or Amiga item from Europe, Robert was willing to bring it to the U.S., provided that the item fit in his suitcase.

One of his European stops would be in Venice, and he was still trying to choose a hotel. Mike Battilana of Cloanto, the company which produced of Amiga Forever and C64 Forever CD/DVDs, had invited him to that part of Italy; he would meet with Robert and show him the area. Mike had attended the Commodore Vegas Expo three times and the Amiwest Show several times.

The first software demonstration was the Family Roots program by Quinsept, one of the top

genealogy programs of its time, which was donated by Justin Jernigan of Mid-Atlantic Retro-Computing Hobbyists. It required a data disk, and we didn't have one set up, so we couldn't do much, but we were able to load the program and take a look at the menus, as well as browse through the extensive manual.

Moving to hardware, Robert brought in a Quickshot SV-2000 robotic arm which he had purchased for only \$10 from an engineer in Camarillo. It was similar in shape to the arms you see in commercials that show auto manufacturing, but small and plastic. It could be controlled via the Commodore 64, but Robert's package did not include the necessary cartridge. Robert was hoping to buy a replica cartridge from Tim Harris at Sharewareplus.co.uk. However, the arm could also be controlled with two joysticks, and we all enjoyed playing with this new toy. (See <http://theoldrobots.com/Mecarobot.html>)

Dick had to leave relatively early, but the members carried on. Though Robert did not actually load anything from it, he attached the new uCassette (microCassette, also from Tim Harris) device to the club's C128. With an audio player transmitting WAV files through it into the computer, the user could load in programs just as if he were using a datasette drive.

On the Amiga front, Robert disassembled his Amiga 3000 in order to install the ZorRAM 256 meg memory card bought from AmigaKit.com. It was a snug fit to install that board into one of the computer's Zorro III slots, and so, Robert held down the machine to keep it from sliding on the tabletop while Roger pushed the board into the slot. The computer was reassembled and powered up. Success! Instead of the maximum 18 million bytes of Fast RAM that the computer formerly had, now it showed a whopping 284 million bytes!

Though we had no program that would tax the

Fast RAM capacity of the Amiga, Robert booted up the naughty Leisure Suit Larry 3, and Roger tried to maneuver around the landscape of this graphical adventure.

JUNE 2014

-by Robert Bernardo & Dick Estel

Despite the 100 degree heat outside, it was cool in Bobby Salazar's Mexican Restaurant on June 8, and FCUG members gathered for good food, good conversation, and the latest in Commodore news.

Enjoying the day were Robert Bernardo, Roger Van Pelt, Greg Dodd, Louis Mazzei, Vincent Mazzei and Dick Estel.

Not computer-related but demonstrating the value of preventive maintenance, the first thing we noticed as we each drove up to the restaurant was that half the roof of a building across the street was caved in, with a large air-conditioning system hanging at a precarious angle. This was a somewhat historic building, having been the site of Gospel Music and Supply Co. at least as far back as the 1950s, but more recently a furniture store. (Photo at www.dickestel.com/images/calif6449.jpg.)

Our waitress told us that the owner had been warned ten years ago to make repairs, and we observed the cost of ignoring this advice. The three people in the building at the time of the cave-in got out safely, but there were gas and water leaks, and Blackstone Avenue, the major street in front of the area, was closed for a day or two, harming all local businesses and inconveniencing drivers.

Robert brought some unexpected goodies. Long ago, probably in the 1990s, he had loaned some Commodore books to Betty Vasquez of Visalia.

She returned them, along with a jar of chocolate-covered raisins. Even if we had no interest in the books, most of us enjoyed a handful of raisins for dessert.

While attending Notacon on April 12-13 in Cleveland, Ohio, Robert learned that the event had lost money and might not continue. He is in discussion with the event organizers about making a significant donation to help the event continue but is still waiting for complete information. There's information on-line at www.notacon.org/ and at <http://www.notacon.org/1895/the-end-of-an-era/> (Robert's photos from the 2011 show are available at www.dickestel.com/notacon2011.htm.)



A HISTORY OF THE AMIGA

PART 8

THE DEMO SCENE

Where else could you have "a hand in creating things that were so damn cool"?

-by Jeremy Reimer

Genesis

As computer games became more and more complex in the late 1980s, the days of the individual developer seemed to be waning. For a young teenager sitting alone in his room, the dream of creating the next great game by himself was getting out of reach. Yet out of this dilemma, these same kids invented a unique method of self-expression, something that would end up enduring longer than Commodore itself. In fact, it still exists today. This was the demo scene.

The genesis of the demo scene started with the Apple II in the late 1970s and fully formed with the Commodore 64 a few years later. It started with the battle between game developers and pirates. Companies, like Sierra, would add newer and more clever copy protection to their wares to prevent copying, and this challenged the pirates (who were mostly teenagers) to crack the protection. If you were the first to crack a game, you wanted to show off your feat to your friends, so crackers would add a byline with their pseudonyms on the game's loading screen.

Friendly competition between cracking groups led to an artistic arms' race. Instead of just modifying the loading screen, groups started to create their own "intros". These were little animations that would scroll the names of the group's members, perhaps with a little music in the background. As the intros got larger and more complicated, they started to rival the size of the games themselves. Eventually, some groups stopped doing the cracking altogether and just packed a single floppy disk with as much of their art, animation, and music as they could. These were the first demos.

Creating the demo scene

Demos required the participation of multiple people, including artists, musicians, and coders, much like a small game studio. Unlike games,

however, demos did not (at least at first!) earn their creators any money. For the teenage crackers who became demo creators, this wasn't a huge issue. Creating a great demo wasn't about getting paid. It was about recognition from your peers, about amazing your friends by showing them something they didn't think could be done. This was something greater than money. It was empowering and addictive.

The first demo groups cut their teeth on the Commodore 64, an everyman's machine that ended its long life after selling 22 million units. When the Amiga arrived, powered by the Motorola 68000 chip, it represented a quantum leap in power over its 8-bit cousins the Commodore 64 and Sinclair Spectrum. Demo groups flocked to the new machine with its greater color palette and superior sound. The Amiga's custom chips were just begging to be explored by clever coders banging directly on the hardware using assembly language for superior speed.

Although the Amiga 1000 was released in 1985, it wasn't until the more inexpensive Amiga 500 came out in 1987 that kids interested in demos could afford one. Trefor James was one of them. "I started out with a BBC Model B and then moved onto a Commodore 128," he explained to me. "When the Amiga 500 first came out, I knew I simply had to have one. It was so hugely ahead of anything else that was around at the time. It changed everything."

A friend at school gave Trefor some pirated games, most of which had intros from the cracking group on the front of them. He loved the idea of a group of guys (and they always seemed to be guys) who dedicated themselves to the challenge of removing copy protection. He also was intrigued by the idea of scroll text, where you could communicate with others doing the same thing. A friend, already in the demo scene under the name "Count Zero," told him that if he liked

intros he would love demos. Count Zero then gave him a stack of 3.5-inch floppy disks.

Most of the demos contained phone numbers in the scrolling text in the end credits, and Trefor called some of them up, not knowing what to expect. He found that they were “a bunch of really cool guys” who were just as excited about computers as he was. Before he knew it, he was part of the scene as a mail trader.

In the early days, the primary method of distributing demos was by mail. This proved somewhat impractical as the scene got larger, so trading moved to dial-up modems and bulletin board systems (BBS). This led to a new problem -- long-distance phone bills. Traders could have up to 150 contacts with whom they swapped software. Trefor said that monthly phone charges of £400 (more than \$1,100 in today's currency) were not uncommon. For a teenager, it was hard to sustain these bills for very long.

Some people sold their computers to cover the costs, thus exiting the scene forever. Others started trading hacked calling cards. “Virgin” cards were highly sought-after currency as they could be used for up to six to eight weeks. AT&T and MCI were the most common as they provided toll-free 800 numbers in most countries. The top cracking and demo scene BBS would trade in valuable text files describing how to build blue boxes and other “phreaking” tips for hacking the phone exchanges.

Before the Internet, these phreakers were building their own international communications network. Demo group collaboration sometimes extended over oceans. Arctangent, a 19 year-old computer artist living in the US, had contributed some graphical screens for an electronic scene magazine called “Grapevine.” One night at 2 a.m. his phone rang. He heard the distant, tinny voice of a British woman asking if “Aaah-tangent”

would like to join the demo group LSD. Initially he thought it was a prank call, but they phoned back and insisted that he “just say yes.”

Running a demo group

Keeping all these far-flung groups of enthusiastic teenagers organized took a very special kind of management. When Count Zero asked Trefor to join the group Anthrox, he jumped at the chance. It wasn't a large group (he was their fifth member) and when Count Zero started winding down his activities, Trefor ended up taking on some of the group's management duties. Much of this activity consisted of finding smaller groups and “consuming” them for their talent. A good way to grab an artist or a coder from a rival group was to bribe them with an offer of a cheap modem. It was a tricky balancing act. Artists and musicians wouldn't join groups without good coders, and the coders wanted the best artistic talent to make their algorithms shine.

Disputes between groups were inevitable, and while they never got truly nasty, sometimes bad feelings would leak out into the demos themselves. Along with the “greet” to other groups displayed in scrolling, bouncing text, more nasty messages could sneak in.

Occasionally a group would release a sub-standard demo “on behalf” of another group they were fighting with. These arguments may seem petty with the benefit of age and hindsight, but they mattered a great deal to the people involved at the time. Sure, in some sense they were typical teenagers, with cliques, in-jokes, and plenty of swearing. But they were also very atypical teenagers, capable of writing highly tuned assembler code that talked directly to the Amiga's custom chips and made them sing.

Running a demo group was basically a job that you paid to do. So why would anyone do it? Trefor provided the answer: “What else could you

do at such a young age that would let you talk to and meet people from all over the world and have a hand in creating things that were so damn cool?”

The technology behind the demos

Demos are, at their heart, a way to showcase the artistic, musical, and coding talents of their creators. As such, each demo was written from scratch by the team members. Sometimes artists would argue about the particulars — was it acceptable to draw images on paper and then scan them in, or should all art be created entirely digitally on the computer? — but generally everyone agreed that all the content should be original. That was part and parcel of the whole exercise.

In general, the graphical effects were rendered in real time when the demo was run, rather than being pre-rendered over many weeks and then played back as an animation. Partly this was due to the technology of the time — you couldn't fit much animation on a 3.5-inch floppy disk — but mostly it was about creating amazing new effects that nobody had seen before. Demo groups mystified the audience about how these pieces were generated. Pre-rendering would have ruined all that.

Some early effects included the aforementioned scrolling text, making graphics ripple and wave, blasting large numbers of sprites around the screen, dynamically shifting colors in a plasma effect, or creating a simulated 3D effect using dots or balls.

Today, with 3D graphics chips being powerful and ubiquitous, it's easy to become jaded about graphical effects. But back then, 3D graphics cards didn't exist, getting 3D effects out of a 7.1 MHz CPU took a combination of tightly coded assembly language programming with some creative tweaking of the Amiga's custom chipset.

The fact that the effects were generated in real time made demos essentially like little video games that ran automatically without user intervention. As such, it seemed like a natural conversion for demo coders and artists to move into the game industry. Many of them did. Some game studios absorbed the demo culture wholeheartedly. Psygnosis, who produced some classic Amiga games like *Shadow of the Beast*, were known for their graphical prowess and even their logo resembled the highly stylized fonts used in demos.

However, the transition from demos to games wasn't automatic. Demos, after all, didn't have to worry about gameplay or even leaving any CPU cycles over for game logic. Some of the demo members were into the scene for the purity of the challenge and saw making games as “selling out.” And of course, there was natural attrition as scene members got older and got regular jobs, discovered girls, or both. Despite all this, the demo scene continued to grow.

Demo parties

Creating demos and distributing them over the world via mail and electronic bulletin board systems was fun, but it lacked a certain something. Every demo group member wanted to prove that they were the best, but how could you do that? The only way to know for sure was to gather all the best demo groups into the same room and let the audience judge for itself. And thus the demo party was created.

The first parties evolved, like the demo scene itself, out of pirating. “Copy parties” brought people with the same computers together for an afternoon of discussion and trading software. A typical party was one like the monthly meeting of the PaNoRaMa Commodore Computer Club, which at its height had more than 1,500 people coming to meetings held in a lecture hall at Simon

Fraser University [in Burnaby, British Columbia, Canada]. On the main table, a stack of daisy-chained floppy drives droned constantly thanks to the Amiga's multi-tasking prowess. As time went on and law enforcement found out about these parties, they shifted away from copying (at least out in the open) and more toward demos.

Demo parties started out as small gatherings of friends but soon grew into much larger events. As they became more serious, it felt natural to award prize money to the winning contestants. The money came not only from entrance fees but also from corporate sponsorships. Companies ranging from local businesses to industry powerhouses like Intel and Nvidia advertised at demo parties. The amount of cash raised varied from a few hundred dollars to more than \$50,000 for the largest parties.

One of the most popular demo parties (and one that is still around today) is Assembly, an annual three-day event held in Finland. The first Assembly was held in 1992 and was organized by the Amiga demo groups Complex and Rebels and the PC demo group Future Crew. Each year the party got a little bit bigger until, by 2002, they had to rent out an entire hockey arena to fit everyone.

Amiga versus PC

In the mid-to-late 1980s, the Amiga was the undisputed champion of the demo scene. Its custom chips, multiple graphics modes, and 16-bit processor ran rings around PCs. An Amiga could display 4096 colors at 360×576 resolution while simultaneously playing four-channel stereo digital sound without taxing the CPU. A typical PC of the same time mostly ran in text mode or, if you were lucky, displayed at 320×200 in four glorious colors while sometimes managing to emit a solitary beep.

In the early 1990s, however, this began to change.

Mostly this was due to advancing PC hardware, particularly the new VGA standard that could display 256 colors out of a palette of 256,000. PC hackers like Michael Abrash dug deep into the VGA internals and found undocumented features like Mode, a method of programming that allowed for smooth scrolling, something previously considered impossible on PCs.

The release of the 386 chip and its cheaper 386SX cousin also propelled the PC forward in pure processing power. Games like Doom and Wing Commander showed some of the amazing almost-3D effects that you could do purely on a 386.

The Amiga and PC scenes quickly formed a rivalry. The Amiga folks were suspicious of the PC upstarts and disliked the inelegance of the PC architecture. The PC people felt that the Amiga was languishing in the past. Sometimes this rivalry extended to the demos themselves. Amiga demos would make fun of the PC in scroll text, while PC demos would flash messages saying "it's dead"—and everyone knew what they were referencing.

The rivalry still lasts to this day, but it has become more of a friendly one. Many of the demo scene participants are getting older and are more interested in socializing than fighting. Many demo parties separated Amiga demos and PC demos into distinct categories to avoid any cross-platform competition. Some, however, still bundled all demos into one big pot. In these competitions, whenever an Amiga demo won, there was loud cheering and energetic sign-waving from the Amiga fans. The last time this happened was in Assembly 2006, when Starstruck from the group Black Lotus took home the grand prize. It's still an impressive work of art today.

Where they are now

Many demo scene members went on to interesting industry jobs in graphics, animation, or software

development. All of them remember their Amiga demo days fondly.

Arshad Rahman lived in Toronto in the 1980s. He was part of a small local Commodore 64 cracking scene that moved on to the Amiga. While the North American demo scene was a small fraction of Europe's, with its massive Assembly demo parties, it was still a chance to create impressive new things and get noticed by the industry.

Arshad had written a cool 3D ball demo and showed it off at one of the Amiga Developer Forum's monthly meetings. This caught the eye of the owner of a video game development company, and he hired Arshad immediately to work on a game. He ended up working on a high-end Video Toaster-based editing software package before joining ATI in 1995.

ATI released one of its first 3D accelerator cards in 1996, the Rage2. This card was somewhat derided at the time as a "3D decelerator" because the poorly optimized Windows drivers would often produce lower frame rates than simply using software rendering on the CPU (I had a friend who bought one of these cards at the time and we personally verified that it did actually slow things down). Arshad took the card and, returning to his Amiga roots, bypassed the drivers entirely and programmed the card directly on the "bare metal." He was surprised to find that the card's 2D performance was blisteringly fast, and he ended up porting a few of his old Amiga demos over to a Macintosh running a Rage2 card. The card didn't have all the custom chips that the Amiga did (such as the copper) but a significantly faster blitter chip combined with a fast CPU made it possible for a PC to finally catch up with and surpass what the Amiga had been doing for years on a 7MHz 68000.

The modern demo scene

While the demo scene still exists today, it has

transformed somewhat from its early roots. Because virtually anything imaginable can be produced in real time with modern 3D video cards, there are "64k intro" and "4k intro" categories for groups that want to show off exactly how much visual wonder can be produced from a tiny amount of code. (The 64k is the maximum size of the executable file, but the demo may use as much RAM as it deems necessary). They use extremely aggressive compression techniques and the modern PC's insane processing power and memory to generate a lot of content on-the-fly.

Razor 1911, a cracking and demo group with a long and storied history, produced a 64k intro ironically called The Scene is Dead for the Revision 2012 demo party. It started off with a view of an old AmigaOS boot screen viewed through a retro nostalgia lens and ended with 65,535 bytes of pure visual joy. YouTube provides a good approximation of the results, but the quality when running the code directly is still superior.

Much like the Amiga itself, the demo scene ignited people's passions and imaginations. It showed what amazing things people willing to spend time and effort on their craft could produce with the help of a computer. In the end, it spawned careers and industries too numerous to mention. While at first glance the demo scene might seem to be a part of history, its continued existence is nothing less than a triumph of the human spirit.

Tune in for the next installment in the series that will cover the Amiga's Video Toaster and the incredible impact it had on the industry.



THE REAL STORY OF HACKING TOGETHER THE COMMODORE 128

-by Bil Herd

The most popular computer ever sold to-date, the Commodore C-64, sold 27 Million units total back in the 1980's. Little is left to show of those times, the 8-bit "retro" years when a young long-haired self-taught engineer could, through sheer chance and a fair amount of determination, sit down and design a computer from scratch using a mechanical pencil, a pile of data books, and a lot of paper.

My name is Bil Herd and I was that long-haired, self-educated kid who lived and dreamed electronics and, with the passion of youth, found himself designing the Commodore C-128, the last of the 8-bit computers which somehow was able to include many firsts for home computing. The team I worked with had an opportunity to slam out one last 8 bit computer, providing we accepted the fact that whatever we did had to be completed in 5 months... in time for the 1985 Consumer Electronics Show (CES) in Las Vegas.

We (Commodore) could do what no other computer company of the day could easily do; we made our own Integrated Circuits (ICs) and we owned the two powerhouse ICs of the day; the 6502 microprocessor and the VIC Video Display IC. This strength would result in a powerful computer but at a cost; the custom IC's for the C-128 would not be ready for at least 3 of the 5

months, and in the case of one IC, it would actually be tricked into working in spite of itself.

To add to the fun, a couple of weeks later the marketing department in a state of delusional denial put out a press release guaranteeing 100% compatibility with the C64. We debated asking them how they (the Marketing Department) were going to accomplish such a lofty goal but instead settled for getting down to work ourselves.

As the project progressed we realized that this most likely was going to be the final 8 bit system to come out of Commodore. We began shoving in as many features as could fit in a 5 month time frame. Before we were done we would have a dual processor, triple OS, dual monitor (40 and 80 column simultaneously) with the first home computer to break the 64k barrier. We started referring to the C128 as 9 pounds of poop in a 5 pound bag, we couldn't quite get 10 pounds to fit. We also joked about turning out the lights on our way out the door as we knew that the 8-bit era was coming to a close.

The C128 would require two brand new 40 pin custom chips; a Memory Management Unit (MMU), a Master Programmable Logic Array (PLA), and the venerable but scary VICII video core chip needed to be re-tooled. We also had the chip guys bond up a very special 48 pin version of the 6502 microprocessor and we decided to use Commodore's newest 80 column chip which by itself almost caused us to miss CES. (But that's a different story).

So here is where the need for some serious hacking comes in; we needed to start writing software (a whole new Rom Kernel and Monitor and a brand new version of Basic featuring structured commands), we needed to start the process of making PCB's and we needed to start debugging the hardware and understanding the implications of trying to use 128k of DRAM (yes "k", not m,g or t) which was a first, as well as the

first MMU in a home computer. Along the way it turned into a dual processor system 6502/Z80, and simultaneous 40 column TV display and 80 column monitor. Home monitors didn't really exist yet, we were kind of counting on having that done in time also, along with a new hard drive.

What we ended up doing was designing the first PCB to take either finished 40 pin dip chips or 40 pin emulator cables leading to emulator boards built of 74LS chips that when combined with some rather cranky PLA's (The FPGA of the day) and delay lines and whatever else we could find, acted close enough to a custom chip that the programmers could continue working.

Our construction technique was to add to the PCB as much as we knew we needed for sure and then add jumpers to that as needed. The mainstay though in the 80's was good old-fashioned wire-wrap, and so we proceeded to lay out a sacrificial main PCB and wire-wrap sub-assemblies to act like the custom chips that would hopefully arrive in a couple of months. (Looking at the bottom of the main PCB its hard to believe that in about 3 months we would start a production run of several million.)

This was just the beginning, ahead lay some fairly insane kludges that all had two things in common; We had to get any hack or fix done overnight while the managers were home sleeping and the end result had to work in million piece quantity.

During the final push to CES we ate our holiday dinners out of aluminum foil in the hardware lab using the heat of disk drives to keep the food warm, and the bathroom sinks doubled as showers. My shoes became unwearable due to extended use and were discarded, only to have a mouse take up residence in the toe. (The first Commodore Mouse).

We assembled units in the booth the night before the show, Commodore Business Machines (CBM)

employees were tasked with hand carrying the 80 column chip which had almost been a show stopper. The programmer that had ported CPM was able to fix the last of 80 column bugs by editing raw data on the floppy.

As far as the product performance at the show we nailed it. Nothing failed, there were no "blue screen" moments, and the press was kind to us. Upon returning to work we struggled with how to ramp down after having been in the crucible for so many months. Showers were taken and eventually the slack-jawed expressions gave way to normal-jawed expression.

We figured we had done the last big 8-bit computer, we knew one era was ending but we were also excited about the advent of the 16-bit Amiga even amid rumors of big layoffs in engineering. Without the drive of the founder, Jack Tramiel, CBM seemed to wander aimlessly canceling the next computer, the LCD Computer system amongst little to no marketing of main products. The feeling for me was as the days of Camelot had come to an end. The team slowly broke up without a new challenge to bind us together, I ended up working at a Trauma Center in New Jersey in my spare time as I had become somewhat addicted to adrenaline.

The C128 Engineering Team as seen in the Easter Egg image:

Bil Herd: Designer & Hardware Lead

Dave Haynie: Intricate timing, PLA Emulator and DRAM

Frank Palaia: Z80 Integration and Ram Expansion

Fred Bowen: Programmer and Software Lead-Kernal & Monitor

Terry Ryan: Programmer- Basic V7 including structured language additions.

Von Ertwine: Programmer- CPM

The Commodore C128 was produced in 1985 and sold 5+Million units generating about about \$1.5

Billion in revenue. The C128D with built-in disk drive was supposed to be released at the same time as the standalone unit but the C128D did not make it into production for a couple of years.

[CBM engineer Dave Haynie replied to many questions after Bil's article was published. Here are Dave's responses, minus the sometimes wordy inquiries.]

Dave Haynie says:

December 9, 2013 at 3:49 pm

The 68000 was a bit of both. To a hardware guy, it's a 16-bit chip... 16-bit data bus, extended address bus. To a software person, it was all 32-bit, with the expected 32-bit flat addressing (logically, anyway), the 32-bit register model, and instructions for 8, 16, and 32-bit data types. To a CPU designer, it's a little of both. 32-bit registers, but most other things are 16-bit. There are three 16-bit ALUs, and yeah, you can do 32-bit operations, but they run in two phases, so they're a little slower... still much faster than not having them.

The only really important thing in the long run was the instruction set architecture. That allowed for future 68K systems that were fully 32-bit, starting with my old buddy the 68020. Even got a tiny instruction cache and 32-bit barrel-shifter in that bad boy.

Dave Haynie says:

December 9, 2013 at 4:00 pm

The "towers" as we called them were made from very fast TTL chips and PLDs. The VIC chip couldn't have been emulated, but the "PLA" and MMU were small enough. They were more complex than anything you'd find in most computers of the era — some of those 10ns or 5ns PALs ran \$10 each.

Commodore actually put the 8520, or at least

most of one, on a very expensive FPGA, years later. The chip designers were moving the 8520 design to HDL for incorporation in the CD32 all-in-one support chip. Do to test this, it went into a multi-hundred dollar FPGA... not exactly a practical replacement for a \$1.25 chip, but when you can test out you new chip designs in old hardware, you do.

Dave Haynie says:

December 9, 2013 at 9:01 pm

In the day, I wrote hundreds of Amiga articles,. And that one angry film... There's not all that much call for it these days, though I am doing an Amiga thing at VCF East this Spring... postponed from last year, as they were still recovering from Hurricane damage. But I'm always happy to talk/write about this stuff (you might have noticed).

Dave Haynie says:

December 9, 2013 at 9:09 pm

We also did similar towers for various Amiga chips. There had been a Fat Agnus tower, there was an A500/A2000 Gary tower, no original Buster tower — that had in theory been prototyped on the German version of the A2000, but that implementation contained a big I didn't find until we had the first chips back — ouch! All kinds of very large towers were made to prototype A3000 chips. But the project C128 was the last time anything had been wire-wrapped... at one point, we had three theoretically similar C128 towers, each doing something slightly different.

Later on, at least for awhile, Commodore got really good at fast turns. Gary, DMAC, RAMSEY, Buster were all built on Commodore's in-house gate array process. So we could, if necessary, get new chips turned around in a month. It's hard to get a new PCB turned around in a month. For just a little while, I was very spoiled... my punishment was to work at start-up companies ever since :-)

Dave Haynie says:

December 9, 2013 at 8:37 pm

Of course the 68000 wasn't an option for the C128. The goal was to deliver a C64 upgrade, not a completely different computer... and besides, we already had a 68000 project. The 68K would have required considerably more memory, a 16-bit bus architecture, etc... it's a different computer. The Z-80 was cheap, and easy to adapt to the existing 8-bit bus... well, easy once Frank joined the team.

The 68K was certainly a better choice for the next ten years, but that wasn't the question the C128 team was trying to answer... you kind of knew that by the fact we pretty much knew the name of the product before the project had started.

And actually, at Commodore, before Jack left, there was this other project: the "Z8000 project", also dubbed the Commodore 900. Prior to acquiring Amiga, that was the future direction for high-end systems at Commodore. The Z8000 was, of course, Zilog's upgraded CPU — 16-bit all the way, but with a real MMU chip as an add-on. So it was running Coherent, a UNIX clone.. that solved the "big system" OS problem in a useful way, since writing a real next-generation OS was not easy task (which is why you didn't have many companies doing this from scratch — most used off-the-shelf pieces, which unfortunately didn't necessarily make things very "next generation").

What became of the Commodore 900? Well, at Commodore, it was cancelled. But if you take out the Z8000, drop in a 68000, and put it in a C128-like "flat" computer + keyboard case, it's going to look an awful lot like the Atari ST. Thing is... there were three different hardware teams on the C900... it had been going on several years by the time we got into the Amiga business. The first two teams just couldn't get the damn thing to work. The third team, GRR (George Robbins) and Bob Welland, went on to bring you your Amiga

500. People from the second team left with Jack to go do things at Atari.

That last version was done... it could have been productized, and might even have been, had Commodore been healthier in '84-'86. It would have been an amazing value in monochrome megapixel UNIX workstations, up against the Sun 2 and similar 68K machines. No way did the Z8000 ultimately have the staying power of the 68K, RISC, or eventually the x86, but in '85, it wasn't a bad way to deliver that. The Z8000 machine also had its own expansion bus system, designed using flat cards with 2-piece connectors... a little like the idea of Sun's S-Bus, you could have these in pretty low form-factor workstations.

Dave Haynie says:

December 10, 2013 at 10:00 am

Remember.. there actually were C64 emulators for the Amiga. They didn't work at speed, except on trivial stuff. The one on my smartphone pretty much does.. then again, my 2-year-old smartphone (Galaxy Nexus) is faster than most PCs were 10 years ago, not to mention any Amiga, ever.

That said, if you really believe that C compilers even now can match top assembly coder performance on 68K code, much less 6502 code, you haven't met any good 68K assembly coders. It wasn't even much of a contest. And that wasn't even the right question to ask. Compiler didn't win because they produced better code. They won because the definition of "better" was always in flux, and the simple fact that you could change a few compiler switches and change "better" from "as small as possible" to "as fast as possible"... much less the output from "68K object" to "x86 object" to "ARM object" is why compilers won. Hands down, and long before, as it has been the case recently, CPUs got complex enough, and compilers good enough, for hand assembly to be a

bad idea in general. I mean, a modern compiler can take into account the effect of the actual CPU hidden under the virtual x86 in any modern PC desktop processor. Your brain may know about things like register renaming, but it doesn't track that. Not that this gets used much — folks write code for “x86's; or maybe “2013-vintage-x86's, but not so much effort targeting the LGA2011 i7-3930K in my PC versus the i3 or A10 in someone else's.

And sure, there were loser technologies that weren't bad, even then. The National 16032 and 32032 were interesting... and their “blitter per bitplane” graphics processor technology even more interesting, at least to me at the time. AT&T's 32xxx series, their later “Hobbit”, etc. were another that had some good ideas, but got lost in the noise (and, apparently, the chip being too complex to make at AT&T's fab in Allentown, PA).

Dave Haynie says:

December 9, 2013 at 4:42 pm

Oh please, the Sinclair QL was even slower than the C128... the only appearance of the 68008 outside of a toaster oven or dishwasher. You really shouldn't run a 32-bit ISA over an 8-bit bus... that's just wrong.

Just as with Tortelvis fans, 5,000,000 C128 fans can't be wrong. Sure, we did much better things with the Amiga, the first machine to have the performance to back up a GUI environment. We knew the C128 was likely Commodore's last 8-bit machine, and there were plenty of uses for such computers. It wasn't for some years that the Amiga had better office tools than you could get for the C128... on the day it shipped. Different computers for different purposes... not everyone wants a “bleeding edge” system.

And consider, too, that the C64 was a transitional system in the target of the computer. Sure, there

were business machines by then, but a fairly limited market. In the era of the PET, you bought a computer to get “into computing”... the same reason you might buy a guitar or a camera... that device was the central focus of your hobby. This was still largely true in the VIC days, other than for gaming, and into the C64 era.

By the time the C128 came out, this really wasn't true... most computer buyers were computer users. They bought the computer nit to hack, but to support something else with it... like I might design a PCB, edit a video, produce a song, or write articles on some silly blog with my PC (or in the latter case, my tablet)... no coding necessary. Computing for most isn't an endpoint, but a means to some other end.

In 1985, the C128 ran more software, mostly mature, reliable software, than any other computer. The Amiga 1000 shipped a couple of months later, but it was really for computer hobbyists at that point. Not regular users. That changed over the next decade, but back then, the C128 was a much better choice. I'll leave it as an exercise to compare C128 sales to Amiga 1000 sales, despite the fact the Amiga changed more about personal computing in one product than certainly anything since Chuck Peddle invented personal computing with the launch of the PET 2001.

Dave Haynie says:

December 9, 2013 at 8:57 pm

The C64 and, by extension, the C128, were designed to be low cost systems. That means you're budgeted on case complexity, budgeted on the power supply — only a little juice there for add-ons, etc.

Believe me, they counted every penny. I spent quite a bit of time working on C128 timing and compatibility — I ran every cartridge known to mankind on the C128, and when something didn't work, I had to figure out why. Often that also

meant telling the manufacturer what they did wrong in the design (usually after I reverse engineered it — quicker than trying to get anyone to send schematics), but probably still trying to support it if we could.

A one point I had figured out that the 74LS245 data bus buffer to the “1MHz bus” was too slow for expansion to always work. I needed to switch to a 74F245.. and that was a big deal... the 74F245 was MORE EXPENSIVE. I mean think about it, at C64 volumes, if you spent an extra \$0.50 on a part, that’s \$2 million in lost profit every year.

Here’s another good one... we actually fixed a software mistake in the C128's hardware. Back in the olden days, when Bil had hair on his head, dinosaurs roamed the earth and I still fit in size 34 jeans, there was this drawing program from Island Graphics (“Micro Illustrator” maybe), and it was kind of a big deal. This came on a cartridge, and ran in C64 mode. When you booted it up, it had this splash screen that got really clever and draw itself using their own primitives. One of those was flood fill... and on the C128 in C64 mode, when they went to go dot the “i” in the logo, they missed. See, of course, every program counted not just bytes but bits, and to save some of those, they read these character patterns from the C64 ROM.

But someone (Fred?) had spent time making a more readable font for the C128. As a result, the i’s dot had moved up by one pixel. So the splash screen proceeds to flood fill most of the screen... and then, since that erased lots of other stuff, run more and more of these really slow operations. So it took more than 1/2 hour to get past this already-too-long 1-minute-or-so splash screen. That’s when the C128 started backing the character ROM... when you’re in C64 mode, you have the old C64 character set. That’s the kind of thing we found, though this was certainly one of the more entertaining versions. That’s why none of us in

Engineering would ever have approved the “100% compatibility”... it’s that old saying: genius has it’s limits, but stupidity is unbounded. Never bet that you are smarter than everyone else is dumb :-)

Dave Haynie says:

December 10, 2013 at 10:08 am

That penny-pinching was the reason Commodore won the 8-bit “wars” and put most of the competition out of business. It’s the reason there were 27 million C64s sold... it wasn’t until the Apple iPad that any single model of any personal computing device sold as well.

What killed Commodore was the opposite... penny-pinching on the development side, while at the same time rewarding bad managers with outrageous pay. When you had just Irving Gould and Mehdi Ali receiving each several times the pay of the CEOs at Apple and IBM, it wasn’t very difficult to smell the problem... in fact, there’s a film about this –

[http://www.amazon.com/Deathbed-Vigil-other-
tales-digital/dp/B00B1X898K/ref=sr_sp-
atf_title_1_1?ie=UTF8&qid=1386698760&sr=8-
1&keywords=deathbed+vigil](http://www.amazon.com/Deathbed-Vigil-other-tales-digital/dp/B00B1X898K/ref=sr_sp_atf_title_1_1?ie=UTF8&qid=1386698760&sr=8-1&keywords=deathbed+vigil)

Sure, cutting too much on cost can affect the quality.. but that wasn’t the case here. They say there’s a C64 in every closet... but what’s also true: the C64 in every closet still works.

Dave Haynie says:

December 10, 2013 at 10:18 am

150K QLs, 5 million C128s. Do the math... the QL was a failure. Nobody wanted one. It just didn’t deliver a computing experience superior to existing AND WELL SUPPORTED 8-bit machines. It pretty much proved what most developers already knew: you could’t just drop a pseudo-next-gen CPU into a current-generation 8-bit platform and make anything interesting.

They also got a bad rap for claiming it was ready

long before it was (though that was far more standard practice in the mid 80s than it is today... Commodore used to “trial balloon” products at CES shows all the time), shipping with all kinds of bugs and faulty hardware, etc. The QL barely lasted a year in production.

Dave Haynie says:

December 10, 2013 at 7:10 pm

Hey, if you liked the QL, great. The problem was precisely that Sinclair built a last-generation system with half of a next-generation processor. For people who were into the “computer as a hobby” thing, it was an interesting option for just about a year, before real next generation systems were out. I’m not knocking that... I bought my Exidy Sorcerer in ’79 and my Amiga 1000 in ’85 both because I wanted something cool to program — didn’t really care about the applications. But by 1984-1985, that was a tiny fraction of the market for computers. And pretty much any computer at that time offered the same level of interest, if not more, other than maybe a chance to get the first 68K machine.

And your analogy is incorrect... both Volkswagen and Mercedes have been successful car companies, despite the very different price model ... particularly going back to when the C64 was dubbed the VW Bug of computing. In that model, maybe the QL was the DeLorean... looked interesting from a distance, but most people didn’t buy one after seeing it up close. McDonald’s is successful, but so are hundreds of five-star restaurants. So are thousands of food trucks, too... but more businesses fail than succeed. Making a computer people want IS an important part of being in the computer business.

And you’ll get no arguments for me supporting the Atari ST... elsewhere in this blog I related another story about the move of Jack and his boys to Atari. I didn’t know that team so well... I started at C= in October of ’83, they left in

January of ’84. But as I mentioned, they may have left with big ideas and even designs that were the Commodore 900 and may allegedly have had something to do with the Atari ST, but the folks who actually got the C=900 to work, George Robbins and Bob Welland, went on to make the Amiga 500.

And no one’s going to argue with you on what’s best for you, personally. Me maybe least of all. When I made Amigas, I made them as much as possible for myself, which turned out to also be a good enough thing to sell hundreds of thousands or millions to other people. But seriously, that’s kind of how things went at Commodore. It was like that when Bil was there, but didn’t change all that much. The Amiga 2000 got a fully functional video slot because GRR and I were sitting around the lab one day and just kind of came up with the idea... without that, no Video Toaster. The CPU slot worked correctly because I knew fully well that, even getting into “serious” computers like the Amiga (the kind with a real OS that actually gets updates, rather than the old 8-biters, where the OS is essentially part of the hardware spec), so I wanted a drop-in CPU upgrade. The A3000 got a 32-bit expansion bus because I thought it needed one, and decided to go invent one. I mean, the absolute best part of working in computers in those days, or in consumer electronics in general: you get to make something that can meet your own standards. That does tend to make one critical of lesser things.

And for the record, Macintosh hardware was the worst of all... they used polling where an Amiga would use interrupts, they used interrupts where we’d use DMA. Of course, they’re still around... slick software is an easy marketing win. No one understands the hardware anyway.

When I want a new computer today, I make one from boards... no one’s selling just what I want... made a new one last summer... typing on it now.

Dave Haynie says:

December 10, 2013 at 3:00 pm

Once again, the whole point of the Z-80 was to enable, cheaply, access to lots of existing software that could take advantage of the 80 column display. That was it — the Z-80 was because of CP/M... all kinds of business software available off-the-shelf. Again, the C128 wasn't intended to be the computer for the next 10 years, but something to replace your C64 with.

The only 68K personal computer in 1984 was the Macintosh... sure, there were some 68K-based workstations, but they were an entirely different thing, requiring lots of memory (memory was VERY expensive in the C128 era, and sometimes even in short supply) and hand-made UNIX-style MMU solutions and hard drives... not an option in a \$500 personal computer yet. The 68K was a good answer to the question of a next-generation system, but it made absolutely no sense just dropped — without software — into a old architecture.

And of course, the 68008 ran everything the 68000 did at half-speed. So your 8MHz 68008 wouldn't necessarily outperform a 2MHz 6502 on important tasks. The 68008 made some sense for embedded projects, where it had the advantage of more memory (up to 1MB), and code development was largely new for each project (it's certainly much faster to write for a 68K in C than a 6502 in assembly).

Not that the Z-80 was fast, either... it wasn't. But it was also a gateway to more software. The CP/M system on the C128 worked very well... I had a system set up with three 1571s, a good monitor, modem, etc. Kept using it for awhile even after I got my A1000.

Dave Haynie says:

December 10, 2013 at 7:20 pm

Nearly major business program of the day ran on CP/M. That was the main attraction. All that stuff

that got ported to MS-DOS started out on CP/M. And CP/M was actually way more system-independent than MS-DOS... the C128 ran pretty much anything the Kaypro could run. So that was instantly a thousand+ professional programs that ran on the 80-column display. And most were already discounted, because the serious business users had paid their \$5,000 for an IBM PC by then, so all the CP/M stuff had been dropped in price. But still supported.

That was kind of ironic, too, because most CP/M machines ran rings around the original 4.77 MHz IBM PC. Even the PC-AT was kind of a wash at that point... not talking the C128's 2.08 MHz Z-80 here, but the systems that had pushed business apps before IBM came along. The reason the IBM PC took over was, first, the FPU... drop an 8087 in there, and your spreadsheets went 100x faster than on a CP/M machine. Or an Apple II. Or a CBM/PET/C64, whatever.

So, to flip it back, just what successful 68008-friendly operating system could we have launched on the C128 to deliver anything like that, on the day the C128 shipped? Building a whole new 68K OS was not an option... we already had the Amiga coming, and of course, the aforementioned C900, which hadn't been cancelled when we started the C128.

Dave Haynie says:

December 9, 2013 at 9:31 pm

Actually, it was the early development stuff, the stand-ins for the PLA (which wasn't really a PLA, but we called it that because it replaced the actual PLA used in the C64 design) and the MMU. By late '84, we had at least early revisions of most of the chips.

That really expensive 6-hour turn was for a PCB tower. There were all kinds of problems with the 8563 at that point in time. The big problem: most of them just didn't work. It had terrible yield, but some did. Once you found those that could work,

though, the problem was that they didn't work as designed in the system. I had poked and prodded the very first ones we got in, written some code to get a display up and running on the very first silicon, and found the main problem: you could write a register, but it didn't always take. It was much more reliable if you write it twice, but even then not 100%. Turned out that the 8563's designer was originally from Texas, and there had been a few other things from Texas that had a similar behavior (part of the chips in "Tragic Voice", for one), so these got dubbed "Texas registers". But I digress.

Bil, along with Dave DiOrio, figured out the 8563 wasn't properly syncing between it's own 6502 bus interface and it's pixel clock, so they did some PLL magic to make that lock happen outside the chip... that's what the tower did. While they were cranking out that tower, I was working along with some random managers to sort through hundreds of 8563 chips for the few that could be made to work ok.

And as Bil says, things went off like magic at CES that next week. What he didn't tell you was how much of a dynamic process that was. So ok, if you came into the booth at Commodore and played around with C128s, they all worked as they were supposed to. You could run them all day, no problem, as long as you left them doing the things they had been set up to do. But there was a little smoke and mirrors going on here. Some of the 8563 worked very well, once whipped into submission with Bil & Dave's tower. Some... not so well; they worked, but they weren't stable enough so that you'd want to show them. Worse yet, the PLL tower had to be tuned, and it wasn't temperature compensated well enough. So if you shut one of these systems down and then rebooted immediately, it probably wouldn't lock. It most likely would, if you let it cool for 15-20 minutes, but not something you want on the show floor.

Little of this would have been a problem, except for the fact that Marketing People kept turning off the C128s, putting some into 80-column mode that maybe were supposed to be showing C64 programs, etc. So I had a can of freeze spray and a "tweaking tool", and I spend much of the week pushing around Marketroids and resetting C128 PLL towers.

One night that week, Bil and I were invited up to the Amiga suite, to hang with RJ Mical and Dave Needle, and get a closer look at the Amiga. They cracked the case... one of us remarked something like, "hey, we have one of those too"... they had a very similar looking tower under one of the Amiga chips. Good times!

Dave Haynie says:

December 10, 2013 at 10:36 am

Yeah, it was 16. .. that was the C128, too.

Amiga changed it up... that's why we had to deliver monitors to go with the Amiga in the early days... PCs used "RGBI" monitors... 4-bit digital color code per pixel, 16 possible colors, and determined by your monitor. And the monophonic 8-bit SoundBlaster was the standard sound in a PC at the time... and an add-in, even at that. Stock PCs only had that built-in beeper thing.

Macs, of course, were mono-only, as were most "business" computers. In those days, the Atari 400/800 has the best color, far as I recall, short of dedicated CAD systems. They could do up to 16 colors out of a 256-color palette, depending on the mode... lots of weird modes in those computers. Of course, in theory, any computer using CVBS or Y/C output could deliver any NTSC/PAL color. Most had other limits, though, particularly one of memory bandwidth... another place going to 16-bit-wide memory buses (and running them twice as fast as your CPU did) helped considerably.

Dave Haynie says:

December 9, 2013 at 9:37 pm

For those who do have fond memories of the 6502, check this out:

<http://www.visual6502.org/JSSim/index.html>

These guys actually reverse engineered all 3,500 transistors (1/20th the size of a 68000) and have a cool simulation running in HTML5. Links to the sources, too... not suggesting it's time for a transistor-level C64 emulator, but cool none-the-less.

Dave Haynie says:

December 10, 2013 at 2:45 pm

As the name suggests, the Spectrum ULA was an "Uncommitted Logic Array"... a gate array.

That's inherently a step down in complexity from the VLSI used in most Commodore chips. We didn't have an in-house gate array process during the C128 development, If we had, the PLA and the MMU would have likely been done as gate arrays... certainly the PLA (which, as the name suggests, had actually been an off-the-shelf 82S100 at one point in the C64 — the C128's was a custom chip, but did much the same thing, doing all the memory mapping for both C128 and C64 modes).

There's also version of the Spectrum ULA up on Open Cores... it actually fits inside a cheap, modern CPLD. So no, not complex at all. They were typically taking 10-50 TTL or PAL chips, or some similar functionality, and putting them into a single gate array in that era.

Dave Haynie says:

December 10, 2013 at 10:41 am

Maybe Freddie would know... the C65 was a big mystery to most of us. Why particularly when Commodore was having trouble — did they go ahead with that? They had better resources by far for the C65 than we had for the C128: whole new graphic chips, whole new CMOS processor (4502) with new instructions, a Z register even (I

heard that was Hedley Davis' idea), etc.

Near as I can figure, the guy leading the chip development was a chip designer no one else wanted to work with...



-by Dick Estel

INTRODUCTION

This is number nine of a limited series of articles saluting some of our past members, people who have made a significant contribution to the club. Our more recent members did not have the pleasure of knowing these men and women, many of whom have passed on. However, they made a lasting impression on the club and the author.

Questions and comments to our web address, info@dickestel.com, are welcome.

KEITH SOHM

Keith is not really a former member, but he's as close as you can get without actually leaving the country. We haven't seen him for a year or two, but he sometimes appears unexpectedly at a meeting or our annual dinner.

I first became aware of Keith's value to the club when he took over the club BBS, so you can guess how long ago that was. The long time System Operator (SysOp) was moving on to other things. The BBS was operated on an MS-DOS

machine (probably AT, but maybe XT), and Keith was among the few in the club who had a good working knowledge of that operating system.

Keith continued as SysOp as long as the BBS was in operation, probably four or five years. Meanwhile, I became better acquainted with him, and eventually his family. He was a friend from many years earlier with one of our newer members, and Jeff, Keith and I, along with my daughter and her family, enjoyed a couple of camping trips with my travel trailer on the Kings River . During one of these Keith and Jeff launched a large rocket, which they had to cross the river to retrieve.

Keith was self-employed as a handyman, and I was able to hire him for several projects, including the installation of a new water heater at the duplex I owned at the time. In keeping with his computer skills, he had a laptop and a small printer that he kept in his truck, and printed out the invoice on the spot.

By this time Keith had met and married a charming lady with two children, a son and daughter, and they eventually had a daughter together. This girl often accompanied Keith on his service calls at my house, and the entire family was able to join us a time or two for our yearly dinners. Hopefully they will do it again some day.