

EIGHT BIT



COLLECTORS GUIDE: THE COMMODORE 64
THE GALAKSIJA Z80 COMPUTER
APPLE'S 40th BIRTHDAY
GAME REVIEWS, INTERVIEWS,
PROGRAMMING AND MUCH MORE...

EDITORIAL

Welcome to issue one of Eight Bit Magazine. Firstly, a big thank you to all those who contributed to the magazine. Without your support there wouldn't be a magazine. In fact our Kickstarter project exceeded expectations so much that we now have enough funding for the next few issues. Although we do plan on going much further than that.

Remember to look for us on Facebook for up to date news and check out our website which should be live by the time you read this at: www.eightbitmagazine.com

*Enjoy the magazine,
The Eight Bit Team*



Issue 2 Out Now...

GENESIS

BY MARTIN GRUNDY

1972 - 1983

The birth of gaming was a complicated one and not everybody agrees on who the father is. It's often said that Ralph Baer is the daddy of gaming with his invention of both the Brown Box in 1968 and the world's first home games console - the Magnavox Odyssey - in 1972.

Others point to Nolan Bushnell as the true father of gaming as his 1971 *Computer Space* machine was not only the world's first commercial coin-operated videogame, but also predated the Odyssey by a year.

Purists and pedants hark back even further. Right back to the 60s and 50s putting forward 1962's *Spacewar!*, 1958's *Tennis for Two* and even 1950's *Bertie the Brain* as the first examples of a computer game. There's no doubt that following the end of the second world war rapid technological development resulted in more powerful computers which were capable of creating 'computer games'. Yet such games of the 1950s and 60s were made mainly to

'show off' what a computer – back then a machine about the size of a semi-detached house - could do. They were demonstrated by scientists rather than played by gamers and were not within the experience of everyday people.

So in my humble opinion, gaming was born when games came out of the laboratory and into the public domain, whether that be amusement arcades or the home. That's when most people – especially young people – got their first taste of gaming and underwent an experience akin to what we would have today when we play a videogame.

By this definition, gaming was born sometime in the early 1970s. For the sake of argument, let's say that its 'biological father' was Ralph Baer with his prototype Brown Box but it was Nolan Bushnell who brought it up. It was early arcade games such as Pong, Night Driver and Sprint 2 (all released by Bushnell's new company, Atari) which introduced videogames to the masses



Ralph Baer's Brown Box - 1968

and sowed the seeds of a new cultural and social phenomenon that would spread rapidly throughout the remainder of the twentieth century and beyond.

Back in 1971, and before Atari was formed, Bushnell used his electronics skills and knowledge to build *Computer Space* – a coin operated game with a 19 inch black and white screen. Nolan had 1500 *Computer Space* machines built with a plan to set them up in bars and amusement arcades across the States. Unfortunately, the bar and arcade industry didn't really understand the concept of a

coin-operated video game in 1971 and those who did complained that *Computer Space* was too confusing and had too many instructions. Very few bars and arcades agreed to have a machine and the project fell flat on its face.

Fortunately for future gamers, the failure of *Computer Space* didn't deter Bushnell. He listened to the feedback and went back to the drawing board. He was determined to create a game that was easy to understand and, most importantly, fun to play. What he came up with was a simple tennis game which he named *Pong*. Almost immediately *Pong* was a smash hit across the US and sales of the machine enabled Bushnell to set up Atari, the world's first video game company, in 1972.



Tennis For Two—1958

So it came to pass that *Pong* was the first commercially successful videogame but, as we mentioned earlier, it was preceded (by just a few months) by the world's first games console, the *Magnavox Odyssey*. Based on Ralph Baer's Brown Box and released after *Computer Space* and before *Pong*, the *Magnavox Odyssey* was the first attempt to create a commercial games console for the home. Unlike modern consoles it came with dice, decks of cards, fake money and casino style chips so that it looked like contemporary 1970s board games. The thinking was that if it looked like a board game then the public would understand it and therefore be more likely to buy it. However, the masses weren't convinced and, partly due to poor marketing, the *Magnavox Odyssey* was a flop. It sold only 100,000 units in its first year and was discontinued just a couple of years later.

Yet, despite the failure of the *Magnavox Odyssey* to capture the public's imagination, the fact is that by 1972 both the commercial arcade game and gaming console had debuted in the U.S. Not only had gaming been born but it had also taken its first baby steps.

So by the early 70s the world had witnessed the first games console and the first arcade cab. But what about home computer games? After all, this magazine is largely

about the 8-bit computers of the 1980s. How did games on home micros begin, you may well ask?

The story of home computers begins a couple of years later, in 1974, when Nolan Bushnell employed a university drop out to work as a technician at Atari. The newly appointed 17-year-old Steve Jobs was excited by the prospect of working in the fledgling games industry but was aware of his technical limitations. Fortunately, Jobs' friend, Steve Wozniak, was a technical genius and Wozniak would help out whenever Jobs got a bit stuck. After a while



Photograph © 1971 - Nutting Associates/Szyzygy

Wozniak officially joined Atari and, together with Jobs, took Pong and transformed it into the classic bat and ball game *Breakout* which hit the arcades in the mid-1970s.

Outside of Atari, the two Steves spent the weekends and evenings hard at work in the Jobs' family garage inventing what would become the world's first home computer. They called it the Apple Computer and sold fifty units to local electronics enthusiasts in 1975 - each one hand made by Wozniak. Jobs quickly realised that there was potentially a huge market for home computers and set to work designing the Apple II, intent on making it appeal to a much wider audience. Jobs drew up the design specifications while Wozniak got on with the technical side of things.

However, to make the Apple II a commercial success Steve and Steve needed investment. Jobs approached Nolan Bushnell and asked if he'd like to be in on the computer but Bushnell declined. Nolan was busy with his latest videogames project - a home console version of Pong which could be sold to the American mass market.

Atari's home version of Pong (imaginatively titled *Home Pong*), was a massive success when it was launched in 1975 but Bushnell didn't rest on his laurels. Just two years later, on September 11th 1977, his masterpiece, the Atari VCS (video game console) was

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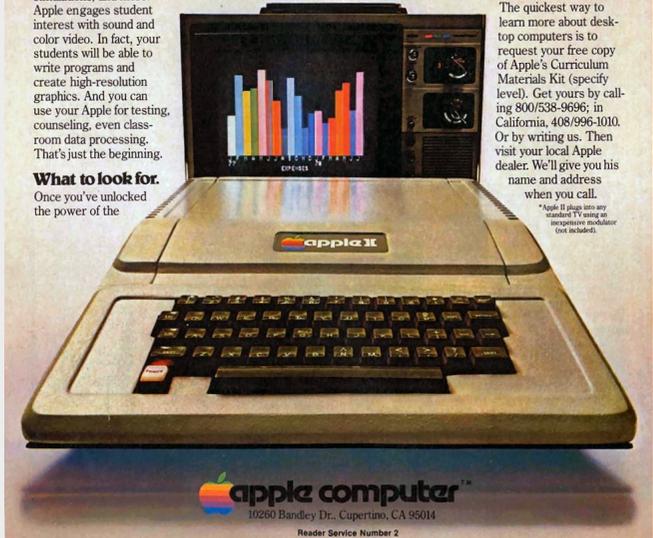
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*Apple II plugs into any standard TV using an inexpensive modulator (not included).



released. The VCS was light years ahead of anything that had gone before and stunned everyone who saw it. It boasted colour graphics, dynamic sound and the promise of changeable cartridges which would allow users to play dozens of games from the comfort of their living



Commodore PET (USA 1977)

room. The VCS was a massive success and Atari sold over 30 million of them in the years to come – that’s 100 times more units than Ralph Baer’s Magnavox Odyssey console.

Also in 1977, Jobs and Wozniak brought their new computer – the Apple II – out of the garage and into the market place. Due to its expensive price tag, the Apple II was relatively unknown outside of America but it was a big success in the States. It had stiff competition in the form of the Commodore PET yet Commodore were aiming their machine firmly at business and college users and at the time had little interest in developing a micro for home computer enthusiasts.

Whilst the Apple II was pretty much unknown in the UK, the much more affordable Atari VCS found its way into thousands of British homes when it was released in the UK in 1978. Indeed 1978

turned out to be the first of a number of significant years for videogames across the world. As well as the huge success of the Atari VCS, a previously unheard of Japanese company called Taito introduced the world to the first major videogame craze in '78 – Space Invaders. Space Invaders was such a phenomenon that by 1981 it had grossed \$1 billion and it was rumoured that the shortage of 100-yen coins in

Japan was due to vast numbers of them being pumped into machines by addicted gamers.

By the time the 1980s rolled around another hugely significant event in the history of home computers took place. The Sinclair ZX80 (released in 1980) gave the world home computing at an affordable price. At just £99 it was incredibly inexpensive and thousands of orders were placed in the first month of its release. Despite problems with machines overheating and breaking down, the ZX80 was a roaring success and sales quickly reached 50,000. It was very primitive but its impact was huge and it contributed significantly to the UK leading the world in home computer ownership throughout the 1980s.

By 1981 videogaming was gathering momentum. The Atari VCS was going from strength to strength with the release of more great titles and handheld gaming was born with the popularity of

Nintendo's cheap Game and Watch machines and electronic table top games such as Grandstand's Astro Wars. But the most significant development of 1981 was the explosion in the UK home computer scene which was spearheaded by two rival companies based in Cambridge.

Following the success of the ZX80, Sinclair Research released the new and improved ZX81 on 5th March 1981. It had a black and white display, no sound and just 1K of memory but it was capable of running more complex software than the ZX80 and that, of course, meant games. At just £69.99 for a ready built ZX81, and with ads taken out in national British newspapers, Sinclair were clearly aiming their product at the mass market. In addition, the ZX81 was easy to program - compared to contemporary machines - and gradually, over the course of the year, Brits from all walks of life – not just the beardy techy types - dipped their toes in the waters of computer coding for the first time.

At the same time Acorn computers, also based in Cambridge, brought out the Acorn Atom. The Atom had the edge on the ZX81 in power – it had colour, sound, a 2K memory and a proper keyboard. But at £170 for the ready-made version it was £100 more, and £100 was a lot of money in 1981. While its more advanced features meant that it could be used as a games machine more

effectively than the ZX81, its less user-friendly programming language and smaller owner base meant that hardly any games were produced other than a handful of simple arcade clones which appeared in the mail order pages of early computer magazines.

Across the Atlantic, following the success of their PET computer, Commodore had come round to the idea of releasing a home micro and the VIC20 was unleashed. The VIC20 had 3.5K of memory, colour graphics, good sound, a real typewriter keyboard and the ability to accept cartridges as well as cassette based software. It was clearly intended to be used for games as it had a joystick port – something the other machines lacked. However, the VIC20 had a couple of major drawbacks which prevented it from stealing the ZX81's spot as the most popular computer in the UK. The major stumbling block was the price. At £190 it was even more expensive than the Atom and this was made worse because you had to buy Commodore's own £45 tape deck to use cassette software.



Sinclair ZX81 (UK 1981)

Photograph by Billy



Atari 800
(USA 1979)

This total of £240 took it beyond the reach of the average man in the street and as such it failed to sell in huge numbers upon its release. The VIC also wasn't as easy to program as the ZX81. To use its more advanced features the programmer had to develop an understanding of machine code which made it less accessible to novice computer users and undoubtedly held back its initial popularity.

Arguably the best 8-bit home computer of the early period preceded all of the above. Released in 1979 Atari made its entry into the home computer market with the 400 and 800. These computers were incredibly high spec for the time boasting fast processors, big memories and excellent graphic capabilities. Compared to the Atari machines, the efforts of Sinclair, Acorn and Commodore looked rather pathetic yet, despite success in the U.S. in the first few years of its release, the Atari failed to catch on in Europe. Why? Well there were a number of factors. The big problem was the price.

An Atari 800 would knock you back a whopping £650 in 1979 and if that wasn't bad enough you could only get games made by Atari as they initially discouraged software development by outside companies. This meant that Atari 400/800 computer games were thin on the ground and there wasn't a lot of point having an awesome machine with no software to run on it. In contrast the ZX81 and Vic 20 may have been low spec but they were a fraction of the price and had hundreds of games to choose from.

In the end, like so many future computers and consoles, the Atari 400 and 800 failed because it didn't have the software support, good marketing or the right pricing. Familiar mistakes that would be repeated in the industry again and again right up to the present day.

A trip to the arcades in 1981 revealed that things had moved on quickly since Space Invaders landed in '78. A slew of innovative games such as *Battlezone*, *Centipede* and *Moon Cresta* all arrived in

1981. Shoot 'em up *Gorf* was the first game to use speech and the brilliant *Donkey Kong* introduced the world to an Italian plumber by the name of Mario. But by far and away the biggest game of 1981 was the legendary *Pacman*. While it lacked the fancy 3D vector graphics of *Battlezone* and the synthesized speech of *Gorf*, Pacman more than made up for it in pure gameplay and its simple but addictive formula was amazingly popular selling 400,000 hardware units and raking in an eye watering \$2.5 billion in North America.

As the year reached its end it became clear that 1981 was going to be the first videogame Christmas and there was something available for all budgets. At the low end of the market cheap handheld and table top arcade clones could be bought for less than £30 while for those with a bit more cash to splash the Atari VCS package was an absolute bargain. For just £99 you got a VCS, two joysticks, two paddles and the Combat game cartridge. At the high end of the market was Mattel's Intellevision which boasted superior graphics and more sophisticated games than the Atari but at £200 it was twice the price and had only a limited number of titles to choose from.

Following the huge sales of electronic toys and videogames in the run up to Christmas 1981, electronics manufacturers spotted the potential to make even more money from this growing desire for electronic gaming. The ZX81 alone had sold over a quarter

of a million units in 1981 and Atari and Mattel had also experienced record sales. It was the trigger for a rash of computers to appear during the coming year, two of which – the ZX Spectrum and the Commodore 64 - would dominate gaming in the UK for the remainder of the decade.

Yet the first new machine of 1982 didn't carry the moniker of an established computer company such as Sinclair or Commodore, instead it went under the banner of the British Broadcasting Corporation. The BBC had launched a computer literacy drive in 1981 and wanted a machine that could be used to help novices learn about computing. Computer companies were invited to submit designs for this new machine and many expected Sinclair, with its early success in the industry, to be awarded the contract. However, it was Acorn, makers of the Atom, who managed to bag the deal and the result was the BBC Micro which came in two specs – the Model A which had 16K and was priced at a rather steep £300, and the Model B which had a massive 32K but was even more expensive at £400.

The BBC Micro was amazing for its time. It had an excellent keyboard, superb sound, lots of colour graphics capabilities, plenty of memory and a fast processor. It was perfect for learning to program and became the computer of choice for schools across Britain when Education Minister Kenneth Baker set up a computer literacy programme a year

later. Many children, myself included, got their first taste of computing on a school BBC Micro and it was a great introductory machine. I fondly remember playing 'educational games' such as the terrifying Granny's Garden and the atmospheric Sphinx Adventure in the tiny library of Highfield CP Primary School.

While Clive Sinclair may have been deeply disappointed to have missed out on the lucrative BBC contract, he wasn't the sort of chap to let it get him down for long. He'd taken the concept behind his proposed BBC computer, made a few tweaks and turned it into the next Sinclair machine. Initially named the ZX82, the renamed Sinclair Spectrum was unveiled in April 1982 and, like Clive's previous computers, it was another game changer. The Spectrum had high resolution colour graphics, sound, a nippy Z80 processor, a memory of up to 48K and a rather unusual rubber keyboard - which wasn't brilliant but was infinitely better than that of the ZX80 and ZX81. The Spectrum's most powerful weapon though was its price. While the 32K BBC was selling for £400 you could pick up a 48K Spectrum for just £175. Again Clive was aiming for the mass market and his touch hadn't deserted him. Sinclair was swamped with so many orders that it struggled to meet the demand and customers often had to wait three months for their

machines to arrive. Yet when it did appear buyers were generally delighted with the computer and it didn't take long before newly established software houses such as Liverpool's Imagine started making Spectrum games.

The success of the Spectrum and the BBC Micro opened the floodgates and pretty soon every electronics manufacturer in Britain was developing a home computer. There was the Welsh made Dragon 32, the Computer Lynx, the Jupiter Ace, the Oric 1 and the rather fabulous sounding Grundy NewBrain. Yet most of these computers failed to gain a decent share of the growing market. The Dragon 32 and the Oric-1 had some success but compared to the dominant Spectrum and BBC they struggled to make much of an impact.

It wasn't until the end of the year that the dominance of the BBC and the Spectrum were challenged in the form of an American import called the Commodore 64. The successor to the VIC 20, the Commodore 64 was a machine to take seriously. It had a massive 64K memory, excellent colour and sound capabilities and included specific game making hardware which allowed programmers to create sprites and scroll the screen in a similar way to arcade machines. Commodore also had years of success in the industry and had established a foothold in computers with the eventual success of the VIC20. Commodore, like Sinclair, also had a highly driven man at the helm – Jack Trammel, a formidable businessman

whose mantras included 'Computers for the masses, not the classes' and the rather intimidating 'business is war'. However, despite its capabilities (and Jack's mass market mottos) the hefty £350 price tag made the 64 too expensive for 'the masses' and in a strange move Commodore decided to try and flog the machine as a business computer, even though it was undeniably a games machine - so much so that it boasted two joystick ports.

1982 had been a year of rapid development yet the old Atari VCS was still very popular, mainly because of its ever growing range of games. This was in part due to Atari opening up the platform to other developers. Activision produced the classics Pitfall and River

Raid while Parker Brothers brought Frogger and The Empire Strikes Back to the VCS. Unfortunately, the early promise shown by Mattel's Intellivision failed to materialise with few games released during 1982 and, as Atari continued to thrive and the home micro business boomed, the Intellivision disappeared with something of a whimper.

By 1983 videogames were beginning to establish themselves as more than just a fad. It was increasingly evident that they were here to stay. Arcade machines became more and more impressive as 16 bit processors became the preferred choice for new cabs. Games such as TX-1, Star Wars, Dragon's Lair and M.A.C.H.3 looked amazing and showed what the rapidly developing technology was



Photograph by Stuart Brady

BBC Micro (UK 1981)

capable of. Back in the home, the Atari VCS was starting to show its age but with over 1500 titles available there was plenty of life left in it and it was still selling well. In fact, console gaming was in pretty rude health in 1983 and had netted a cool \$5 billion in North America alone. Which made it even more surprising when the home console industry completely collapsed in the U.S. less than a year later.

In the UK two new consoles arrived in 1983, the Colecovision and the Vectrex. In addition, more home computers appeared in the shops including Mattel's Aquarius, the Sord M5 and something called the MTX512. Like many before them, these new machines failed to catch on and all of the above disappeared before the end of the following year.

However, there was one new computer which bucked the trend in 1983. The

Acorn Electron was essentially a budget BBC Micro priced to compete with the ZX Spectrum. Due to its already established range of BBC compatible games and familiar Acorn name, the Electron did pretty well in a heavily saturated market but its success wasn't significant enough to put a dint in Sir Clive's sales figures.

During '83 Sinclair reduced the Spectrum from £179 to £129 and Clive got his machine onto the shelves of WH Smith which resulted in another spike in sales. The Spectrum's success was reflected by the emerging software houses of the early 80s, most of whom were making the Spectrum their machine of choice. This meant that the rubber keyed computer had far more games than its competitors and by '83 Spectrum games were beginning to find their feet. Psion and Melbourne House released the early hits Hungry Horace and The Hobbit but the biggest seller of the year was Bug Byte's Manic Miner coded by a 16-year-old programmer called Matthew Smith.

Photograph by Bilby



Memotech MTX512 (UK 1983)



Commodore 64 (USA 1982)

Manic Miner was a brilliantly designed game and is a stone cold classic of the early 8-bit gaming era.

Manic Miner coder Matthew Smith set up his own games company, Software Projects, in 1983 but he wasn't alone. It was the year when numerous software houses popped up across the country. The kings of the Spectrum scene – Ultimate Play the Game arrived in 1983 with some awesome games. Jetpac, PSST, Lunar Jetman and Atic Atak set new standards in gaming and showed what talented programmers could do with the Sinclair machine. In the North of England Liverpool based Imagine software were making a name for themselves too. They'd produced some decent games such as Zzoom and Arcadia but what really made them stand out was the lavish ads they took out in computer magazines and the stories they told the tabloid press of teenage computer whizzkids making thousands of pounds

making videogames and living life in the fast lane.

At the other end of the East Lancs Road in Manchester a company called Spectrum Games had published a range of arcade clones and had sold them in pretty healthy numbers. Such early success convinced owners David Ward and John Woods that there was money to be made in the games business and they rebranded themselves as Ocean software and started making games for the Vic 20, BBC Micro, Commodore 64 and Dragon 32 as well as the Spectrum.

In late 1983 Commodore dropped the price of the C64 to £199 and, although it was still £70 more than the Spectrum, it was now within reach of a much bigger market. The C64 boasted some impressive games with the likes of the home grown International Soccer and a stack of excellent US imports such as Aztec Challenge, Beach Head, Forbidden Forest and Solo Flight. Some of these American titles were very sophisticated



Amstrad CPC 464 (UK 1984)

games for the time and were often made by teams of developers rather than single coders – something that would become increasingly common as game development evolved over the decade.

So by the close of 1983 the UK 8 bit games industry was beginning to take shape and by the dawn of 1984 home computers were dominant and consoles were a dying breed. The once all powerful Atari was on the verge of financial collapse and Mattel cancelled the manufacture of the Colecovision console. The all-conquering home computer was killing off consoles mercilessly and during '84 yet another range of new micro machines hit the shops. These included the Sinclair QL, the Commodore 16, the Commodore +4,

the MSX range and the Amstrad CPC 464. Of all these new computers only the Amstrad really took off in the UK. Alan Sugar's success was undoubtedly helped by Amstrad's already established brand name, its wide reaching distribution network and close links to the big UK stores. The Amstrad's unique all-in-one package of computer, tape deck and monitor (a model copied from Amstrad's successful all-in-one range of cheap stereos) appealed to consumers and over the course of the year the CPC 464 muscled itself into third place in the UK home computer market not too far behind the ZX Spectrum and C64.

So by 1984 the four major micros of the decade – the Amstrad, BBC, ZX Spectrum and Commodore 64 – had all established

themselves in the UK. Although you may have owned, or had a friend with, a Dragon or an Atari, for example, the vast majority of kids owned one of the aforementioned big four computers with the ZX Spectrum and Commodore 64 being the biggest sellers of the period. As 1984 unfolded coders pushed these machines further and further and produced increasingly sophisticated games. The Spectrum was blessed with the likes of Jet Set Willy, The Lords of Midnight and the incredible Knightlore. Whilst C64 owners enjoyed stunning titles such as Raid Over Moscow, Summer Games and Impossible Mission. 1984 also saw the birth of the budget games industry with Mastertronic and Firebird both appearing in the Spring. With these cut price publishers selling software for around £2 each, it meant that gaming was available to everyone, no matter how small their budget.

So although the exact date of gaming's birth and the identity of its father may be up for debate, it's a definite fact that by 1984 the modern games industry was up and running. Selling games through small black and white mail order ads in the computer magazines of the day was swiftly being eclipsed by big, colourful, professional spreads produced by the likes of Ocean, Imagine and Ultimate. By '84 the industry had shaken off its amateurish beginnings and morphed into a more mature, professional and business-like industry. It was the start of the modern era of gaming and a tremendously exciting time.

For rest of the decade, the UK would lead the world in videogames development. This small island was a fertile breeding ground for innovation, originality and sheer 8-bit brilliance and British kids like myself - lucky enough to be caught in the middle of it - would reap the rewards. It was a golden age of gaming which burned brightly from the early 80s to the early 90s when it was finally snubbed out by 16bit computers such as the Amiga and Atari ST and the triumphant return of the videogames console.

So although the 8-bit era is a period now long gone (a quarter of a century and counting!), it's certainly not an era that should be forgotten. Those halcyon days were the childhood of the games industry and, as with all childhoods, they represent the crucial formative years which made videogames what they are today. As with many childhood remembrances, we may be guilty of looking back at the games of the 80s through rose-tinted spectacles but there's nothing much wrong with that. It was an incredibly original, pioneering and significant time - an era that shaped what went on to become the biggest entertainment industry on the planet. And that's surely something worth celebrating.

***Enjoy the
magazine.***



John: So Joerg, why did you start Scene World?

Joerg: Because Driven died back in 1998. the NTSC diskmag. (They came back from the ashes briefly in 2005 but then died a 2nd time) and I had this crazy idea to create a publication that would combine both scopes of the c64 users. NTSC (America, Canada), and PAL (Europe, etc)

John: Was the diskmag a success from the start?

Joerg: Depends on your point of view. NTSC sceners loved it because they had a diskmag again to cover and support their activities. PAL is more about demoscene and as we are not specifically covering that exclusively we received some feedback initially that this wasn't so welcome but this changed over the years :-)

John: Obviously you're a programmer yourself?

Joerg: Not for any bit.

John: Really?

Joerg: Yes. Apart from 10 PRINT"HELLO": 20 GOTO 10, I know nothing. I can do html page description language on the fly.

John: The diskmag takes a little bit more than that to work. There's a number of people involved in it?

Joerg: 22 at the moment . :-)

John: Anyone you want to mention in particular? Anyone you want to say hi to?

Joerg: The whole staff really. we do so much together and most of them I am friends with personal for many many years, such a big project like Scene World

THE INTERVIEW

JOHN KAVANAGH INTERVIEWS

JOERG DROEGE

FOUNDER OF SCENE WORLD.ORG

doesn't run without a well working and encouraged team. :-)

John: I can imagine. Lots of different talents from the team? What's your role?

Joerg: Yeah, especially since we have branched out with a podcast, youtube video interviews, twitch live shows, youtube reviews, just to mention a few. I am organizer and founder of the Scene World Diskmag and organize the other stuff we do as well. And I am co-moderator in the podcast that we run. And last but not least I conduct the Skype video interviews with all the VIP guys in the tech field.

John: This question is predictable, what's your favourite interview? Anyone famous?

Joerg: The one I am most proud of is the interview with the inventor of home video gaming Ralph Baer because it was the

longest and sadly the final one prior to his death. But apart from that all of them are awesome, especially if you take into account that I have dreamed since a kid to talk to them.

John: Ah yes, the maker of the Brown Box. Was that a video interview?

Joerg: Yes. 1h via Skype video can be found here:
<http://sceneworld.org/blog/2014/01/16/video-interview-with-ralph-h.-baer/>



John: I must have a look at that interview, sounds interesting. You also interview Jeri Ellsworth I see? [known for creating a complete Commodore 64 system on a chip.]

Joerg: Indeed. :-) She is a super busy woman, so I am happy she made it.

John: So I heard. Does it take long to create an issue and where do the ideas for each issue come from?

Joerg: From the members. and yes, it takes many months to co-ordinate and get the pieces together. So we release 2 issues per year. One in summer and one in winter. This works out well so far. Sometimes we make special major topics like the birthday of boulder dash recently.

John: Would you agree that the Commodore scene is the most active among all the 8 bits? By the way, I actually have the boulder dash issue up on my second screen right now.

Joerg: I have never been a part of the Atari vs Commodore battle. And if you look at the hardware support and what you can get today as new for our retro lovers, you will be amazed. Today I received 50 classic Gameboy game cartridge cases brand new from the factory sold via eBay from a French seller. Also you can get card reader devices for almost any 8bit, 16bit and 32bit console and computer nowadays.

The boulder dash topic was so big, we actually made 2 issues out of it. :-)

John: In your opinion do you think the Commodore scene has grown or shrunk over the years? Do you think it's better or worse now and in what way?

Joerg: it's not dying, despite reading that thing since 1993. Groom of scene.org makes a yearly statistic of that on his blog. worth reading it.



<http://blog.subsquare.com/state-of-the-demoscene-1991-2014/>

John: I agree. Those who have stayed this long will continue to stay. Any upcoming plans for future issues you can tell us about?

Joerg: We have huge plans and will support even more hardware with issue #27. stay tuned!

John: Keeping your lips sealed?

Joerg: Yes. as we haven't made the plans fixed yet. We are in the early discussing stage at the moment. But we got 2 more coders who joined us this year to help realizing the plans.

John: I'm looking forward to seeing future issues as well as our readers I'm sure.

Joerg: Thank you, we look forward to provide the new stuff to you as well. We have surprised people with a magsys which runs on NTSC & PAL 100% accurately, supports IDE64, printer, 1351 mouse and joystick support. Now we want to go further and shock our readers positively with new things. And of course we will try to provide more exclusive live events over our live channel at [twitch.tv/sceneworld](https://www.twitch.tv/sceneworld)



John: From what I've seen so far it already looks impressive. Looking forward to seeing more. We'll be happy to support each other in the near future. Regarding interviews, if you could interview anyone, who would it be and why?

Joerg: Bruce Artwick who invented home flight simulation but he doesn't give interviews as a general rule unfortunately.

John: Anyone else?

Joerg: I have invited the inventor of email recently (Roy Tomlinson), but he never replied because he died shortly after, which is sad. I am trying to not miss chances and interview people if I can. Luckily, so far 99% agreed :-)

John: That is sad.

Joerg: Yes it's sad, so I am glad we could take our part in preserving those stories of those thinkers.

John: Captain Crunch (John Draper). I haven't read the interview you did with him but I imagine it was interesting?

Joerg: I am a personal buddy of John and he comes to my city every couple of years to visit all his friends in my city including myself. He is an awesome person to spend



a weekend with and interview him and talk to him.

John: Anything you could tell us extra about John Draper that is generally not known?



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Joerg: Well, I don't know. John is a very outgoing person, not hiding much from the public. He is not faking anything or being different in person than what he appears to be on the net.

There are 2 interviews with him. One via Skype video from 2012 and one audio interview of our podcast from last year.

Another hero of my teenager years I wanted to meet and talk to in person and suddenly I am his host for a whole weekend. And at Gamescom in August we will run our own booth again and Dave Lowe will be running his as well.

John: The video game composer?

Joerg: Yes, exactly!

John: That's fantastic. I hope we get to meet some interesting people ourselves.

Joerg: Will you will present as well? as a visitor? Then pop by!

John: No plans yet but we would love to.

Joerg: So what else you wanna know?

John: Favourite Commodore 64 game and why?

Joerg: Test Drive I. Because it runs smoothly on a

SuperCPU with full frames but they were smart enough to include a frame lock so it would not run too fast but just fluent. Impressive thinking ahead for 1987! And I love racing games the most.

John: Me too. Sadly the Commodore 64 had many bad version of good racing games. Chase HQ for example, fantastic on the Sinclair Spectrum and Amstrad CPC and horrible on the C64.

Joerg: Luckily they made a successor that

POND SOFTWARE
New Commodore 64 games
<http://pondsoft.uk>

The advertisement features three small screenshots of Commodore 64 games: 'Spaceman Splorf' (top left), 'Pond' (middle left), and 'Test Drive I' (bottom left). The central illustration shows a green alien character with tentacles holding a wrench, standing on a rocky, green landscape. At the bottom, the text 'Spaceman Splorf' is on the left, the 'Pond' logo is in the center, and 'available now' is on the right.

was much better! Or Hard Drivin' which I run just for Dave Lowe's music in it :-)

John: Any other game composer you like?

Joerg: Tons! Chris Huelsbeck, Jeroen Tel, Rob Hubbard, etc etc etc etc I totally dig the Tetris theme of Wally Beben!

John: Music when done right certainly does sound beautiful on the SID chip.

Joerg: Agreed!

John: Do you collect or use other 8 bit computers?

Joerg: yes. I do have a VCS, and an NES, a game boy and much more.

John: Too much to list? :-)

Joerg: Exactly.

John: Ok, unless there's something you like to add I think that's the interview?

Joerg: Thank you very much John.

John: Thank you Joerg.

Scene World is the world's only Commodore 64 NTSC & PAL diskmag and can be found at sceneworld.org

There you can download issues for your Commodore 64 or run them through a emulator on the website. There are also interviews, podcasts and a blog. It's well worth checking out for all you Commodore 64 fans out there.



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Beginnings of the Home Computer (R)evolution in Yugoslavia

By Žarko Živanov



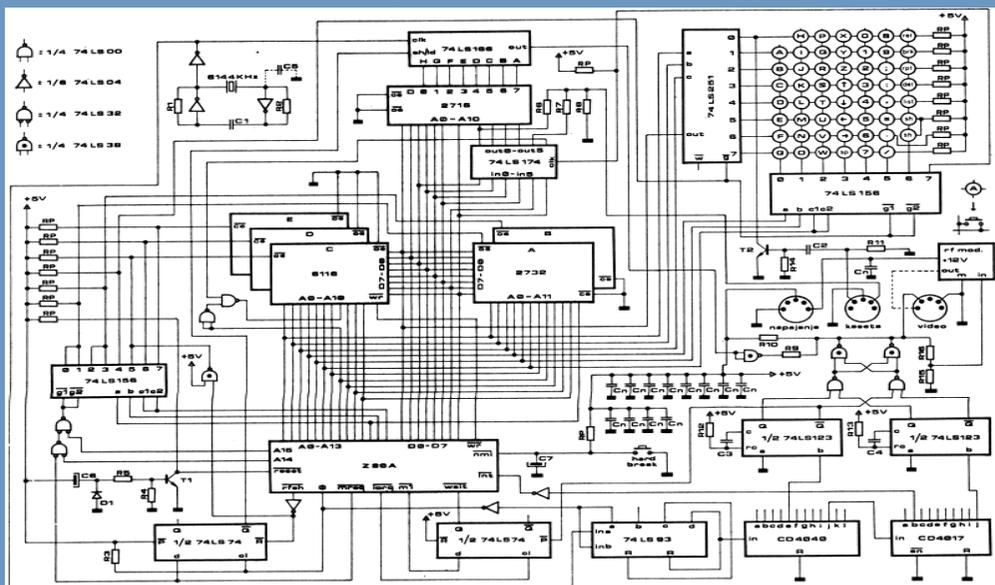
When people think of Yugoslavia, they probably don't imagine it as a computer-manufacturing country. But, the fact is that during the 1960's, Yugoslavia was one of only six countries in Europe that manufactured computers.

The first such computer, named CER-10, was finished in 1960 and was based on vacuum tubes, transistors and electronic relays. Although Yugoslavia was one of the leaders in computer technology at that time, during the late 60's and 70's computer development was abandoned and IBM, Honeywell and DEC machines made their way into Yugoslav companies.

Luckily, this was not the end of the story for computer making in Yugoslavia, although there were many obstacles to be overcome before it continued. When the first home computers appeared in the world in the late 70's, they were too expensive and could not have been afforded by most of the general population in Yugoslavia. To make the

matter even worse, during the same period Yugoslavia's officials passed a law that prohibited import of any merchandise with a price higher than 50DM. This practically made it illegal for citizens to buy a computer outside Yugoslavia and import it.

Only the selected companies were given a permission to do this, and they were mostly interested in importing computers for companies, but not small home machines. Import charges for electronics were draconian, and the few computers that one could legally buy came with a price tag that was 2-3 (or even more) times larger than the price of the same machine in other European countries, which made them even more unobtainable. So what choice did people have if they wanted to buy a computer at a reasonable price? One of the choices they were left with was smuggling. It was a game of fooling the customs officer into allowing the weird typewriter to enter



the country. Sometimes it was successful, sometimes not. After a while, customs officers learned what all those machines were and weren't so cooperative to let them pass the border. Although many people have smuggled all sorts of home computers during this period, this wasn't possible on a global scale.

This situation changed a few days before the New Year's eve in 1983. During the summer of 1983, an engineer by the name Voja Antonić resolved to find a way around this difficult situation. His idea was that, if you can't buy foreign computers at a reasonable price, perhaps you could build your own. Parts for computers were mostly sold for less than 50DM a piece, which meant they could be imported legally - you "only" needed to put them together once they arrived. And so the work to make a home computer began. During the next few months, Voja Antonić developed a simple computer that had a small number of components and complex software to replace expensive hardware parts, so that the finished computer could be as cheap as possible.

Until this time, since there weren't many computers or computer users in Yugoslavia, there were also no computer magazines. There was one science-oriented magazine that was very popular - Galaksija (Galaxy), which featured computer-oriented articles from time to time. Sometime late in 1983 Galaksija decided to publish an experimental special issue featuring only computer related content. Having heard about Voja's work, they got in touch with him and decided to include a lengthy article about his computer. In true open-source

fashion, the article contained complete plans for a home computer named Galaksija, including schematics, PCB layout and software. The magazine also included an ad to buy a kit containing all parts needed to assemble the computer.

Before the magazine hit the shelves in the last days of December, the publishers were unsure about the number of kits they should prepare, but in the end it was estimated that around fifty kits will be more than enough to meet the demand. The response was beyond all expectations - only in the first few days more than one thousand kits were ordered. In order to help to provide the necessary components, many electronics manufacturing companies were contacted to import the needed processors, memory modules and other ICs.

So what was so intriguing about this computer for so many people to be interested in ordering the kit? It was its simplicity and its price. It was a computer that could literally be made at home, if one was not intimidated by a little soldering it required. There were two main facts that made this possible. First, the motherboard had single-sided relatively wide traces, which allowed for it to be easily manufactured at home. The drawback was, of course, that it had many jumpers. Second, the computer had a small number of parts: the CPU, memory, some control logic, the motherboard, and the keys. It didn't have any special video-output hardware - the picture was generated solely by its Z80 CPU.

In order for the computer to use smaller and cheaper EPROMs, the whole

operating system was crammed into only 4KB of memory, including the BASIC interpreter, a line editor, video output generation and peripheral control. The keys were sold by a local company and they had to be soldered to the motherboard.

The hardware characteristics were very modest - 3MHz Z80 CPU, 4KB ROM, 6KB RAM, a professional keyboard, no sound, two colors (black and white), 32x16 characters on screen, 64x32 "bitmap" graphics (actually, just a set of special graphic characters) and a composite video output.

Most of the CPU time was used for video generation, but one could turn the video off and get the speed needed for calculations. Initial peripherals support included a tape recorder and a joystick. For a joystick to work, one had to make a few modifications to the motherboard.

The news about an affordable home computer spread fast. It grew into a national Galaksija campaign, that was supported by the media - TV, radio and newspapers. Voja Antonić appeared in many TV shows to demonstrate Galaksija's abilities. As a result of this increased interest in computers, three regular computer magazines appeared in Yugoslavia in early 1984. A lot of home-brew software was developed for Galaksija, most of which was printed out in computer magazines. At first BASIC programs were dominant, but later the focus shifted to assembly programs. One radio show, Ventilator 202, emitted programs for Galaksija over the radio waves, although the uninitiated were very surprised by strange, unearthly noises that were coming out of their

radios. The process was very simple: the host would announce that in the next couple of minutes a Galaksija program or game would be transmitted. Then one would press record on his/her radio/tape recorder and record it, and later on load it into Galaksija. More adventurous users connected Galaksija to the radio receiver and loaded the emitted program directly - a truly wireless transmission.

Although Galaksija had very limited hardware, the way in which that hardware was used was truly state of the art. To many a future programmer, Galaksija was the entry point to learning how to program. It was not uncommon for one computer to be shared between its constructor and his friends, so the number of people that started to learn programming with Galaksija was even larger than the number of computers. After a while, beside programs, first hardware expansions were developed by more advanced Galaksija users. Galaksija acquired a memory expansion, high resolution graphics, more ROM and RAM, a three channel tone generator, printer support and so on.

The number of one thousand kits that were sold initially grew to over eight thousand over the next few months. But the actual number of Galaksijas in existence is unknown, because anyone could make a motherboard at home and buy the other needed parts in any store that sold them.

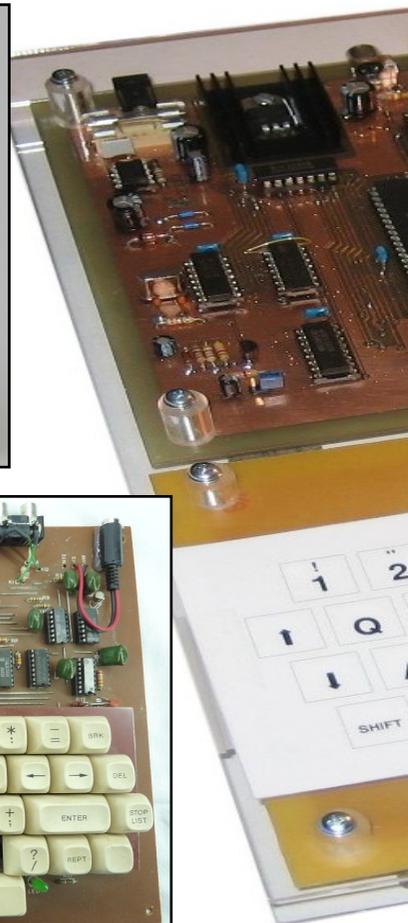
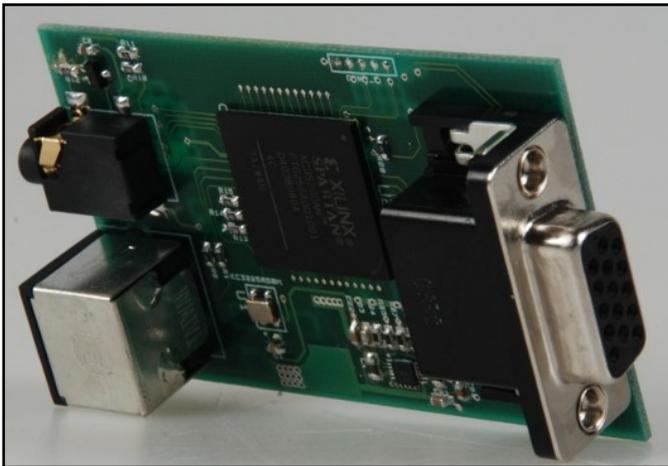
Some estimations mention that there were over ten thousand of these computers, but not all of them have been completed. Since there wasn't any official casing for the computer, there are as many different casings for

Galaksija as there are their constructors. Some of them even decided that they don't need a case, and used the computer without one. One company even made a batch of Galaksijas for schools, but there isn't many of them. These are the only ones that had a consistent appearance, as they had a metal casing.

Galaksija was the first Yugoslav home computer, but it certainly wasn't the last. In other parts of Yugoslavia people were involved in the development of home

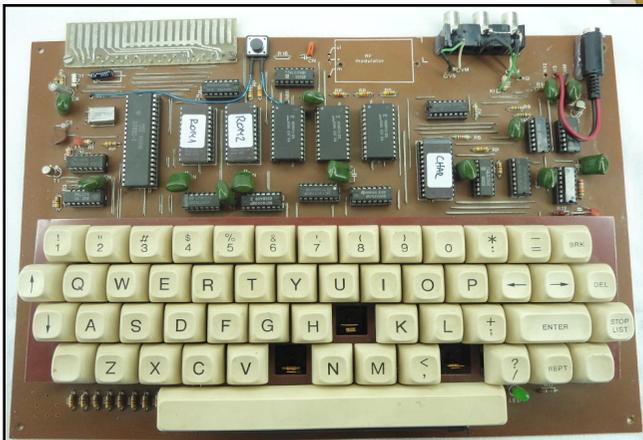
computers since as early as 1981, but were not able to release them to market because of import laws that affected component availability. In 1984 these laws were loosened and several other computers appeared on the market, but none of them received as much attention as Galaksija, nor were manufactured in any greater number. The "Ivo Lola Ribar" company developed Lola 8A. The PEL company developed Galeb and its successor Orao.

The Ei company developed Pecom 32 and



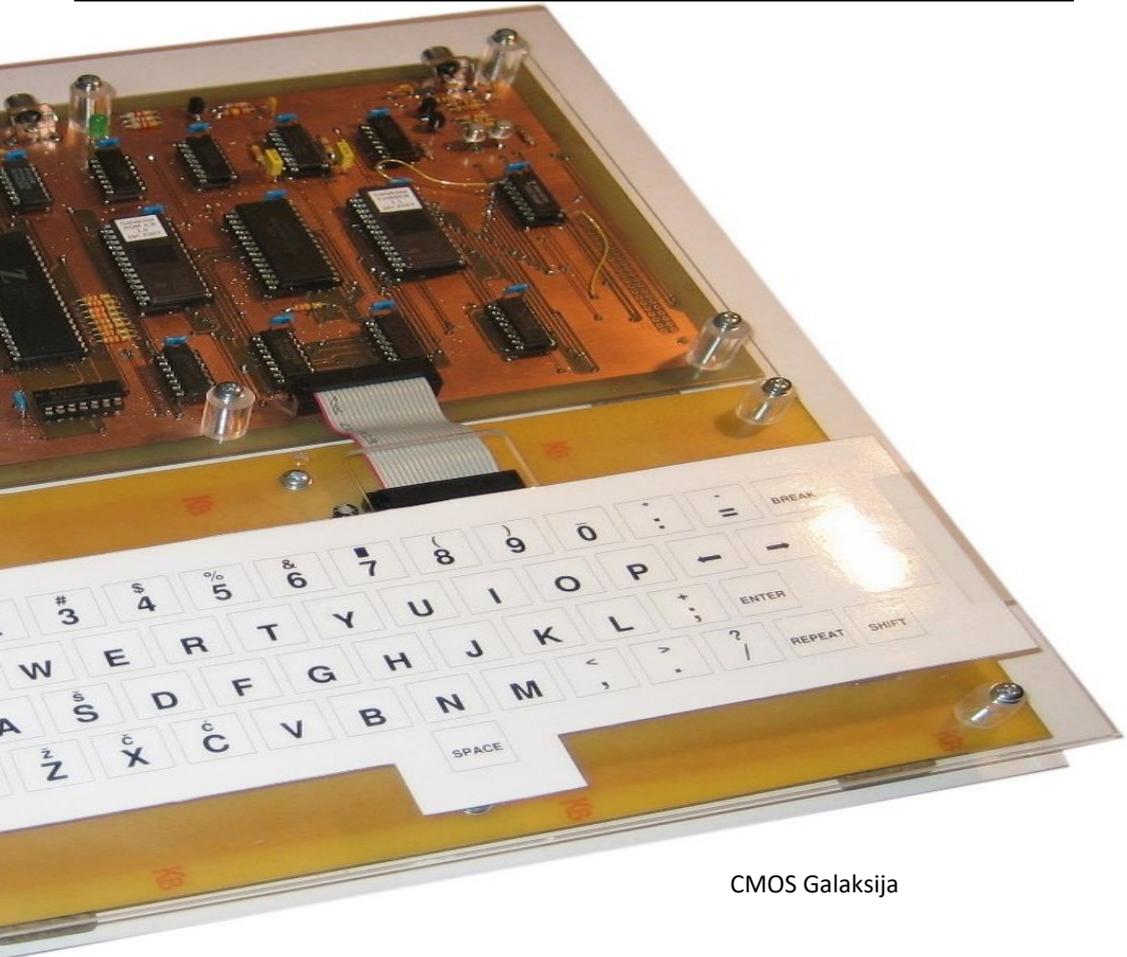
ABOVE: micro Galaksija

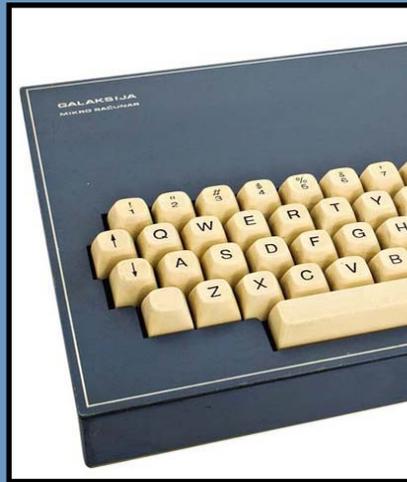
RIGHT: Galaksija without a casing



its successor Pecom 64, and later a PC XT clone named Lira 512, that looked like a slightly bigger Commodore 64. Some companies decided that it is cheaper to just re-brand foreign computers, and we got Misedo 85 (Tandy Coco 2), Oric Nova 64 (Oric Atmos) and INES ZX (ZX Spectrum with professional keyboard, Interface 1 and Microdrive all packaged in one case). Most of these computers were made for schools, since their manufacturing companies had an ambition to be selected as the

manufacturers of “official computers for all Yugoslav schools”. Unfortunately, during the several years of their arguing and fighting over this position, schools did not wait for the matter to be resolved and adopted whichever computer they could or though best. Instead of one universal school computer there were at least ten different models in use, largely incompatible with each other, produced in small numbers, which never got any wider attention.







Finding a Galaksija computer today is a difficult task. From time to time one can run into it on auction sites, and it will usually be the model made for schools. The ones that were constructed at home are still jealously kept by their constructors. For many of them, Galaksija was their first direct contact with a computer, they invested a lot of time into building it and it is not easy for them to part with it. Galaksija practically started a computer revolution among the Yugoslav general public and for many of the people that had a part in it, those first steps in BASIC on Galaksija often had a significant impact on their professional orientation.

Fortunately, even if an original Galaksija cannot be acquired easily, there are several solutions for those of us who wish to take a closer look at how it works. The easiest way is to try it through a software emulator (available at <http://emulator.galaksija.org/>, or as a part of MESS). For those of you who are interested in real hardware, there are at least two practical projects. In 2011, at Petnica research center in Serbia, Dragan Toroman and his colleagues made an FPGA replica of Galaksija, called microGalaksija (more details at <http://galaksija.petnica.rs/>). This version has internal mass storage (tape recorder emulation) which can store all software ever developed for Galaksija. The same team also extended Galaksija's graphic capabilities with color; this extension can even add colors to original games for Galaksija without any changes to them. The second project took more time to develop: during a five year period, ending in 2012, Tomaž Šolc made a CMOS replica of the original computer which can be assembled using the hardware parts available today (more details at <http://www.tablix.org/~avian/blog/articles/galaksija/>). Thanks to its fans from all parts of former Yugoslavia, the story of Galaksija is still being written.

Žarko Živanov

**Assistant professor at Faculty of Technical Sciences,
Novi Sad. One of founders of www.onceuponabyte.org**

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THE COLLECTORS GUIDE TO THE:

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64



**The cheap 8-bit computer
that ended up as the best selling
computer in the world.**

**Here's the collectors guide
to the Commodore 64**

It's the iconic computer of the 1980's. Released by Commodore in the United States mid 1982 at a price of \$595. It went on to sell 17 million plus units for the next 12 years making it the world's most successful computer. Here's your collectors guide to the Commodore 64.

Not having the opportunity to own one until recently I can give an honest first impression. With no rose tinted glasses in sight the first impressions are positive. The computer feels well-built and has a reasonably good keyboard which was much better than membrane based keyboards on some other computers of the time. It can be considered ugly to many with its brownish colours and bullnose front. However it does have a charm of its own and many people would consider it better looking than sleeker looking C64C redesign. Personally to me, the sleek white 64C does appeal to me more. I'm just not a fan of browns and I like the lower front for typing.

Turning on the computer reveals the iconic 64's blue screen with a blinking icon waiting for your BASIC commands. For those who

don't know what BASIC is. It's a high level programming language where commands are relatively English like, making it easy to use. BASIC stands for Beginner's All-purpose Symbolic Instruction Code and is the programming language that's available on start up for most 8-bit computers. Sadly the Commodore 64 came with Commodore BASIC 2.0 which is similar to the version that came with the VIC-20. Only 71 commands are available with no commands for controlling background or foreground colours or even for drawing graphics. Luckily a lot of stuff can be done with the POKE command. For example typing POKE 646,x where x is a number between 0 and 15 changes the text colour. POKE 53280,7 changes the border colour to yellow and so on. It's not as elegant as BBC Basic but

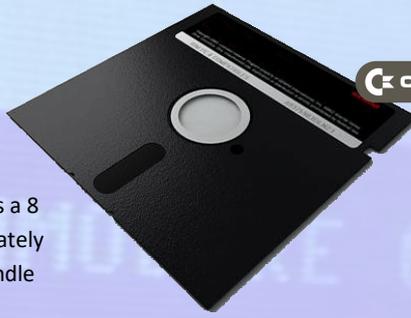
it works. The inbuilt BASIC seems to be speedy enough compared to other 8-bits of the time even if it is slightly hampered by the 1 MHz CPU.

Graphics and Audio

There are three text modes and two graphics modes. Characters are created in a 8x8 matrix occupying a screen size of 40 x 25 characters. The two graphics modes are Standard Bitmap Mode at 320x200 pixels and Multicolor Bitmap Mode at 160 x 200 pixels. Both screen modes take up 8K of memory. Two colours out of the sixteen available can be displayed on each 8x8 grid at 320 x 200 pixels and four colours per 8x8 grid at 160 x 200 pixels. The C64 has built in hardware scrolling as well as being able to display 8 sprites. More can be displayed using raster interrupts. Audio is provided by a 3-voice



THE SLEEKER LOOKING COMMODORE 64C RELEASED IN 1986



programmable sound generator chip. The MOS Technologies 6581 SID has a 8 octave range of approximately 16 to 4000 Hz and can handle four different waveforms which were sawtooth, triangle, pulse and noise. It was the first of its kind to be included in a home computer.

Software Library

While marketed as a business and home computer at first it was considered to be a games machine later in its life.

Playing games is where the Commodore really shines with its impressive smooth scrolling, built in sprites and fantastic audio making it the system of choice for many gamers. No other home computer of the time came close. There are literally thousands of games available. As expected the quality varies widely from terrible and forgotten to gobsmackingly amazing.

Software such as word processors and spreadsheet packages were available which are basic but functional.

A graphical based operating system was release in North America in 1986 called GEOS. More on that in a future issue of Eight Bit Magazine.

The Floppy Drive

While tapes were the medium of choice in Europe, the faster and more reliable option of disk drives were the common method of loading software in North America and the most common disk drive was the 5¼

inch Commodore 1541. Except for the fact that it wasn't fast at all with a data transfer rate of about 300 bps (bytes per second) making it vastly slower than the competition. For example the Atari 810 floppy drive released in the late 70's has a claimed transfer rate of 19.2 kbps although the drive capacity was only 90 Kilobytes compared to the C64's 170 KB. There were a number of reasons why it was slow but one of the reasons was due to a timing bug in the 6522 IC



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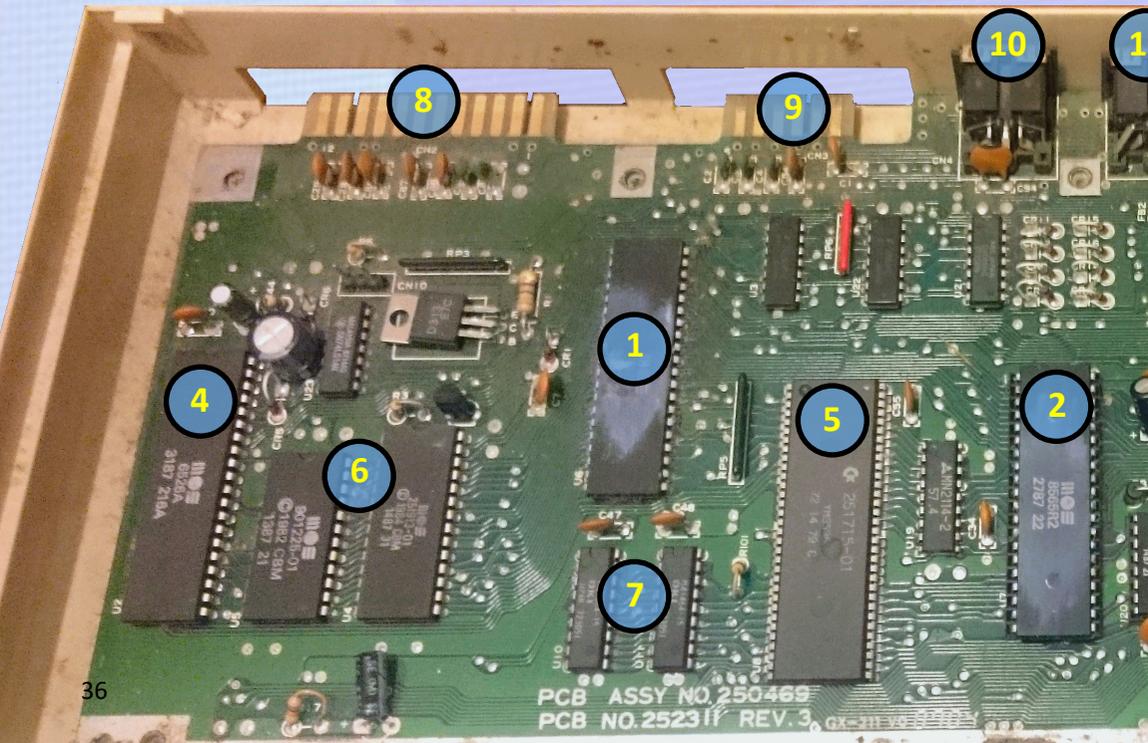
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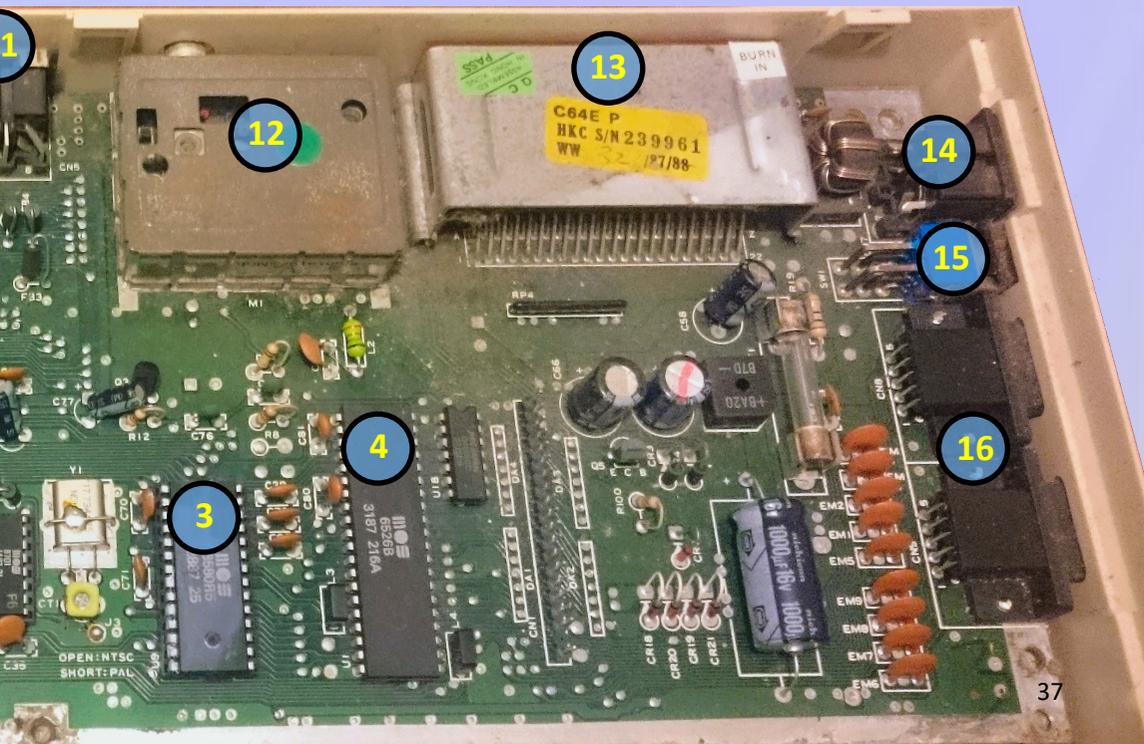
SCENEWORLD.ORG

We open a Commodore 64C to see what makes it tick:

1. MOS 6510 CPU operating at 1.023 MHz NTSC or 0.985 MHz PAL
2. VIC II graphics chip provides the C64 with 320 x 200 screen resolution and a total of 16 colours. It has smooth hardware scrolling and 8 hardware sprites.
3. The SID (Sound Interface Device) chip was the first of its kind and still can't be emulated correctly today. With 3 tone generators and four waveform nothing came close for the time.
4. The Complex Interface Adapter (CIA) controls input and output processes such as the parallel ports, keyboard and joystick interface. It also contains an internal timer. There are two CIA chips fitted inside the Commodore 64.
5. This is the MMU (Memory Management Unit) and it's basically gives the CPU the ability to handle more than 64 Kilobytes of RAM using a technique known as bank swapping.
6. On the left is the character ROM and on the right is the Kernal / BASIC ROM.
7. Ram chips, on the C64C, there are just two 32K chips instead of eight 8K chips as on previous models.



8. The User Port is for adding devices such as modems and printers.
9. Datasette Port is self explanatory. It is also used sometimes to power other devices such as some versions of the SD2IEC floppy emulator.
10. Serial Bus is for connecting devices such as printers and extra drives. It is not compatible with the RS232 standard.
11. Video / Audio Jack. Early models outputs composite video while later models can output composite as well as S-VIDEO.
12. RF Modulator for connecting to a old style analogue TV
13. Expansion / Cartridge Port is for plugging in game cartridges or to expand the system. Examples include RAM expansions, Fast Loaders and even a CP/M cart with a Z80 CPU built in.
14. Power input
15. On / Off Switch
16. Joystick ports. The C64 comes with 2 Atari style joystick ports.



which was used to convert parallel data to serial. Luckily there were solutions to the problem by use of a fast loader. There are hardware, cartridge and software based loaders. An example of a hardware based solution is to install a JiffyDOS ROM. It's faster and has better compatibility over a cartridge based device. However, to use JiffyDOS requires opening up the computer and doing some soldering which made a cartridge based device the more popular choice.

Examples of cartridge based devices were the Epyx Fast Load and Final Cartridge III which increased disk loading times dramatically. While software based fast loaders weren't as good they did increase loading times significantly for larger programs.

The Commodore 1541 floppy drive was bulky, weighed 5 kg (11 lbs), runs hot, was noisy and unreliable. Having said that it does have a certain charm about it and it does match the original breadbin 64 perfectly. The drive originally cost about as much as a Commodore 64 itself and was considered a 'intelligent drive' with its built in 6502 CPU. It was practically a computer itself being able to function without using memory and precious CPU cycles from the computer.

The 1541C was released in 1986 and was quieter and more reliable. The 1541-II was introduced in 1988 and matched the style of the Commodore 64C. The power supply was not built in to the unit resulting in a cooler running and therefore a more reliable unit.

The Datasette

The Commodore 1530 (C2N) tape player was the most popular method of loading software in Europe. Although slow it was about five times cheaper than a disk drive. Transfer rates were only 300 bps although this was increased significantly using fast tape loaders which were included with the tape loading process of most games.

Interestingly the datasette has a built in analogue to digital converter so the computer received digital data on the fly instead of having to convert the audio signal itself. This meant you would have to use a tape drive built specifically for the Commodore 64 but it allowed for better reliability for loading and saving data.

PAL and NTSC

While there was no region locking there were incompatibilities between systems from North America and Europe due to different television display standards. PAL based C64's operated at 0.985 MHz instead of 1.023 MHz. This caused some software, mostly games, to be incompatible between systems.



IN 1984 TO MARK THE 1 MILLIONTH SALE IN THE US A GOLD EDITION WAS MADE.. IN 1986 THE SAME WAS DONE FOR GERMANY.

Overall

There are multiple reasons to own a Commodore 64 today but the three main ones are the following:

One. Thanks to its sound and graphical capabilities the Commodore 64 often offers the best version of a game over other 8 bits. Not to mention the C64 only exclusives.

Two. The SID chip was the first of its kind and is still used today to make some amazing tunes.

Three. It's a iconic computer. You can't call yourself a collector of 8 bit computers or indeed a collector of computers in general without owning one of these.

The CPU is a little slow when compared to the competition of the time and would be a problem except for the excellent VIC II chip taking on the graphical intensive tasks. The disk drive is very slow but that can easily be sorted with a

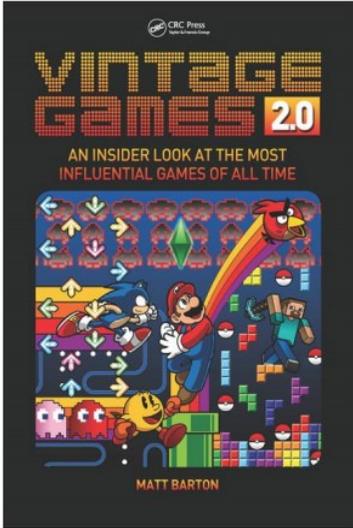
fast loader cart or a JiffyDOS ROM. The built in BASIC is terrible, penny pinching at its worst. As a work computer is was average at best. However it's the graphical and audio capabilities that makes the title of the world's best selling computer well deserved.

Often considered the best 8-bit systems to own. While you can find 8-bit systems with improved capabilities in one area or another, it's difficult to find one that beats it as an overall package.

SCORE: 5 out of 5



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Matt Barton
Saint Cloud State University, Minnesota

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JOY OF THE STICK

The Competition Pro was and still is the joystick of choice for Commodore 64 owners. One word, Essential.



BETTER VIDEO

The standard RF signal is terrible, for better video quality get a composite video lead which can either be RCA or SCART based. Despite what many may say the C64 does not output RGB. Commodores with a 8 pin video port instead of 5 can use a S-Video lead which offers the best possible display. This is the way the C64 was meant to be experienced.

SD2IEC Floppy Emulator

This cute looking device lets you store your entire C64 software collection on one SD card. Compatible with JiffyDOS, GEOS and multiple fast loaders. Get it from www.thefuturewas8bit.com



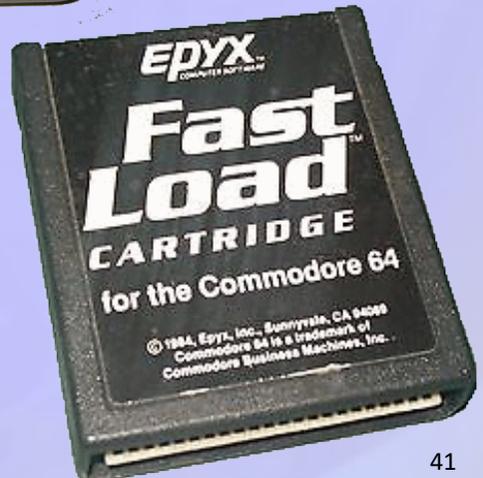
**OLD SKOOL**

The Commodore 1541 disk drive is loud, noisy and prone to failure but there's nothing like it for experiencing the C64 the way it meant to be experienced. Get the more reliable 1541-II if you have the newer style C64C. The same goes for the Datasette recorder for European readers. It's all for the experience.

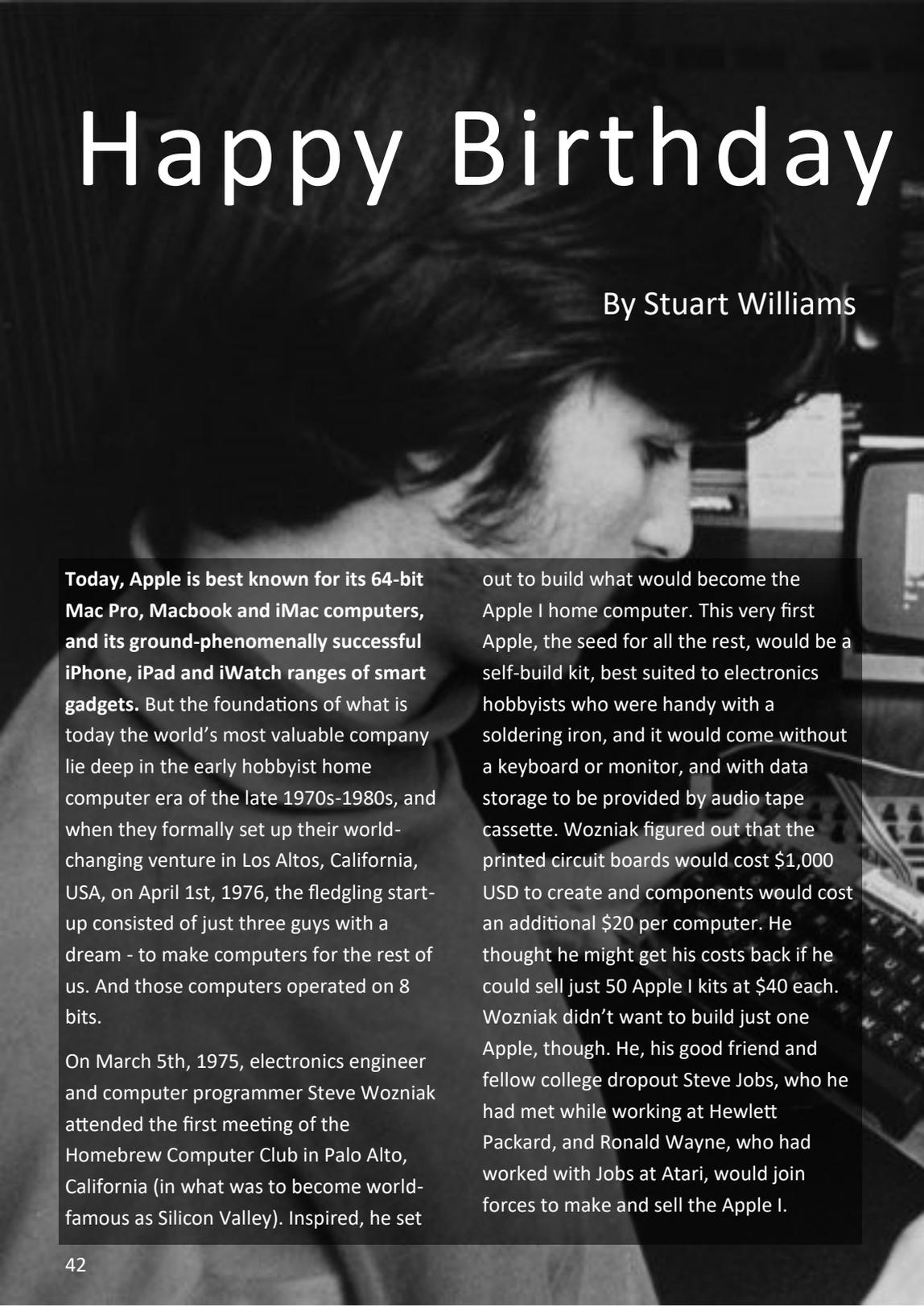
**Fast Loader Cart**

A fast loader cart is essential in combating slow disk drive speeds. Examples are the Epyx Fast Load and Final Cartridge III. The Future Was 8 bit sells the Epyx Fastload Reloaded for £ 16.99 Sterling.

www.thefuturewas8bit.com



Happy Birthday

A black and white photograph of Steve Jobs, looking intently at a computer monitor. He is wearing his signature round glasses and has a serious expression. The background is slightly blurred, showing what appears to be a computer workstation from the late 1970s or early 1980s.

By Stuart Williams

Today, Apple is best known for its 64-bit Mac Pro, Macbook and iMac computers, and its ground-phenomenally successful iPhone, iPad and iWatch ranges of smart gadgets. But the foundations of what is today the world's most valuable company lie deep in the early hobbyist home computer era of the late 1970s-1980s, and when they formally set up their world-changing venture in Los Altos, California, USA, on April 1st, 1976, the fledgling start-up consisted of just three guys with a dream - to make computers for the rest of us. And those computers operated on 8 bits.

On March 5th, 1975, electronics engineer and computer programmer Steve Wozniak attended the first meeting of the Homebrew Computer Club in Palo Alto, California (in what was to become world-famous as Silicon Valley). Inspired, he set

out to build what would become the Apple I home computer. This very first Apple, the seed for all the rest, would be a self-build kit, best suited to electronics hobbyists who were handy with a soldering iron, and it would come without a keyboard or monitor, and with data storage to be provided by audio tape cassette. Wozniak figured out that the printed circuit boards would cost \$1,000 USD to create and components would cost an additional \$20 per computer. He thought he might get his costs back if he could sell just 50 Apple I kits at \$40 each. Wozniak didn't want to build just one Apple, though. He, his good friend and fellow college dropout Steve Jobs, who he had met while working at Hewlett Packard, and Ronald Wayne, who had worked with Jobs at Atari, would join forces to make and sell the Apple I.

Apple



Engineer and scientist Wozniak (today affectionately known as Woz) not only single-handedly created the first ever Apple computer, but also went on design much of the second Apple of the eight-bit era, the II (at first styled][), and to create the first ever affordable home computer disk drive controller, putting Apple ahead of the cassette-based competition. Jobs would be their sales and marketing guru. The older Wayne (who was to leave the first ever affordable home computer disk drive controller, putting Apple ahead of the cassette-based competition. Jobs would be their sales and marketing guru. The older Wayne (who was to leave the company before it became a major success) provided administrative oversight. A draftsman, he also designed the first Apple logo, drew up their partnership agreement, and wrote the Apple I manual.

Even in those early days, Steve Jobs was no fool when it came to marketing. In a move that clearly predicted his now-

legendary (if occasionally controversial) status in that field, he managed to sell fifty Apple computers to The Byte Shop (a now-famous computer store in Mountain View, California) at \$500 per kit. But, not having much ready cash to finance the Apple I, Wozniak was forced to sell his HP-65 calculator for \$500, and Jobs sold his iconic Volkswagen Microbus, to fund the project. To fulfil that first \$25,000 order, they obtained \$20,000 worth of parts at 30 days net and, remarkably considering they were operating at first from Jobs' bedroom and his parents' garage in Los Altos, California, the two young friends managed to deliver the fifty finished kits in just in 10 days. They had a little help, though, hiring neighbourhood kids (including Steve's sister Patti). Just a couple of years later they would move their operation to real premises in Cupertino, not far from the company's current campus, on Bandle Drive.

The new computer, based on the eight-bit MOS Technology 6502 microprocessor

was first publicly demonstrated in July 1976, appropriately enough at the Homebrew Computer Club. Strictly a hobbyist machine, the Apple I was sold simply as a motherboard (with CPU, RAM, and basic monochrome textual-video chips), which left the buyer to sort out a power supply, keyboard and monitor. Some even built their (now exceedingly rare and valuable) Apples into wooden boxes - kind of an Apple crate, in fact!

The microprocessor which was at the heart of the Apple I and most of the later eight-bit Apples had been designed by a small team led by Chuck Peddle for MOS Technology. When it was introduced in 1975, the 6502 was the least expensive fully featured microprocessor on the market, which was a very good reason for using it in a home computer. It initially sold for less than one-sixth the cost of competing designs from larger companies, such as Motorola and Intel, and caused rapid decreases in processor pricing. But it was another aspect of the Apple I that was most striking - it was the first

personal computer with a video display, something we have taken for granted for decades. Apple I could be used with a TV set (add an RF modulator) or a monochrome monitor with composite video input. Competing machines of the day such as the Altair 8800 were generally programmed with front-mounted toggle switches and used indicator lights for output. They had to be extended with separate hardware to allow connection to a computer terminal, or a teletype machine, which was not exactly what you wanted in your study or living room. Apart from the low cost for the time, the ability to use a video display is what made the Apple I so remarkably innovative.

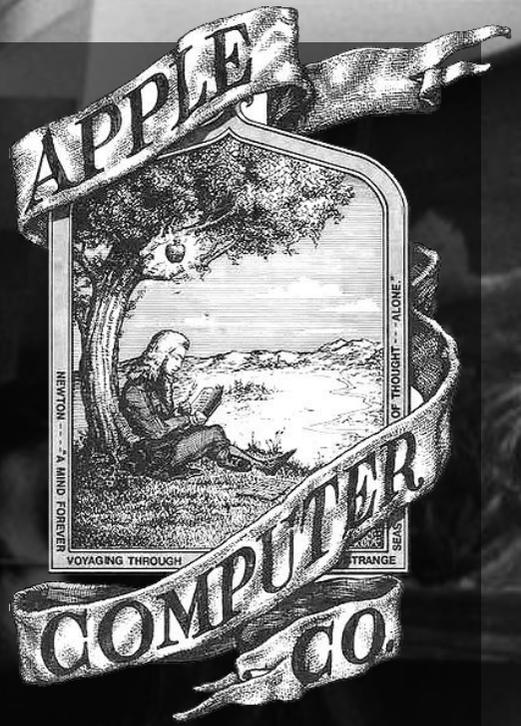
But by November 1976, MOS Technology had been acquired by Commodore, and it was clear that Apple would, sooner or later, have competition in the personal



Apple I computer in home-built wooden case at the Smithsonian, picture by Ed Uthman

computer market as fans of the later Commodore PET, Vic-20 and C64 will soon tell you!

In April 1977 the Apple I's price fell to \$475, remaining on sale through August 1977 despite the introduction of the superior Apple II in April 1977, which began shipping in June of that year. Apple dropped the Apple I from its price list by October 1977, officially discontinuing it. Since Steve Wozniak was the only one who could support customers with their first computer, the company decided to offer Apple I owners discounts and the chance to trade-in their machines against purchase of an Apple II. Apple then destroyed the recovered boards, which is the main reason they are so rare, collectable – and expensive – today.



The very first Apple Computer logo, drawn by Ronald Wayne



Steve Wozniak (right) and Steve Jobs with the Apple I in April 1976 picture courtesy of Joe Melena, copyright Apple Computer, Inc

Come in number][

The Apple I had proven that, IBM's corporate opinion to the contrary, there was sufficient public interest to be worth developing a more mass-market successor, and it therefore inspired one of the first, and one of the first, most successful, mass-produced home, educational and business computer systems, the Apple II (styled apple][) range, which became the shoulders upon which the later Macintosh range would stand.

The Apple II was also powered by the 6502. With electronics and software designed primarily by Steve Wozniak, the design of the Apple II's unusual case, with its removable lid and easy access to expansion slots, was overseen by Steve Jobs, and the power supply was developed by Rod Holt. Introduced in 1977 at the West Coast Computer Faire by Jobs, it was the first 'consumer' product sold by Apple Computer, and the first in a long-lived line which would include the original][, II plus, II europlus, IIe (enhanced as][/e), IIc (a compact, portable version) and IIgs (a 16-bit system) which were produced, until finally the Apple IIe ceased production in November 1993. The Apple II was also the first home computer with a colour video output, at first in the American NTSC system and later in PAL. The Apple II range pretty much set the standard for other manufacturers to follow, at least in terms of form following function. A keyboard, a



Steve Wozniak, aka Woz, with an Apple I board back in the day, courtesy Woz

central processor etc. and a video output, with the ability to expand.

A home appliance?

BYTE magazine predicted in April 1977 that the Apple II "...may be the first product to fully qualify as the 'appliance computer' ... a completed system which is purchased off the retail shelf, taken home, plugged in and used". But 1977 was also the year Commodore launched the now almost as legendary, if less long-lived, PET home and education computer...

Initially assembled in Silicon Valley, and later in Texas, printed circuit boards for the Apple II were manufactured in Ireland and Singapore and the first computers went on sale on June 10th, 1977.



1976 Apple 1 Computer in a briefcase From the Sydney Powerhouse Museum collection, picture by Binarysequence

The basic spec included a 6502 microprocessor running at 1.023 MHz, 4 kB of RAM , an audio cassette interface for loading programs and storing data, Steve Wozniak's Integer BASIC programming language built into the ROMs, and two game paddles,. The display was 24 lines by 40 columns of monochrome, upper-case-only text on the screen, with NTSC composite video output suitable for display on a TV monitor, or on a regular TV set by way of a separate RF modulator.

The original retail price was \$1,298 (with 4 kB of RAM) and \$2,638 USD (with the maximum 48 kB of RAM).



Enthusiast???



Vintage is The New Old - Everything about every 8-bit computer in one place.

VintageIsTheNewOld.com

Reflecting the computer's colour graphics, the Apple logo on the casing was filled with rainbow stripes, and featured in Apple's corporate logo until 1998.

Sound was produced using a toggle circuit, which could only emit a click through the built-in speaker or a line out jack.

Remarkably, all other sounds (including two, three and, eventually, four-voice music and playback of audio samples and speech synthesis) are generated on the Apple II entirely by software.

The smart, professional-looking Apple II was also the first personal computer which could be easily expanded with the 5.25 inch 'disk][' floppy disk drive, using a remarkable plug-in controller card designed by Steve Wozniak to save money compared with the previous 8 inch drive standard by hugely reducing the number of chips on the controller, and controlling it in software. Wozniak also designed the drive itself, which was originally manufactured by parts supplied by Shugart and later by Alps, and it was the first in a long line of Apple floppy drive designs. Ironically, it was in 1998 that Apple would decide that the floppy drive was obsolete, and they were the first to stop using them.

Apple II Plus

The Apple II Plus, introduced in June 1979, included a new Applesoft BASIC programming language in ROM. This Microsoft-authored dialect of BASIC,

previously available as an upgrade, supported floating-point arithmetic, and was to become the standard BASIC on the Apple II series, albeit slower than Steve Wozniak's Integer BASIC. Except for improved graphics and disk-booting support in the ROM, and the removal of the 2k 6502 assembler/disassembler to make room for the floating point BASIC, the II+ was otherwise identical to the original II, but because of a drop in RAM prices it sold with a full 48k of memory already installed. Even more ram could be added by bank switching.

Apple II Europlus and J-Plus

In 1979, Apple expanded its market into Europe, Australia and the Far East. A variation on the Plus allowing greater regional compatibility, the Apple II Europlus was developed specifically for Europe and Australia, and the Apple II J-Plus was configured for sale in Japan. Apple made hardware, firmware and software changes in order to comply to regional standards, including keyboard lettering and layout, mains electricity supply voltage, and video in the European and Australian model, where the output signal was changed from colour NTSC to monochrome PAL. . If the customer required colour in a PAL region then they would have to purchase an extra video card, because the simple tricks Wozniak had used to generate a pseudo-NTSC signal with minimal hardware would not work with the more complex PAL system. Production of the Europlus ended in 1983.

But before that came the Apple III.

The ill-fated Apple III

No company ever had a straight-line course to success, and Apple has had more than a few ups and downs, despite its present day supremacy. These 'hiccups' included unforeseen problems with machines such as the Apple III, a bigger, business-oriented but still eight-bit cousin of the Apple II, first released on May 19th,

1980 and using the faster Synertek 6502A processor running at 2Mhz, almost twice the speed of the Apple II line.

It incorporated a new Disk III floppy drive. The most important features which business users wanted in a personal computer were a true typewriter-style upper/lowercase keyboard (the original Apple II's was based on a teletype, with no lower case) and a proper 80-column display, all of which the Apple III was



Apple II computer. On display at the Musée Bolo, EPFL, Lausanne picture by Rama

designed to offer.

By the time the Apple III came along, however, technology had begun to move on apace. Apple's latest eight-bit micro was too expensive for a mass market (being aimed almost entirely at the business sector) and had circuit design issues. Fourteen thousand early machines were recalled for stability problems, and though these issues were eventually sorted out, the damage to the machine's reputation was done. It has also been suggested by some that the III was also badly marketed, or even deliberately sidelined. Some have also said that since 1979 Steve Jobs was more interested in his own pet project – the Apple Macintosh, which followed on from the relatively unsuccessful Lisa (only 100,000 sold). Jobs had been forced out of the Lisa project and joined the Macintosh project, which he then redirected into basically building a cheaper, smaller and better Lisa – and so history was made, but that's another story.

Whatever was going on in the background with the Lisa, the Mac and the Apple III, later, more popular models in the Apple II line were to incorporate some of the improvements made with the III and, with sufficient memory, they could also run ProDOS, which was based on the Apple III's new operating system, the Sophisticated Operating System, or 'SOS'. This all ensured that the work on the Apple III wasn't entirely wasted.

Apple IIe

The Apple II Plus was followed in 1983 by what was to become the classic eight-bit Apple home computer, the Apple IIe, a more powerful machine using newer chips to reduce component count and cost and to add new features, including displaying upper and lower case characters and offer a standard 64 kB of RAM. Also launched was the DuoDisk, essentially two half-height Unidisk Disk II 5.25-inch drives (the Unidisk being Apple's replacement for the Disk II) in a single enclosure designed to stack between the computer and the monitor, together with a new controller card with different ports. The DuoDisk suffered reliability problems, however, and was not as popular as the Apple IIe itself.

The most popular eight-bit Apple ever built and the workhorse of the line, the IIe also has the distinction of being the longest-lived Apple computer of all time, being made and sold with few minor changes for almost 11 years. In the period following the original, two design variations were introduced, known as the Apple IIe Enhanced (styled //e, four new replacement chips plus 128k RAM gave it more compatibility with the later model Apple IIc, including an upgraded processor called the 65C02) and the Apple IIe Platinum (a modernized new look for the case colour to match other Apple products of the era, along with the addition of a built-in numeric keypad). The //e enhancements could also be simply



Apple II plus, picture by Bilby

applied to the unenhanced version after sale, using a kit of parts available through dealers.

Apple IIc

Apple released the compact Apple IIc in April 1984, promoting it as a portable Apple II, because it could be easily carried, though unlike modern laptops it lacked a built-in display and battery, instead running off the mains and being offered with a compact 9-inch green screen monitor, which echoed the also monochrome, but paper-white, Macintosh display, which had been introduced in January. The IIc had a fold-down carrying handle, allowing it to be propped up into

a typing position. The first of three Apple II models which were made in the Snow White design language, it was the only one in a creamy off-white colour.



Apple III plus, picture by Bilby

The IIc, which was the first Apple II to use the 65C02 low-power variant of the 6502 processor, deleted the now-obsolete cassette port and featured a built-in 5.25-inch floppy drive and 128 kB RAM. Having no internal expansion slots, the compact IIc contained a built-in disk controller that could control external drives, and offered ports for composite video, serial interfaces for modem and printer, and a port joystick or mouse port. The disk port was eventually able to work with 3.5-inch disk drives and even third party hard disks. The later IIc Plus of 1988 was basically the same, but with a 3.5" disk drive built-in. It was the final member of the Apple II line, but before then came the Apple II GS, released on September 15th, 1986. A radical departure from the existing Apple II line, the II GS featured a true 16-bit microprocessor, and as such, despite being a fascinating machine, is beyond the scope of this magazine.

Writing on the Wall

The Apple eight-bit line was highly successful, particularly in its home market, although it was much less so in the UK, where by 1982 the home computer market had become dominated by homegrown computers. Here, the educational niche was occupied primarily by the Acorn BBC Micro, itself also 6502-powered but more advanced than the early Apples on some ways. Sinclair with its Z80-based ZX Spectrum dominated the low-cost games computer niche. And then

there was the other American invader, the Commodore 64...

But even in the early 1980s technology was changing rapidly, and the writing was already on the wall for eight-bit systems, at least as far as business computing was concerned. In 1981, IBM unveiled the 16-bit IBM Personal Computer (PC), which was soon cloned by far-eastern manufacturers and the market flooded. As a result of the arrival of these more powerful, if III, far less cuddly, PC DOS/MS-DOS based systems, the business market began to pull rapidly away from the Apple eight-bit range, and that was pretty much the last nail in the coffin for the Apple III, despite the subsequent longevity of the Apple II line in the home and some scientific and educational markets.

The final version of the Apple III, the III Plus, was discontinued on January 24th, 1984, ironically the day Steve Jobs introduced the Apple Macintosh to the world. It would be left for Macintosh, the 'computer for the rest of us', to take up the fight against 'Big Blue' and popularise the (subsequently much-copied) new mode of operation using Windows, Icons, Mouse and Pull-down menus which rules the world of desktop computing today. But that is another story.

A roller-coaster ride

Since Apple was first founded, It's been a four-decade-long roller-coaster ride that almost came off the rails in the late 1980s-

1990s. Steve Jobs was pushed out of the company in the mid-80s after the Mac range struggled and he attempted to oust then chief executive John Sculley. From 1997, however, the triumphant return and inspired leadership of Jobs helped to define a new era for Apple and since then the company has gone from strength to strength.

Sadly, Steve Jobs, the inspirational design and marketing genius and eventual saviour of Apple, passed away in 2011. Thankfully Steve Wozniak, creator and programmer of the first Apples and pioneer of the personal computer revolution, is still doing his own thing, being surprisingly accessible through his website www.woz.org and social media. He's still a stipended Apple employee, and is also a shareholder, but has gone on to run several other ventures, including working in academia, as well as teaching computer classes to children from the fifth through ninth grades – and teachers as well.

Today, forty years after the firm was official incorporated as The Apple Computer Company, Apple has changed the world and the way we see, hear and communicate with it. The company now has a massive headquarters in Cupertino, California, with another, popularly known as the 'spaceship', expected to open this year. It runs more than 480 retail stores in eighteen countries worldwide and reported income of more than \$18 billion

US dollars – £12.4 billion – for the first quarter of this year. The company recently revealed that there are now more than one billion active Apple devices being used around the world. Not bad for a three-man venture started in a bedroom and a garage.

And, as for the great days of the eight-bit Apples, as long as the thousands of skilled and enthusiastic Apple retro-computing fans and collectors world-wide can keep their carefully restored and conserved machines going, well those days never really ended, did they?

April 1st, 2016 was the 40th birthday of the Apple Computer Company. Happy Birthday Apple, and many happy returns of the day.

April 1st, 2016 was the 40th birthday of the Apple Computer Company. Happy Birthday Apple, and many happy returns of the day.



Apple IIc with monitor, picture by Billy

THE TECH ZONE

In the first article for the tech zone John Kavanagh check out the Zaxon floppy emulator for the Amstrad CPC 6128.

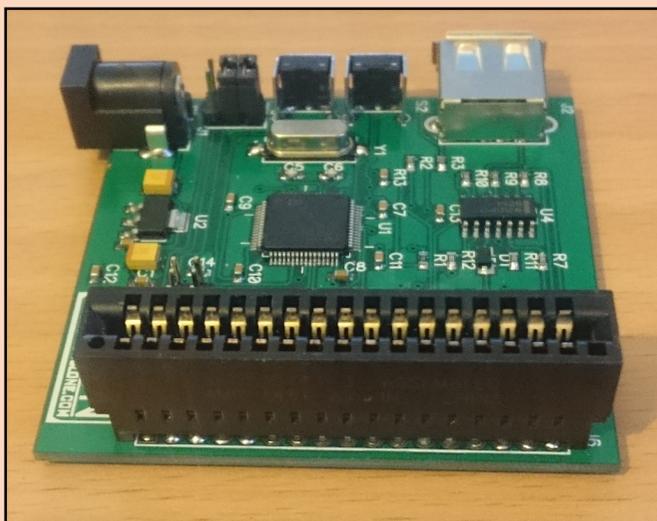
The idea of having access to thousands of disk images on a real Amstrad CPC 6128 is extremely appealing. No more sourcing hard to get and expensive 3 inch disks and then having to transfer the .DSK images to the CPC using a PC to CPC parallel cable or worse, playing on a soulless emulator. While I wrote a three part series for CPC Oxygen on doing that back in the early 2000's thankfully there are simpler ways nowadays. Devices such as the

Gotek USB floppy emulator and the HxC Floppy Emulator does the job perfectly. However they were a little on the expensive side and you'll still require a suitable floppy cable which could bring the price up to near the 100 Euro mark for either device.

A cheaper and some may say a more elegant solution is being offered by Zaxon which offers two different floppy emulators for the CPC, a much larger one with a LCD screen for the 464 and one for the 6128. We'll be

reviewing the 6128 version which is also compatible with the Amstrad 6128 Plus and Schneider branded 6128 when used with the correct Centronics adapter. Both versions of the Centronics adapter costs £ 14.99 Sterling. The Zaxon CPC 6128 emulator itself costs £ 26.99 Sterling (around 35 Euro at the time of writing). Postage costs £5 Sterling unregistered or £9 Sterling tracked and recorded. We currently don't have postage rates for outside of Europe but I'm sure a friendly message to Zaxon will give you the postage details.

On receiving the device it was well packaged but there wasn't much else. No instructions, not even an information sheet. Although there were links on the webpage I purchased it from, it would still had been nice to receive at least an information sheet. The device required a 5 volt input with a 5.5 / 2.1 mm connector which is the same



that powers the Amstrad CPC. Xaxon sells a power splitter that allows the CPC and the floppy emulator to be powered from the one source.

However I didn't opt for that and used a 2 Amp, 5 volt power adapter. Although 2 Amp is overkill it won't harm the device. Like all devices it will pull the amount of current it requires as long as you keep the voltage at 5 VDC everything should be fine. How much current does the device needs? I don't know since there's no documentation but I would guess 500 mA would be enough, 1 Amp to be safe. I would suggest the splitter cable if you don't have a box of 5 volts adapters as it only costs £ 3.30 Sterling.

Before powering up the device you'll need to find a USB flash drive and format it to FAT32. As expected it won't work on NTFS. Once formatted, two pieces of software needed to be downloaded which are the HxC Floppy Emulator Manager and the HxC Floppy Emulator.

The files can be downloaded here:

http://hxc2001.com/download/floppy_drive_emulator/SDCard_HxC_Floppy_Emulator_Manager.zip

http://hxc2001.com/download/floppy_drive_emulator/HxCFloppyEmulator_soft.zip



The first thing to do is to unzip the HxC Emulator Manager, browse to the Amstrad CPC folder and copy all the content to your freshly formatted USB flash drive.

Now you need to convert your .DSK images to the .HFE file format, this is what the second download does. It's an application for PC and MAC. Upon opening you can click on



“Load” to load a .DSK image and then click “Export” to export the file in a .HFE format.

However I much prefer the batch converter which can

convert over a 1,500 DSK images in about two minutes on a modest Intel Core i3 PC. Once done, you have to make a folder on the USB flash drive and copy the newly converted files over. If you are doing a few hundred files I suggest separating the images into separate folders such as A-C, D -F etc. Otherwise you'll find yourself scrolling forever to find what you are looking for as the scrolling does slow down the more you scroll. I'm not sure why there's such a slow down but it's get to the point of being almost unusable on long lists. Keeping files in separated folders kept game selection nice and fast.

With the Amstrad power off I plugged in the device, power cable and the flash drive and it

didn't work! Trying it on another CPC resulted in the same issues. After cleaning the contacts on the edge connector of the CPC things improved. Although once in a while the device needed to be adjusted as the CPC came up with the disk not found message. This is more of a problem with the CPC edge connectors being slightly dusty and suffering from wear. This isn't really a problem as it tends to happen after pressing one of the buttons on the device and not at random.

To load the HxC software, first type CAT making sure HXC is listed, if not, press either the forward or back slot button on the device and type CAT again. Once HXC is found type Run "HXC" and press Return.

Browsing through the folders and pressing 'Return' or the space bar on a game or program adds it to one of the 15 available slots. The idea is that you can load a game or program that has multiple disk images into different slots, using the two available buttons to cycle through different slots.

Once you choose the games you want for each slot you can exit out of the HXC program by pressing 'ESC' and pressing Y to confirm.

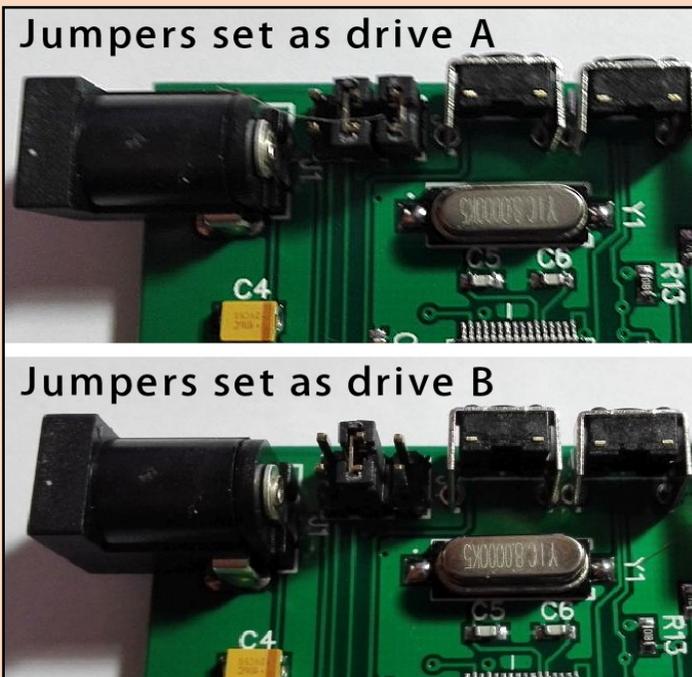
Typing CAT on the CPC will display the files for a certain disk images, pressing one of the two available buttons will cycle through different disk images. There's no way of knowing which slot number

you are on so you'll find yourself cycling through different slots to find the program you want. It can be a bit of a pain trying to find slot zero which is the HxC software. It would be much better if the device went back to the HxC slot after being powered down and restarted.

Another issue I've noticed with the device is that when it's plugged in and the jumpers are configured as Drive A the motor of the floppy drive stays on. A solution would be to configure the jumpers as drive B but as many CPC owners are aware of, some software needs to be loaded from drive A. I didn't like the idea of the floppy motor being left on so I unplugged the build in floppy drive by pulling the plug from the monitor that powers the internal disk drive.

Games loaded at around the same as a real 3 inch floppy drive. 40 seconds for Chase HQ 128k version and a longer time of 1 minute 16 seconds for Gryzor.

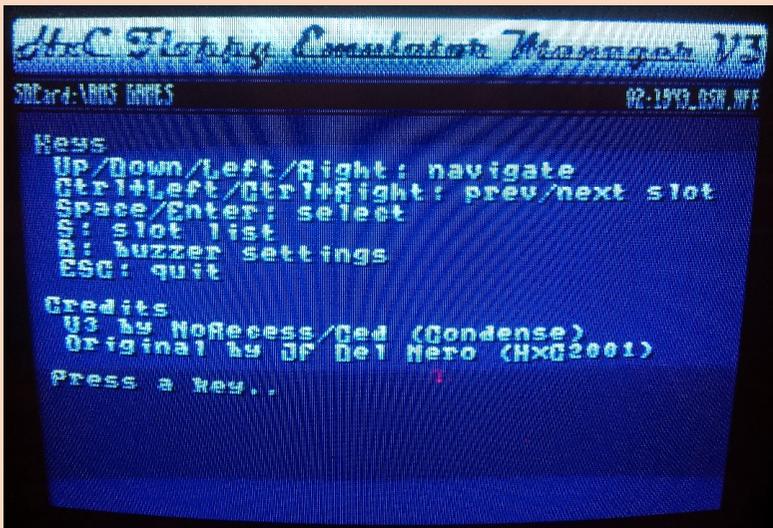
Having said all the above I do like the device. It seems well built and does add a lot of extra joy to using the 6128. The problem I had will using the device was purely down to the design of edge connectors as the device did connect nice and tight. The issue with the floppy motor is easily fixed leaving me with a device I wouldn't do



without. I rate it 9 out of 10, not making full marks due to some minor issues but nevertheless this is possibly the most useful device ever for the Amstrad CPC.

464 ahoy!

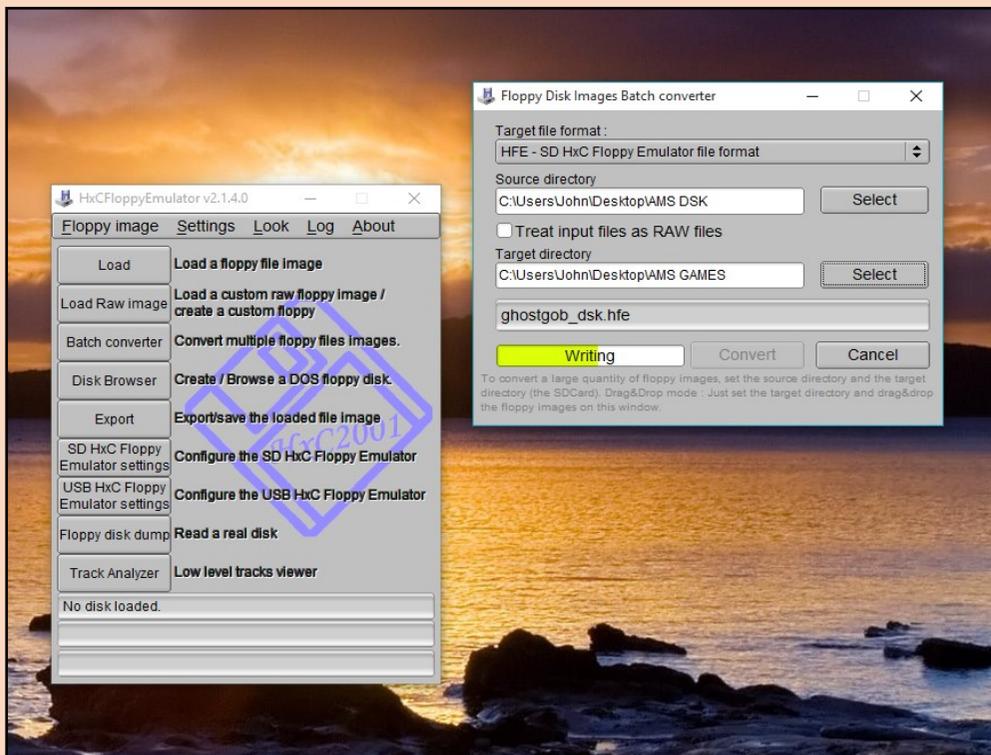
As mentioned earlier there is a 464 version. The added disk drive interface that's required bumps the price up a bit at Sterling £ 52.99. It is still value for money. You can find Zaxon's online store at



www.sellmyretro.com/user/profile/zaxon

In the next issue we will be looking at USB and SD card

devices for other 8 bit formats. Until next time.



Programming the 8 bits

In the first part of Programming the 8 bits we are going to dip our toes in to the fascinating world of programming.

It's a known fact that there were two types of people who had computers in the 1980's those that didn't program them and those that did. The ones that didn't would type the LOAD command to play their games and that was it. While playing games are fun they missed out on a whole extra dimension of owning an 8-bit computer.

Programming, or what some people nowadays like to call 'writing code' gives you a deeper understanding of your computer. To truly know your computer is to be able to program it. Not just with BASIC but all the way down to the CPU via Assembly language.

There are some of you who are reading this who already know how to program and would like more advance features. Not to worry, future issues of EBM will have that. Right now, this article will

focus on the beginner. The goal is to get everyone started on some level. We are going to give a BASIC example as well as a example in machine code for both the MOS 6502 / 6510 and Z80 processors.

BASIC PROGRAMMING

BASIC is usually the programming language available when you first turn on the computer. If you're using a Jupiter Ace you'll get a programming language called FORTH but we are sticking to BASIC for now. BASIC stands for Beginner's All-purpose Symbolic Instruction Set. It's based on easy to use English-like commands. While programs written in BASIC run much slower than those written in machine code they are much easier to write. Take the following short program for example:

```
10 For a=1 to 1000
```

```
20 print a  
30 next  
40 print "Hello World"
```

You can probably understand it without me explaining it. The line numbers are to place the code in to memory. The first line starts a FOR loop. It will set the variable "a" to 1. The next line print the value of a to the screen. If the variable was in brackets like this: **20 print "a"**, it would be have printed the character a and not the value of a. Line 30, the NEXT command brings BASIC back to line 10 as the "FOR NEXT" loops hasn't finished. The variable a is increased to 2 and line 20 prints the value of a again, this time it prints 2 as the value of a. It'll do this until it reaches a value of 1,000. Then line 40 executes which will print the text "Hello World" to the screen.

The wonderful thing about BASIC is that while the Commodore 64 and Sinclair

Named Contributors

6581: POKE 54296,15

Aaron: Proud to be a backer!

Arcano Systems LLC: Arcano Systems creates 8-bit computers, chiptune music synthesizers, and microcontroller-based devices for hobbyists, musicians, students, hackers, and makers. Visit arcanosystems.com or follow @ArcanoSystems on Twitter.

BobCo: Shaw once said: "We don't stop playing because we grow old; we grow old because we stop playing." ...I'm starting to believe him. :)

Bug of NCI: For our German Podcast retrokomppott.de we did some nice interview in english language with scene legends: <http://blog.retrokomppott.de/interviews-english/>

Chris Abbott: Get along to backintimesymphonic.com or sidologie.com for C64 remix goodness.

Cees Meijer: What a great magazine and a marvelous collection of 8-bit computers! (Such a shame my favorite TRS-80 is not part of it...maybe next time?). And remember: your current laptop, tablet and phone will be the retro of the year 2050, so don't throw them away!

Charles Atencio: I witnessed the 1980s Commodore 64 computer hobbyist years, and seen the PC innovation of the 1990s become mired in later standardization. The treasured years of the 8-bit home computer were unique. Few major publishers and direct developer / end user relationships. Innovation was everywhere. <http://charlesatencio.com>

CraigsBar: Thanks to all involved in bringing this mag to the Retro Gaming community.

D. Skilton: It's not our job to question why, it our job to preserve and thrive!

Darren Timmis: Laser Squad - Amstrad CPC. One of the best turn based strategy game to appear on the 8 bits. For me the Amstrad version was by far the leader. 5 maps and numerous variations of armour and weapons and a two player option thrown in. Simply awesome.

Darren Townsend: Retro Forever

David Kico: As a kid I used to go to computer club meetings with my dad in the late 80's. That's how I got hooked on the C64. There were too many games to list and most of the music was and still is incredible. PrintShop was awesome too, and getting on the BB's was basically the internet before most people knew what the internet was. Good Times, Thanks Dad

David Youd: 10

```
A=32768:FORB=ATO+27:READC:POKEB,C:NEXT:
SYS:DATA160,15,152,89,12,128,32,210 20
DATA255,136,208,246,96,12,71,81,65,77,38,84,7
3,94,42,74,74,66,87,2
```

DeKay: Best wishes to all 8bit enthusiasts who made this possible. I've always wanted to get a magazine with articles only about 8bit computers, leaving out consoles. Greetings to all

forum64.de users!

Didier Lüthi: www.sinclair-collection.com OR www.facebook.com/groups/sinclaircollection

Dr Dimitris Gourlis, MD, EHS: Jimmy of Spider Software (TM), a proud member of the QUIKSILVERS group, is still active in the C128 scene after 25 years! Greetings from Athens, Greece.

Dustin Vogel (Astray / Silicon Limited): Retro computers mean a lot to me, especially the 8-bit ones. They look nice and I love the sounds (like the SID), the pixels and the (simple) electronica. In the past I programmed demos for Silicon Limited and SuccesS. Today, I collect 8-bit computers and enjoy life. Commodore is my number 1.

EL Passion:
0100010101000110000100000010100000110000
1011100110111001101100101101110

Ely: The Dragon 32 was my first, but I loved my Atari 8-Bit. All hail the 8bit era!

Fabrizio Pedrazzini: The Strange (and Rare) Videogame Pics Page - TS&(R)YVP <http://faber.p.tripod.com/>

Fhx: 10 print "fhx backed this issue"
20 goto 10
Run

fossi-soft: I want to thank my sister. Without her I had never started programming on a C64 and I had never study computer science. She give up her Christmas presents so that my parents could bought me a used C64 for 600\$. Thank you sister!

Frk'Almg: Frk'Almg sends greetings to all Commodore fans and enthusiasts worldwide. C64 and Amiga rulez forever! Keep the spirit alive :)

Gareth: "GAZCBM" Darby: Long live the c64!

Gereon Faßbender: Hello world!
@LightmileStudio

Gwendelyn Foster: Dominate the world one pixel at a time!

Gryzor: For more retro goodness, visit CPCWiki.eu - the ultimate community and knowledge hub for the Amstrad CPC! Let the 8-bits rule! And of course, here's hoping this effort here flourishes...

Hugo van der Aa: PRESS PLAY ON TAPE

Ian Price: Without history there is no future.

Jakob kjøller, Copenhagen DK: I remember as it was yesterday, getting my first reel computer - the commodore 64. It was christmas eve and the last present from my parents was yet to come. There it was: Batman The Movie Commodore 64C pack including tape deck and joystick. The Wauw effect was enormous. I sat up the system and played the same game all night. I only played the first level, because after finishing it, it said on the screen: "turn tape, rewind and press play"

my english was so bad that I didn't even know what it meant. Only months later i found out and finished the game.

Jean-Luc Crisanto G. Reyes: I am just going to say that I miss everyone of you guys in the Philippines(especially you, Mom). Sending love from San Francisco. I hope you guys read this message and smile. Also, send me more emails of cat pictures.

Joachim Froholt: If you can read Norwegian, please visit our website at Spillhistorie.no. We cover retro, indie and niche games, as well as the occasional AAA-release. Mostly computer / microcomputer stuff.

Joerg "Nafcom" Droege: Scene World Magazine - www.scene-world.org - For All Things C64!
John "MooseCantTalk" Moody: To my gorgeous wife Erin: Thank you darling for supporting my obsessions, I love you! <3. Also, Commodore 64 and Gateway to Apsahl for the win!

Jonathan Garcia: May 4th 2016. Seattle, WA. My 8-bit computer journey started in Saint-Die, France with my best friend Sidoine Pierrel, his Thomson MO5, my Thomson TO7/70. Later I got a Amstrad CPC6128. We had a great time and lot of fun. I later upgraded to an Amiga 500.

Jondo: 8 Bit forever -
LOAD"GreetingsFromMuntafu",8,1

Judge Drokk: Judge Drokk founder of the classic Amiga demo group "Anarchy" is proud to support this magazine. Search me on Twitter

Jürgen Auerbach: Shit happens. Always on my shift

Jörn Kierstein: Wer nicht nur spielen möchte, der findet auf <http://www.retro-programming.de> einen leicht verständlichen Einsteigerkurs zur C64 Assemblerprogrammierung, sowie Infos zum Rasterzeileninterrupt, VIC-II (z. B. FLI & MCI) und noch vieles mehr.

Karpow of Scoopex: The very best regards to Antibyte, Photon, Hi-lite, Reward, Uno, Uncle Tom, Galahad, J.O.E., Autopsy, Thunder, Dan, Made, Deck, Vassago, Dr. Stein, The Bat, Moshmessiah, Dr. Feelgood, Sane, Amenophis, Neil Green and Chris Abbott. 8-bit FTW!

Kim André Sand: Then shalt thou count to eight, no more, no less. Eight shall be the number thou shalt count, and the number of the counting shall be eight. Nine shalt thou not count, neither count thou seven, excepting that thou then proceed to eight. Sixteen is right out.

```
Laurence Gonsalves: 0 dim a(13)\1 for i = 0 to 12:a(i)=rnd(0):if a(i)>.5 then ?"UK ";next:goto 3 \2 ?"J!";next\3 ?4 for i = 0 to 12:if a(i)>.5 then ?"K U";next:goto 6\5 ?"I!";next\6 ?7 for i = 0 to 12:if a(i)>.5 then ?" UK";next:goto 9\8 ?"J! ";next:goto 9\9 ?goto 1:rem i adore my 64
```

Kurt Johann Klemm: Don't forget to flip the floppy to side B

Manuel Sagra de Diego: Thanks for keeping the retro scene alive!

Named Contributors

Marcel Dunkelberg: aka Captain Koelsch

Markus R: I'm just an old grey-haired man who's good at what he does. Playing 8-bit games.

Markus Tillmann: Keep an eye on our Retro Amiga event in October 2017 in Germany and join us! :-) www.amiga30.de

Martin Esser: This is my childhood. Treasure it. martinandrewesser@googlemail.com

Martin Grundy: I always loved Zzap!64. Unlike the majority of rather dull Commodore mag, Zzap! Had the energy and passion of a fanzine. It was also beautifully made with Oli Frey's amazing art adorning its pages and was the first mag written by gamers not journalists. It was my 8-bit bible and a brilliant read. A definite Gold Medal!

Martin Maly: Stare pocitace jsou sexy. Sledujte [@retrocp](http://retrocp.com), [ctete retrocp.cz](http://ctete.com)

L.J.L.: a=e Lipps Pixe. Mj csy jmrh xlmw qiwweki xlex qierw xlex csy evi e zivc wtgmep kmvp! Xs jmrh xli xvieyvi xlmw mw alex csy qywx hs. Ks xs xli ettpi xvii, psso xsaevhw csyv isywi, xeoi 2 wxitw jsvaevh erh hmk pmoi e qsywi z=d.

Mike Burghard: vanye

Michael "FreakChild" Towns:
8 bits of goodness
Some paper and some ink
Is what's in your hands.

A bit like a blog.
But not on the internet
Think it's called a mag.

Faster than data.
Since it doesn't need to load.
Easier sharing.
Just pick the mag up,
Hand it over to a friend.
There, you just shared it.

Mug UK: Everyone needs to remember the good old 8-bit days :)

Mikko "Kaji" Leskinen: Kiitos 6581 - 8580

Nick Lines:
"8 bits are enough for me
This is not where I should be
My life is more than information
I want a life beyond emulation"
- Mind.In.A.Box. Keep the machines alive!

Optimus: optimus.undergrund.net

PA Computer Guy LLC: @pacompguy

PaleDeth: Yay for 8-bit.

Patric Beckereit: 1973

Paul Castellani: Keeping Retro Relevant!

Paul Cook: The Commodore 64 redefined the soundscape of "Computer Music". Talent and Imagination evolved AWESOME masterpieces still remixed and played today for all = 30+ years after!

Community = KWED SLAYRADIO C64AUDIO LUKHASH KICKSTARTER....

It is Inspiration in our time.

Paul Blake: A magazine in honour of all those innovative backroom coders of the 80's!

Paulo Garcia: As a supporter of any retro computing initiative, I am thrilled to help to launch this magazine!

Peter J. Badrick: 8-bits ought to be enough for anyone.

Pentagon: Visit: <http://www.forum64.de/>

Recovering from a Scratch blog: Bought a C64 again a few months ago so am rediscovering the best computer! Your magazine couldn't have had better timing, I hope it's a success and we can look forward to a regular, proper retro mag for 8-bit owners! Philip

Remute: www.remute.org

Rev Dave Wakely: Really proud to support 8-Bit Magazine. Here at Turbo Formula we love Retro Computing but have to say my personal favourite is the Commodore 64! I look forward to some really interesting articles in the months to come.

Reverend Neil Wakely: I run <https://www.facebook.com/C64-523546447677965> A Proud Donator of Eight Bit Magazine. I am a true retro geek and collect old retro computers and consoles. I am also a member of <http://www.turboformula.co.uk>

Roberto Vergani: Thanks to Willy the miner, Qbert, Dirk and all my other 80' friends

Robin Harbron/P1XL Games: Greetings to creators and readers of 8-Bit Magazine from Thunder Bay, Canada! Find me on Facebook or WWW; my pixelly indie games: P1XL Games, and my geeky music: Bedford Level Experiment. C64, Commodore PET, and Atari 2600 are my favourite 8-bits!

Roysterini: Well done on reaching your goal, guys. Keep an eye out for future releases for C64 by Pond Software.

Sam Jules Cave: In memory of good times.

Sebastien Clavet: 1988, late night, dim lights, a blanket and pop corn. An old sci-fi movie playing on TV in the background, giving the room a magic glow. The ambience was set to play Maniac Mansion on my C64. It was a great and simpler time and this magazine, like a window into the past, will revisit this era to make us feel like kids again!

Sebastián Gavilán Gurvitsch: Gavilán strikes back again. From Argentina, in 2016, 8 bit rulezz!

Smithers Charitable Group: Ecstatic to be a part of successfully funding Eight Bit Magazine! Coming from the island of Guam.

Steven Merrill: The American Way LLC supports free speech, and all 8bit from the apple 2, to the TSR 80 model 100, and beyond!

Stuart Polkamp: We had Spectravideo computers my dad bought for us which were great fun. Friends had the C64, that captivated me with games like Beach Head, Last Ninja and groups playing Winter / Summer / World games. On both computers, it was interesting learning commands and hilarious changing words that appear in games to something funny.

Stuart Williams: I'm proud to be able to contribute to the launch of this magazine, long may it be published. There seems to be a Renaissance in retro computing now, and Eight Bit Magazine is part of it. Good luck!

Tale-X: Greetings to all 8bit enthusiasts, especially to the folks from forum64.de and Computerclub Klausdorf!

Tim "Octoate" Riemann: The Amstrad CPC new portal - <http://www.octoate.de>

Timothy Blanks: My brother and I had saved for 8 months for an Atari 2600, doing odd jobs for neighbours, by Christmas we had only saved half of the total cost when our parents surprised us by giving us one for Christmas. I loved that machine, until the moment I saw the Ocean loader for Cobra on the C64 (coming off a tape!) I still have my Atari and C64 on my desk now.

Thraka:
0110110001101111011011100110011100100000
0110110001101001011101100110010100100000
01110011011010011001010111001001110010
011000010011101101100100011011101110011
001110110110011011010000110000101110010
0110010101110111011000010111100101100101

tobo bobo: @tobobobo - 8-bit fanboy and dodgy doodler. Hoping this doesn't go over the 255 character limit

Todd Haynie: Gambit rules!

Thomas Sebastian Jensen: Greetings!

Villain: 43 50 43 20 66 6f 72 65 76 65 72 21

We would also like to mention the following who contributed to have their name included:

Eetvartti
Harry Culpan
Jakub Tyszko
Jonathan Ellis
Paul Monopoli
Ronny Wagener
Simon Davies
Stuart Croy
Zach Crawford

And finally I think the entry on the next page is a little over 255 characters. Can someone confirm this? :-)

I didn't had the heart to exclude it and it's a story I think we all can relate to no matter if it's a Commodore 64, an Amstrad CPC or any other 8-bit. The first one is always special.

Named Contributors

TBR: Commodore 64. We had computers at school. Norwegian computers called Tiki 100. It ran MS-Dos through a Z80 processor and we had 64kb of RAM. Don't remember much what work we did with this thing but one day after school I went up to a friend of mine who had just got his very own computer at home. Wasn't a Tiki 100. This was something else entirely. There wasn't much else but the keyboard, right, but this keyboard was fat. My friend turned it on and instantly came the ready prompt. Brilliant. The Tiki 100 was integrated with its monitor but this Commodore (huh?) 64 you had to connect to a TV. Let's play a game, he said. Man, I remembered the games we weren't allowed to play in class, very simple games, but still better than the lecture. What games could possible be on this 36 something less than the Tiki 100 ? Tapes! The Tiki had these floppy disks and some even had a hard drive. Were the games audio only? He had this cardboard box of tapes called 'The Magnificent Seven Ocean' whatever and there was small squares of pictures on the back. Don't I have better things to do this day. . . I got blown away, didn't I? Of course I did. Now, I can't recall which game we played first because we played them all! I do remember 'Frankie goes to Hollywood' didn't make any sense at all and we didn't know 'Wizball' has a second player option. But the music... Real music, no beep and blop from the Tiki but proper tunes. So cool.

Couple of days later he had a box full of tapes. Which game is this, I asked him while holding up a random cassette. Not 'game', he answered, try games. That's when I got introduced to the GRL-Turbotape. Yeah, SYS 53100 (I think) to LOAD a game. This was mid 1987. I asked and asked, begged my parents for a C64 of my own but Christmas came and went but no big box for me.

Other friends of mine all had C64's and I used to play with all of them. Yeah, got sent home from one friend and went right over to another. Had a massive yelling when I finally got home, all these questions like 'do you even KNOW what time it is' and 'don't expect any dinner at this hour, son!'. They still didn't get me my own Commodore. Of course I didn't know how much they did cost, what did I know about money? I did know my parents never really had too much of that anyway, but I really, REALLY, wanted my own computer. I could use it to do my homework on... Didn't we all try that approach? What I didn't know was my father had made a deal with a friend of his. He couldn't pay for it but this friend of his needed some work on his roof. Oh, my

dad always exchanged stuff for work. Yeah, we had all of a sudden the biggest satellite dish in the neighborhood.

I had my tenth birthday the 6th of August 1988 but a week prior to that I had to go to the hospital and that's were I celebrated my birthday. Hospital food! I didn't like it. My mother told me about this surprise waiting for me back home and I couldn't wait to leave this bed. Stupid hospital! The surprise was of course a brand new Commodore 64. Mine was white while my friends' all had brown machines. I later learned it was a C64G. It was all set up in the living room when I returned home. My parents spent two days setting it up while holding my little sister away from the Computer. Don't touch it, your brother will be using this to do his homework, isn't that right, son? Sure, mom... I also learned that while I was at the hospital my parents would play games on my Commodore. To tell you the truth I thought, and still, think that was just so cool! Playing games I'd never play before and having my parents give advice to me as to what to do and where to go. I loved it. "Careful now, or you'll kill the frog.. Better try the door on your right..." or "don't shoot the teacher, he'll put you in detention..." My parents just loved 'Wizard's Lair' but my favorite of those 25 (plus the Commodore cartridge with three games on) games (wow) that came with my C64 were 'Deflektor' and 'Cybernoid'. I still have all my games I got 28 years ago. Homework on my Commodore 64. Yeah, that didn't happen. My father found I needed a printer. Didn't make any sense to do my homework without a printer, he said. Some months later I got a printer. A Commodore MPS 802. He had bought it second hand. It came with another C64 and a 1541 diskdrive. Wow, I only knew one other guy who had a disk drive but he was some years older than me and I wasn't allowed to hang out with him. None of us kids was. There was also a box full of disks. I used 'Tasword' for my homework and printed it out on my printer.

I don't think there was anyone else in my class that delivered their homework on these printed sheets of paper, I actually was told NOT to do this. I was let down by this but then again I could go home

and play 'Maniac Mansion' or 'Airborne Ranger'. I even worked out the amount of fuel I needed in my rocket backpack in 'Rocket Ranger' without ever knowing there was supposed to be a code wheel to do this. So many hours spent on working that out but in the end there was places I never could reach and I never got to finish the game.

Anyway, the thing is having a Commodore 64 back in the day was great! At school we shared tapes and disks and back home I did copy the disks and my dad (I) copied the tapes with his audio rack.

I copied games to my friends and we all had a blast but then... The Amiga came. My friend who introduced me to the C64 got it first. Another friend had the Atari ST 520 and years later they all had the PC. I still have my Commodore 64. Well, it's more than one now. I also have some Commodore 128's and a C128 D and more games than I ever had as a kid. The Commodore 64 is more than a computer. For me it's part of my childhood. With the computer came buying games and magazines, saving up my weekly allowance to buy a disk notcher and printer ribbons. My friend, from the very beginning of this tale, had other friends who threw together an Amiga Club. I cleaned the floor with my Commodore 128 and some classic demos. In the later years I actually met some of the SID Legends, like Ben Daglish and Jeroen Tel. Reyn Ouwehand bought me a beer in Stockholm 2008. Most of my live concert attendances have been Commodore 64 shows. The Commodore 64 is still with us and I am still keeping up with my C64. New games are being published, new hardware is being produced. It's just as exciting now as it was back in the past. Difference is I can afford more new stuff now. I will always have the Commodore 64 in my life and I'll keep on playing until my hands give in. That's when I'll get myself a Zipstick.



The Tiki-100 was a Norwegian educational computer

SUPER STARSHIP SPACE ATTACK

Reviewed by John Kavanagh

Commodore VIC20 (with 16k + Joystick)

From the moment the game loads you know you're in for a treat with fantastic music and a title screen that bounces to the beat. Super Starship Space Attack is a fun space shooter.

The aim of the game is to collect 3 power units while avoiding the walls and the cannons that are shooting at your ship. Some walls can be destroyed with a few shots while others are indestructible. Once the 3 power units are collected you got to head back where you came from to exit to the next level.

The first level is like a tutorial with text on the walls saying "shoot me" and no enemies shooting at you. This level is all about getting accustomed to the controls. The second level is where the game really starts as you try and avoid the walls as well as the cannons.

Simon Ulyatt of **Cronosoft** was kind enough to give us a copy of the game for review.

Get the game in tape format from Cronosoft:

<http://cronosoft.orgfree.com>

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Sometimes it's difficult to take out a cannon when it's behind an indestructible wall. This forces you to time your move to avoid getting hit. Either go slowly and risk not being able to accelerate away on time or pass the cannon at crazy speeds and risk flying into a shot or a wall for that matter. When your ship does get hit or when it crashes in to a wall it's always feels like human error and never feels unfair. This to me points at good game design.

The game was developed by Mika "Misfit" Keränen and plays on PAL and NTSC systems with a 16k RAM expansion. It's a fantastic and enjoyable game that won't disappoint.

Graphics 9 - Overall the graphics are nice and scrolling is fast and smooth.

Audio 9 - Music is fantastic and the sound effects are spot on.

Playability 9 - When you are shot by the canon or smash in to a wall it always feels like yours fault and not the game. Excellent.

Lastability 7 - I can see myself coming back to this every once in a while to try and push further and further.

Overall 9 - Very enjoyable, and certainty worth having in your game collection.

ET Phone Home!

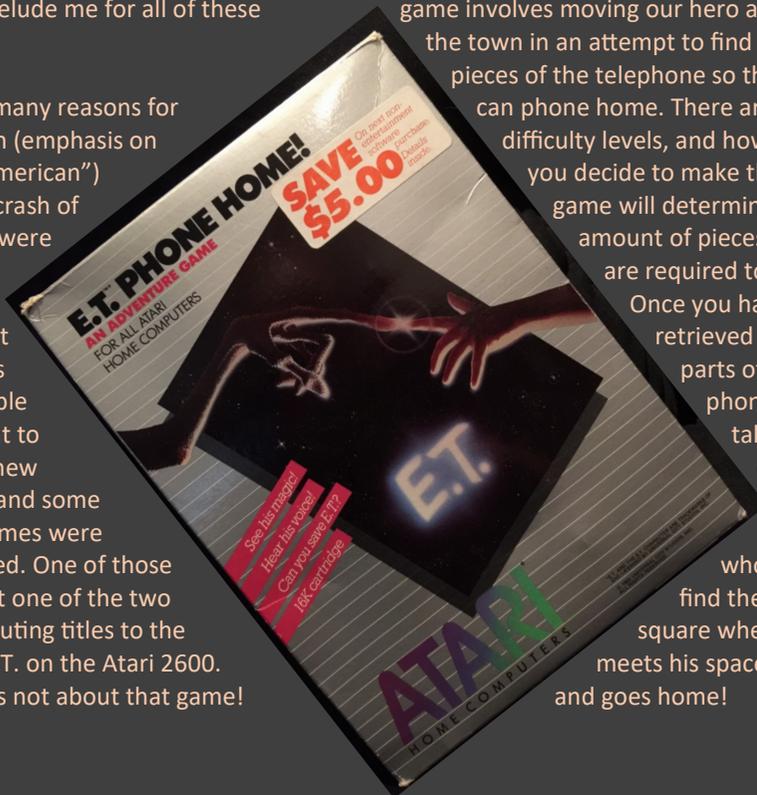
Reviewed by Paul Monopoli

Atari XL / XE

Before I begin I thought I would mention the fact that I have never seen the movie, E.T. Yes, people like me do exist. I was born in 1979, so I was around during the E.T. phenomenon. I can't explain it, it just seems that somehow the movie has managed to elude me for all of these years.

There were many reasons for the American (emphasis on the word "American") video game crash of 1983. There were a flood of consoles in a market that was still in its infancy, people were hesitant to move on to new technology, and some very poor games were being released. One of those games, infact one of the two main contributing titles to the crash, was E.T. on the Atari 2600. This review is not about that game!

Moving across to the Atari 8-bit computers, E.T. Phone Home is a game that bears little resemblance to its console counterpart, and not just in the extension of its title. In this game you play the role of Elliott, rather than his alien chum. The game involves moving our hero around the town in an attempt to find the pieces of the telephone so that E.T. can phone home. There are nine difficulty levels, and how hard you decide to make the game will determine the amount of pieces you are required to find. Once you have retrieved all the parts of the phone, you take control of E.T. who has to find the square where he meets his spaceship and goes home!





The game features a beeper version of the E.T. theme tune, though the game itself only features sound effects. You will need to have the sound on, as when you move close to a piece of the phone you will hear a beep, which gets louder the closer you get to it.

When you get close enough the piece becomes visible, allowing you to move over to it and collect it by pressing the fire button. Once you have a piece you

need to take it back to Elliott's house before collecting another. The manual and the box heavily promote the fact that you get to hear E.T. speak. This happens once you retrieve all the pieces of the phone, and the clarity of the speech is impressive for the humble Atari 8-bit.

The graphics are nice, but they have their problems. The town is quite well drawn, with trees looking like trees and



E.T. telepathically should you have problems remembering which pieces you need, or if you have trouble finding them. While it is handy checking what you need next, listening to the sound is all you need to help you find pieces.

The biggest complaint about the game is that the playing area is

houses looking like houses. Being able to judge gaps that Elliott can move through can be a little tricky at times, and it is easy for him to get a little stuck.

The biggest problem is that both Elliott's house and the location of the space ship are green squares. As much of the map screen is made up of green squares this can be misleading, unless you've managed to memorise the map. In the game's defence, the playing area is not that big, but would it have killed them to make these areas a different colour?

The game gives you a limited amount of time to complete your task before E.T. hibernates and the game is over. Scientists and agents wander around the map in an attempt to hinder Elliott's progress. Once you are spotted by them you need to move, else they will catch up with you and take your phone piece if you are carrying one. If you are playing as E.T. your energy will be reduced at a faster rate. You are able to run away from them, but any pieces you are carrying will be dropped. You are also able to communicate with

small, so it doesn't take long to complete. On the base difficulty level it is easy to beat the game in under 5 minutes. There is no incentive to play on higher levels, which is a shame as it could have given the game more life.

E.T. Phone Home is a fun game while it lasts. The problem is that it doesn't last very long!

Graphics 8 - Houses and trees are recognisable, though having green squares for important locations is a bit of a hindrance

Audio 7 -- Nice rendition of the E.T. theme on the title screen, but there is little else to write home about here

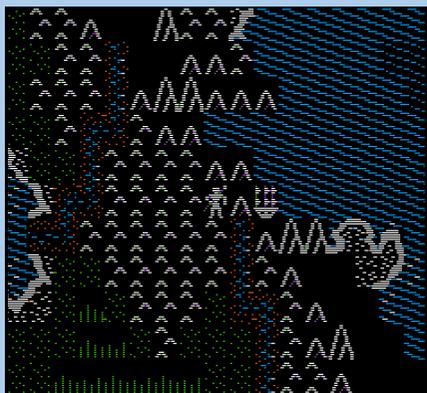
Playability 9 - This is quite a fun game!

Lastability 4.5 - Unfortunately it won't take long to send E.T. home.

Overall 6 - A fun game, but one you can easily complete in under 10 minutes.

The Last Bit

The Last Bit cover the latest retro news and rumours. This Issue, Nox Archaist for the Apple II and a crowdfunding project for a new Spectrum computer!



NOX ARCHAIST

Nox Archaist, a RPG similar in style to Ultima and Bards Tale is currently in developed by 6502 Workshop for the Apple II.

You can follow development at:

www.6502workshop.com where you'll find a blog covering the game. There are also tips and techniques on the art of game development.

6502 also encourages people to participate in the design of the final game

which will be given away for free. In fact there's a competition until the end of July where the best submissions will receive some goodies.

The final game will run on any 128K

Apple IIe or later and is being developed entirely in assembler with no constructions sets in sight.

SPECTRUM NEXT

Another new hardware projects was announced

recently. The latest, the Spectrum Next claims to be a full reimplement of the original Sinclair Spectrum at hardware level. It will also be compatible with most expansions and will offer enhancements such as new video modes, different processor speeds, SD storage, 512 kb of RAM and HDMI output.

The new computer is going to be crowdfunded and you can submit your interest by heading over to their website at:

www.specnext.com



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