

THE MAGAZINE FOR COLLECTORS AND USERS OF EIGHT BIT COMPUTERS

PROMOTIONAL ISSUE

EIGHT BIT



HAPPY BIRTHDAY APPLE

POND SOFTWARE

COLLECTORS GUIDE TO THE ZX81

FREE PROMOTIONAL ISSUE

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MICRO THAT INTRODUCED
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EDITORIAL

Welcome to the promotional issues of Eight Bit magazine where we take bits from ancient issues and jam them all together to bring you some free 8-bit action.

We've included a good mix of articles which we hope will be of interest to everybody.

Be sure to check out our latest Kickstarter, search for Retro Annual 2022, 2023 or use the QR code on page 17.

*Enjoy the magazine,
The Eight Bit Team*

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THE MAGAZINE FOR COLLECTORS AND USERS OF 8-BIT COMPUTERS

ISSUE 12
EIGHT BIT



Issue 12 Coming Soon...



ZX81

EDIT
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AND
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sinclair

ZX81

The 35 year old British micro that introduced affordable computing to the high street

Before the ZX Spectrum there was the Sinclair ZX81, the first low cost computer to be sold in a high street store. Here is your collectors guide to the Sinclair ZX81.

While the ZX81 never will be as popular as the later released ZX Spectrum, it does enjoy a passionate, some would say cult-like following. There are numerous websites dedicated to the little wonder, as well as the occasional game or hardware release. The reason for this becomes clear as you read on.

The Sinclair ZX81 was the successor to the ZX80, which was released a year earlier. As well as being a superior computer, it was also much cheaper. It was released in the UK on the 5th of March 1981 at a price of UK £ 49.95 Sterling in kit form and UK £ 69.95 assembled.

It was also the first cheap mass-market home computer that could be bought from a high street store such as W.H. Smith.

Having never owned a Sinclair product, I recently went a bit crazy and purchased two computers sporting the well-loved Sinclair badge. One being the Sinclair ZX81, the other, a Spectrum +2 which is a beautiful machine visually. Although some would say not as beautiful as earlier Spectrums, its sleek black colour and Amstrad styling is nevertheless pleasing to the eye. Opening the package which contained the ZX81 was somewhat shocking, I expected the computer to be small but not that small. The whole unit measured a little under 16.6 cm (6.5 inches) wide, 17.5 cm wide (6.9 inches), 4 cm (1.58 inches) high at the back and 2 cm high at the front. A little bigger than a portable DVD player. The weight

felt non-existent but I was told it was 350 grams (12 oz). The power supply was heavy as one might expect and produces 9 Volts DC. It has a power jack looking similar to a 3.5 audio jack! Thoughts of accidentally plugging it into a nearby mic or ear jack and destroying the unit flashed through my mind. However the manual offered reassurance that no damage to be done if this should happen. Still, I wasn't going to attempt such a pointless exercise.

The unit can handle between 7 and 11 Volts DC and requires only 700 mA. I imagine changing the jack on any suitable 9 volt adapter would work as a replacement power source if needed. However, I would recommend going for at least 1.2 Amps as was supplied on later versions.

There's no ON/OFF switch or even a reset switch. An inverted 'k' appears on the bottom left of the grey screen when the computer is turned on. There was difficulty getting a crisp image on the test TV which was a portable 14 inch TV from the 1990's. A bit of fine tuning improved the situation, although not as much as I would have liked.

The ZX81 uses a pressure sensitive membrane keyboard and is a bit of hit and miss when pressing a key. Touch-typing is definitely not an option on such a keyboard. While there are only 40 keys, each one can have up to five functions. For example, pressing the F key would print the BASIC "FOR" command to the screen, pressing it again would produce the letter "F" separated by a space. Pressing "SHIFT + F" would produce the "FAST" command. The F key can also produce a graphical symbol and the SGN function. Pressing "P" would display the "PRINT" command, pressing any of the character keys after that produces that character and so on.

Weirdly, when entering BASIC commands one cannot simply type "TO" in a "FOR" statement for example, instead you had to press "SHIFT + 4" in order for the "TO" to appear. Otherwise the computer would report an



THE ZX81 IN COMPARISON TO A MODERN
KEYBOARD AND A 24 INCH SCREEN

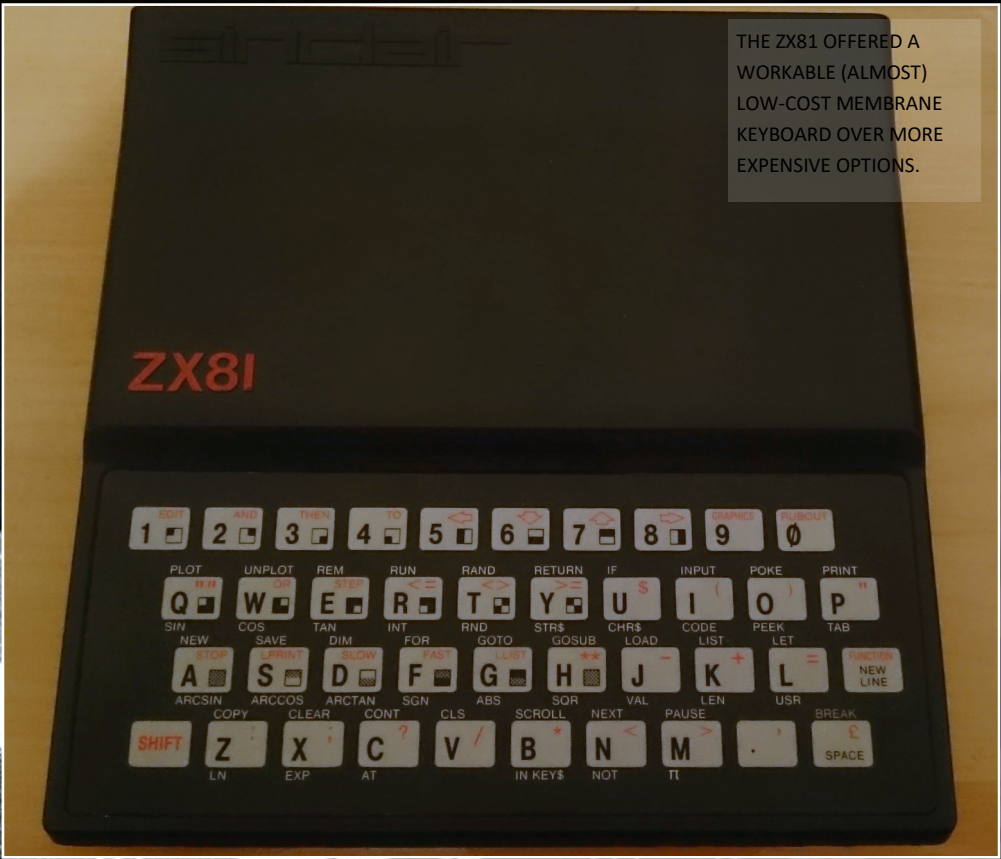
error when entering the line despite it looking identical. You got the same situation with "AND" and "OR" operations which are accessed by pressing "SHIFT + 2" and "SHIFT + W" respectively.

The 8K built-in BASIC was based on the version supplied to the ZX81's predecessor, the ZX80, but upgraded with the much needed floating-point arithmetic. It isn't as forgiving as other versions of BASIC, in that you had to use the "LET" command to define a variable, and the difficulty of entering data as mentioned above. It did have most of the expected commands such as INPUT, PRINT, GOTO, GOSUB etc.

THE HARDWARE

The 32 x 24 character monochrome screen is drawn with the CPU, a Zilog Z80A CPU running at 3.25 MHz. This puts tremendous pressure on the CPU having to process data, while maintaining the screen. Because of this the computer does not perform as one expects from a Z80 CPU. The problem can be solved

THE ZX81 OFFERED A WORKABLE (ALMOST) LOW-COST MEMBRANE KEYBOARD OVER MORE EXPENSIVE OPTIONS.



FROM LEFT TO RIGHT, TV JACK, EAR AND MIC FOR LOADING FROM AND RECORDING TO TAPE AND THE 9 VOLTS DC JACK.

THE COLLECTORS GUIDE TO THE:
sinclair ZX81

by using the FAST command. On powering up the computer it is set to what is known as a "compute and display" mode. This means that the computer refreshes the information on screen while it processes data. The computer struggles with updating the screen and processing data at the same time. The following short program demonstrates this:

```
10 FOR A=1 TO 100
20 PRINT A;
30 NEXT A
```

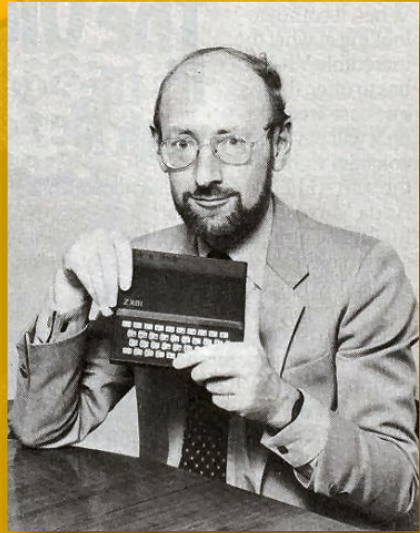
The above took 36.7 seconds to reach the end of the program, where as a Sinclair ZX Spectrum running at 3.5 MHz would complete it in under 2 seconds. Using the US version only makes the situation worse, as NTSC requires the screen to be updated 60 times a second instead of 50. It would takes a whole minute on a NTSC system.

The "FAST" command fixes this, it forces the computer to only update the screen when it isn't processing data. Typing the FAST command causes a irritating flash on screen each time a key is pressed and when a program is running only displays a blank screen. It will however display the screen for INPUT statements and the PAUSE command. Using FAST mode the above program will count out 1 to a 100 in a little over 10

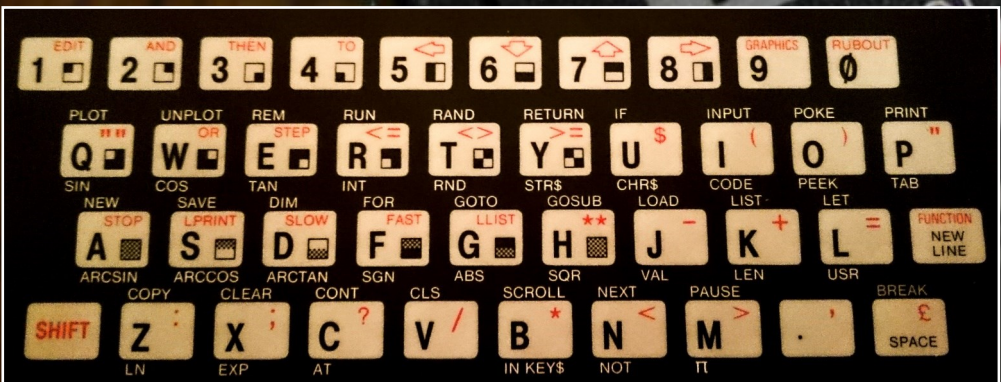
seconds. It's still not as fast as a ZX Spectrum but it is a much needed boost when processing data.

Officially the computer displays a graphic resolution of 64 x 48 using graphical symbols. However, a resolution of 256 x 192 is possible using a 16K RAM pack and some clever programming.

While there's no audio hardware, people have produced sound out of the computer by two methods. By rapidly cycling between the FAST



CLIVE SINCLAIR INTRODUCING THE ZX81



THE MEMBRANE KEYBOARD OF THE SINCLAIR ZX81

and SLOW modes and using the cassette port as audio output. As expected the results are primitive but can be entertaining.

There are only four integrated circuits in the computer, the CPU, ROM, RAM and the ULA. The ROM is 8K in size and the RAM is just 1K but can be upgraded to 64K with 56K being useable. The ULA is a little more mysterious.

Called the “dogsbody” in the supplied manual, the ULA was responsible for many functions. It synchronises the screen display, reads input from the keyboard and generates the timing for the CPU among other things.

Loading and saving data is done by a standard cassette recorder with an input socket for a microphone and a output socket to headphones. Reliability is hit and miss as volume levels can't be too high or low. However, by monitoring the zigzag lines that appear during loading, one can track these levels. The zigzag lines that appear are due to the ULA being unable to maintain the display while saving or loading data. Data was saved and loaded at modest rate of 50 baud. Considering the small size of the programs, this wasn't a problem.

SOFTWARE

The vast majority of available software was made up of games and education programs. There was even a word processor program but as mentioned above, you could not do any real work with the ZX81's keyboard. You'd be better off using your smart phone to write a novel! The games especially, have a charm to them and you can check out the best of them on pages 14 and 15.

RELIABILITY

Reliability was poor, with about one third of ZX81 returned within the first year. Sinclair claimed that the majority of the returns came

from the kit version where people inserted the ICs the wrong way around. Many ZX81s were also returned due to a square-root bug where when finding the square-root of 0.25, the incorrect result of 1.3591409 was given.

The weakest component in buying a used Zx81 today is the ULA, which can run very hot and is often the failing component on a broken ZX81. Replacements, either originals or a modern version programmed in to a CPLD, can be found online with a bit of searching.

FINAL CONCLUSION

I've read in a recent article that when it was launched the ZX81 was a useless computer, comparable to a expensive notepad. The writer of that article didn't grasp the potential of such a little machine. This was the first cheap computer that brought computing in to people homes and gave them the opportunity to experiment. Typing in commands and making things happen on a TV screen back in the early 1980's was truly amazing for anyone with even a bit of interest in technology. It opened up the world of computers to the average person leading them to wanting more.

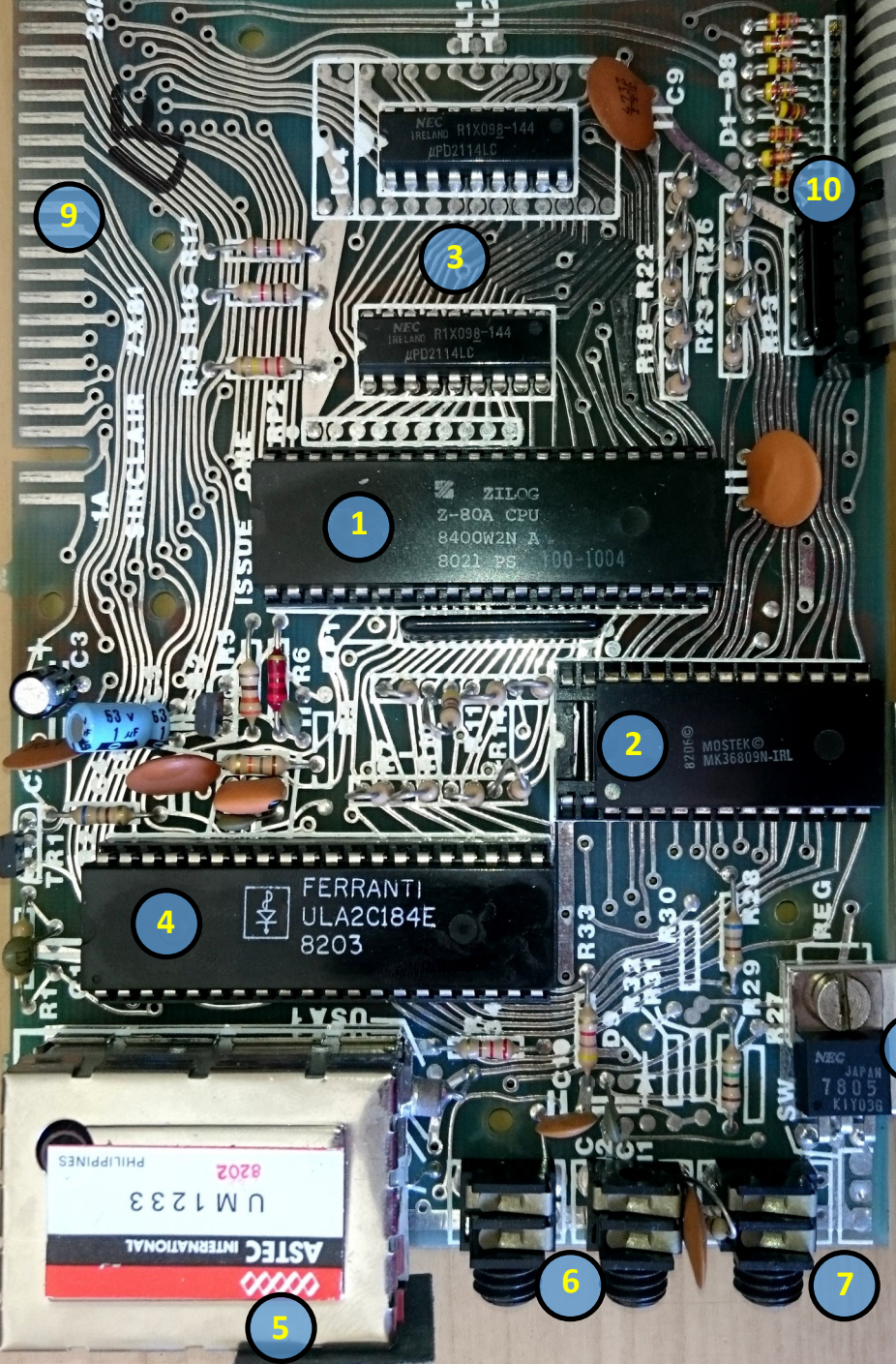
Today the computer is only an interest to collectors and those who had one in the past. You wouldn't buy such a computer for games for example as you would for a Commodore 64 or Sinclair Spectrum, as most games are extremely limited. Especially those games that only use 1K of memory. Having said that, I did enjoy seeing the little machine been pushed to its limits and I loved finally been able to play some classics such as 3D Monster Maze.

Having sold more than 1.5 million units over two years makes this a computer that was easily available at an affordable price. Well worth checking out if you have any interest in early home computers.

Sindair ZX81

BACK

FRONT



INSIDE THE SINCLAIR ZX81

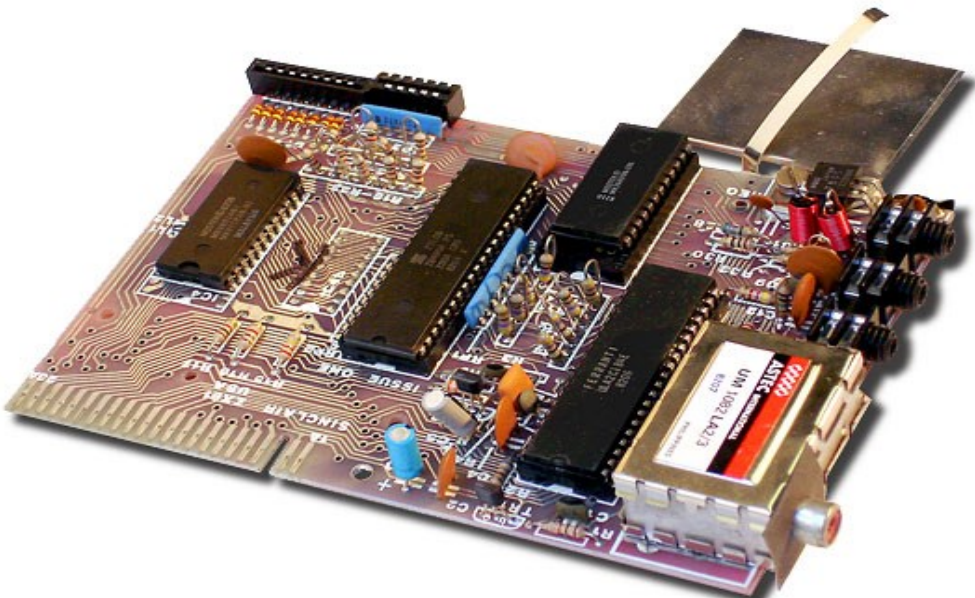
1. The CPU used in this example is the Zilog Z80A operating at 3.25 MHz. A NEC branded CPU is more common in the ZX81.
2. 8K ROM chip providing Sinclair BASIC.
3. RAM was provided by either two 512 bit chips or one 1024 bit chip.
4. ULA stands for Uncommitted Logic Array and was a method of reducing chip count by packing many functions in to a single custom integrated circuit. THE ULA on the ZX81 was responsible for generating the clock for the CPU and detecting keystrokes from the keyboard as well as processing the audio single to and from cassette. It was also responsible for producing the screen display.

The earlier Ferranti ULA2C158E and ULA2C184E ULAs were designed to work on black and white TVs and don't work well on colour screens due to the lack of a "back porch". This causes the picture to be very

dark and lacking in contrast. The later ULA2C210E fixes this problem and should work fine with colour screens.

In this example on the left, the number 8203 refers to the week the chip was made, in this case the 3rd week of 1982.

5. RF modulator for connecting to a old style analogue TV.
6. The EAR and MIC jacks are used for output and input of data using two 3.5 mm jacks to a standard cassette recorder.
7. Power socket for 9 Volts DC.
8. The NEC 7805 voltage regulator smooths out any small variation on voltage input. It is screwed to a simple heatsink. This along with the ULA are the two hottest components.
9. Expansion port. Primary use is to connect a RAM pack.
10. Keyboard connector for the membrane keyboard.



RECOMMENDED EXTRAS

GOING

A RAM is important to get the full experience of the ZX81 as the units 1K of RAM runs out quickly. 16K should be more than enough.



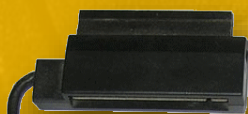
If you really want to experience the ZX81 the way it meant to be then a black and white TV is what you need.

OLD SKOOL

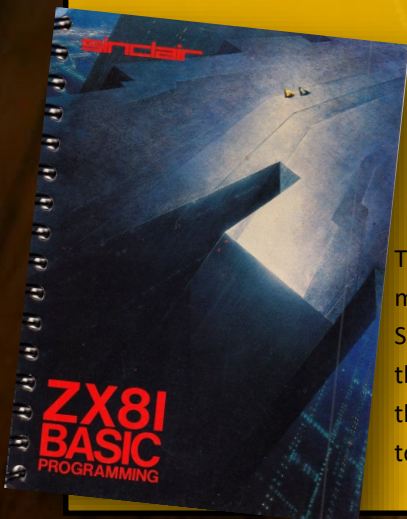
A cassette player with mic and headphone jacks is required if you wish to load original tapes. Remember to get two 3.5 mono audio cables as well.



The printer that was available for the ZX81 is known as a spark printer. It required aluminium coated paper in which the surface is burnt away to reveal a dark underlay. Terrible but fun to play with.



The Sinclair ZX81 manual written by Steve Vickers, gives the reader everything they need to know to get going.



TIMEX TS1000 & TS1500

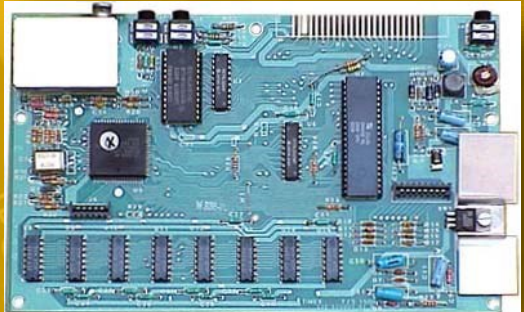
The Timex Sinclair 1000 (TS1000) is the North American version of the Sinclair ZX81 and was released in the United States in 1982. It had 2K of memory instead of 1K with slight differences in design. The keyboard "Rubout" key was changed to "Delete" although technically it was a backspace. "New Line" changed to "Enter". The unit also had better shielding probably to deal with more stricter electromagnetic interference regulations.

The RF modulator was changed from PAL to NTSC as would be expected. Due to NTSC taking up more processor time on the CPU the computer was noticeable slower than the PAL based ZX81. The screen was made up of 32 x 22 characters (instead of 32x24) allowing 64 x 44 pixels on screen.

The eye pleasing Timex Sinclair 1500 was a upgraded TS1000 with a much better, ZX Spectrum type keyboard and 16K of RAM. It wasn't as successful commercially as the TS1000 due to stiff competition from Apple, Atari and Commodore.



TIMEX SINCLAIR 1000 WITH RAM EXPANSION



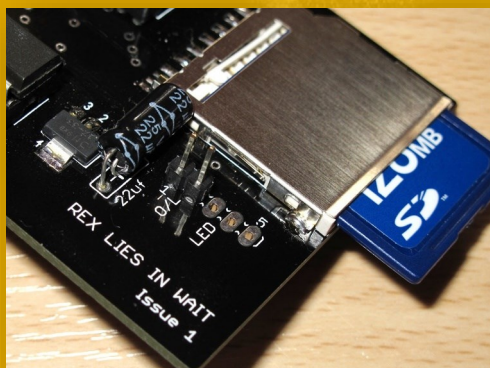
TIMEX SINCLAIR 1500 MOTHERBOARD



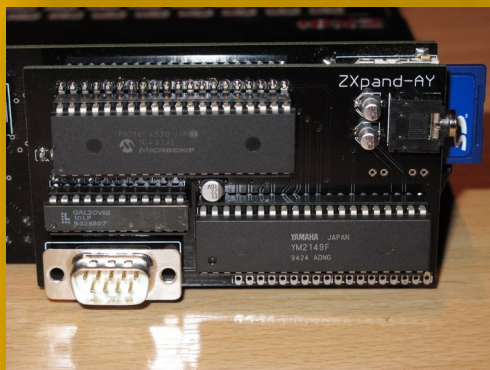
MODERN COMFORTS

Over the years there have been many add-ons for the ZX81 that gives extra features and the ZXpand is one of the best. It plugs in to the back of the ZX81 offering the ability to load software from a SD card. It also expands the system memory to 32K of RAM which is fully configurable to support various graphics modes. The ZXpand-AY sound module is an optional extra that plugs into the ZXpand to give the computer the ability to play audio. It also has a Atari type joystick interface.

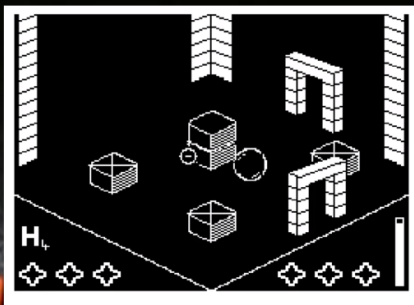
Both devices have currently sold out but will be available in the near future from sellmyretro.com



THE ZXPAND



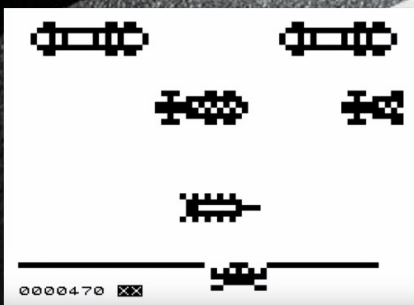
THE ZXPAND-AY OPTIONAL SOUND MODULE



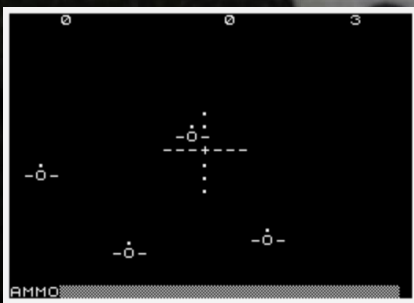
AGAINST THE ELEMENTS (2016)



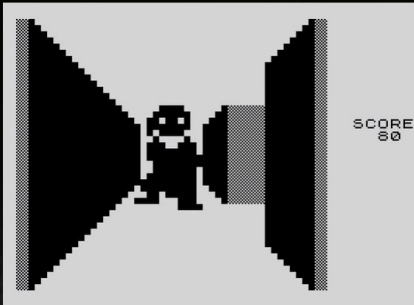
THE GAUNTLET (1982)



FROGGER (1981)



NIGHT GUNNER (1982)



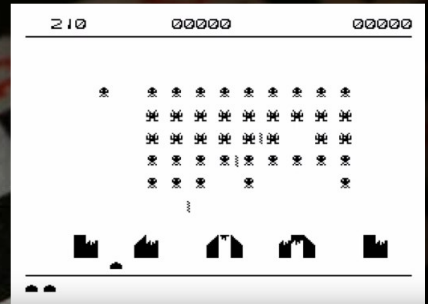
3D MONSTER MAZE (1982)



MANIC MINER ZX81 (2003)



MAZOGS (1982)



SPACE INVADERS (DK) (1982)



ANT ATTACK (2013)



FLIGHT SIMULATION (1982)



3D DEFENDER (1981)



1K CHESS (1982)

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ISSUE 6

ANGELS

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ISSUE 12

EIGHT BIT

AMSTRAD PLUS

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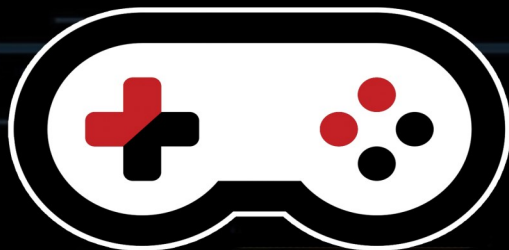


It may seem like an Impossible
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There's also in-depth preview
and interviews. We will t

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Happy Birthday

A black and white photograph of Steve Jobs, looking intently at a computer screen. The image is slightly out of focus, emphasizing the text overlaid on it.

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.

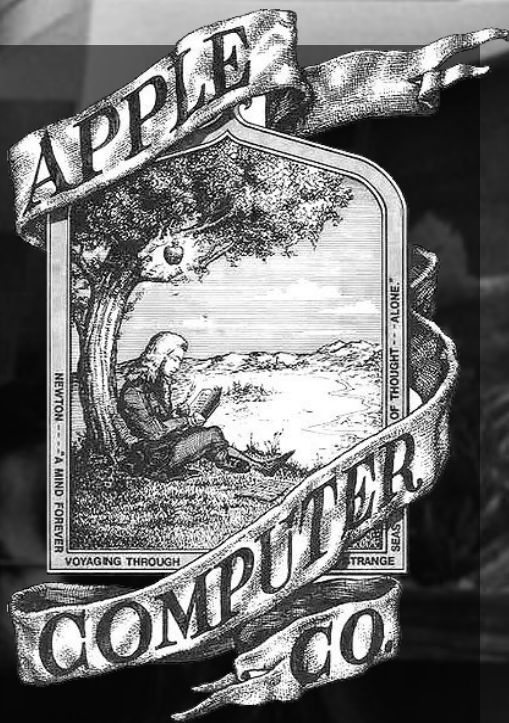
But by November 1976, MOS Technology had been acquired by Commodore, and it was clear that Apple would, sooner or later, have competition in the personal



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???



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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 IIIGS, released on September 15th, 1986. A radical departure from the existing Apple II line, the IIIGS 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

Pond

We talk to Vanja Utne and the rest of the team at Pond Software and have a look at the software they've created and their plans for the future.

Hi Vanja, how was Pond Software founded?

Vanja Utne: I had drawn some asteroid sprites for Andreas, and as a bonus I did a little green alien in a spacesuit, when he saw it he decided we had to do a game together. He suggested naming the little alien "Spaceman Splorf", and that was how our first proper C64 game came to be. Andreas had already released some games for other platforms using his solo brand SDW Developments, so we decided that I should have my own label too. I had drawn a Pond logo on the Amiga back in 1991, and thought it would be a fun name to release things under. Shortly after we released the game, Pond grew from a solo label to a proper hobbyist game dev team, with Roy, Graham and Andreas joining, followed by Craig, and finally Ant, who was hired to brew the tea but keeps sneaking off to work on his own game.

How did you get involved in the Commodore 64 and game development?

Vanja Utne: I've always wanted to make games, but usually something got in the way, like my lack of programming skills, and I have a pile of unfinished game projects from the last 20+ years. Teaming up with the others in Pond has been a great motivation to learn more and actually finish things.

Are there other computers besides the Commodore 64 that you are interested in?

Vanja Utne: Absolutely. I was given the chance to do the loading screen for Magica by Juan J. Martínez on the Amstrad CPC last year, that was a lot of fun. I've done some graphics on the MSX-1 and other 8 bits over the years, I've coded a bit on the Vic 20 and the C16/+4. I'm primarily interested in old 8 bit computers, but I like the Amiga and Atari ST(E) too. We've already started branching out a bit with the Atari 2600 version of Spaceman Splorf, and we have games planned for other platforms besides the C64 and 2600 as well.

The Pond software logo looks like the Ocean software logo, was that an accident?

Vanja Utne: They were a great Ocean, we are a tiny Pond... It was completely intentional, and meant as a bit of a tribute to Ocean and Bob Wakelin, who designed the original logo and a lot of their amazing covers, he's brilliant. I did consider doing a completely different logo design at one point but one of the Pond members, who used to work at Ocean, insisted we keep it the way it is.

Have you met the other members of the team in person?

Vanja Utne: Not yet, no. We work well together, despite being spread out all over the world.

What would be your dream project?

Vanja Utne: Pond is my dream project, really! Oh, games? Something with a Bob Wakelin cover, and lots of room for graphics. Pirates and witches and dragons and goblins and things.

Are there any future projects you can tell us about?

Vanja Utne: Andreas is coding two different shoot'em ups for two fairly obscure 8 bit platforms. We're also working on some more Spaceman Splof games together, all different genres but featuring the same main character.

Ant is ignoring his tea brewing duties and working on Petunia Pickle's Pumpkin Peril, where you play a witch who has to defend her

pumpkin patch.

Craig is working on a C64 version of Swing Copters and a few other things.

Graham has started working on a Snail's Tale, and there's bound to be a sequel to The Bear Essentials at some point.

Roy has a lot of great projects in the works, including Humpy.

I'm hoping to do an extended version of or sequel to Goblin, and maybe finish some of my old projects.

**Check out
Pond Software at:
pondsoft.uk**



The Bear Essentials

Bear has been lazy all summer long and winter is approaching fast. He must collect enough fruit to survive the long winter or face the wrath of Mrs. Bear.

The game is a platformer where you got to collect 326 apples over six stages. Enemies are other animals and all it takes is one touch and your character loses one of his five lives. While the enemy AI is simple, they just follow a pattern, it is still fun trying to get past them to reach the apples. Some apples are difficult to get due to their location and does involve a bit of thinking.

Pond Software released a boxed copy for £15 Sterling which includes the game on a 5.25 inch disk, an A5 jewel case, cover inlay and a 12 page colour manual with stickers. See their website for details.

A very enjoyable game to play, bundled in cuteness. Well worth checking out.



Spaceman Splorf: Planet of Doom

Battlestar Galactica music and references to Star Wars are just some of the Sci-Fi shows that Spaceman Splorf nods to.

You control Splorf, a green alien in a spacesuit, flying through space avoiding asteroids and other debris as the screen scrolls from right to left. Simple but addictive gameplay with controls being just one button. Using the spacebar or fire button on your joystick moves Splorf up, release and he falls back down towards the surface of the planet.

There are eight different music tracks or you can instead choose the hear sound effects. If you got a second SID chip installed in your computer you can play both at the same time.



Vanja Utne Kristiansund N, Norway

What have you done at Pond Software?

I made two small 4 kilobyte games, Goblin and Dog. I've also done graphics and music for other projects, including the C64 and Atari 2600 versions of Spaceman Splorf, and drawn the cover inlay illustrations for The Bear Essentials, our first physical release.

What do you enjoy the most about making games? Breathing life into little characters and building a world for them to move around in, it's magic. Also, working with these amazing people.

Favourite games? Some of the ones I've kept returning to over the years are Wizard of Wor, Barbarian, Bubble Bobble, Turrigan II, Colonization, Monkey Island 1 & 2, EverQuest II, and finally Bonkey Kong, it is just so addictive.

Favourite retro computers and consoles? The first console I owned was the Philips Videopac G7000 (known as the Magnavox Odyssey 2 in the US), and I still love it. It has the best Pac-Man clone ever, Munchkin.

Is the Commodore 64 the best 8-bit? ;-) I enjoy working on all the 8 bits, they all have their charm, but the C64 was my first love and remains closest to my heart. It's extremely versatile, you can do so much with the hardware sprites and different graphics modes. I know some people dislike the palette, but for me as a graphics monkey having worked on a lot of different computers, it's got everything I need. The C64 also has the worst BASIC ever, which was a stroke of genius by Commodore, since it forced people like me to learn 6502 ASM instead of faffing about with BASIC. Thank you, Commodore!





Andreas Gustafsson
Sweden

What have you done at Pond Software? Spaceman Splorf (C64 version released, Atari 2600 version coming soon) Super Ski (C64)

What got you started in making games? I was fascinated with videogames from an early age, and when I got my first C64 at age twelve, I immediately tried creating my own. It ended up in horrible BASIC games, but it was a start!

What do you enjoy the most about making games? For me, it's simply getting stuff on the screen, creating a moving, living experience. On the other hand, when it's time to actually finish a game, do all the fine tuning and create the levels and fix bugs and all that other stuff, I have a tendency to get bored unfortunately! :)

Favourite games? On the C64 my favourite games were games like H.E.R.O. and Giana Sisters (still have my original cassette bought back then!)

Of course I have continued to play games on Amiga, PC, and consoles later and found many games that have eaten quite a lot of time, probably too many to list though!

Favourite retro computers and consoles? I can honestly say that I like each and every one of the old 8/16 bit systems, they each have their own quirks and limitations, and that's what makes coding for them so interesting. As for favourite, maybe I should give a nod to the C64, since it was my first computer.

Is the Commodore 64 the best 8-bit? ;-) Yes! And as I have actually coded for a very large number of the old 8-bit machines, I can actually back this answer up with more than personal feelings! :)

The C64 has a very powerful combination of hardware. The VIC-II chip gives you a great toolbox, character modes, bitmap modes, 320x200 hires mode, 160x200 multicolour mode, charbased colour attributes, scrolling and finally very flexible sprites.

When it comes to sound, the SID is second to none in the 8-bit generation. The only minor weak spot is that the CPU is somewhat slow, but the aforementioned features more than mitigates that.

Finally, it had, and to this day continues to have, one of the largest communities with lots of releases every year.

Roy "Roysterini" Fielding
Cheshire, UK

What have you done at Pond Software:

Not enough. Made Winky Blinky and soon to release Humpy.

What got you started in making games:

Er... back in the 80's I got into bedroom programming and did my first terrible C64 game in 1989 I think. Before that, I did some BBC BASIC simple games.

What do you enjoy the most about making games:

The sense of achievement when I (rarely) complete a project. Also, if just one person really enjoys it, I buzz off that.

Favourite games: Casual games these days, or new releases on C64.

Favourite retro computers and consoles: Faves home computers are C64 (obviously), Spectrum and BBC micro. Consoles, I love the old Atari, NES, SNES and currently, rather like the PS4 despite it's annoying foibles (as all modern consoles have).

Is the Commodore 64 the best 8-bit? ;-) But of course!



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Graham Axten Derbyshire, UK

What have you done at Pond Software:

Bonkey Kong (for the Reset 4k competition) and The Bear Essentials

What got you started in making games:

When my Dad bought his Speccy, we were all fascinated by the games, and interested to know how they work!

My Dad experimented in BASIC and then moved on to machine code, and I tried to follow in his footsteps but it was a long time until I really got to grips with machine code.

I enjoyed typing in programs from magazines and then figuring out what each bit was for, that was a good way to learn programming.

What do you enjoy the most about making games: I think once the players movement has been coded and then you design the first few screens and get to explore them for the first time.

It really feels like you have created a little world, and your imagination kicks in with new things to add to the game, that's definitely my favourite part!

Favourite games: On the C64, I really like Flimbo's Quest and Creatures 2. Out of modern games, I have spent many many hours shooting locust in Gears of War. I also like the Valve games Half-Life 2 and Portal, and I have a soft spot for Nintendo at times (the polish on their games is unreal).

Favourite retro computers and consoles: C64 and Speccy! I prefer computers to consoles these days as they are open for experimentation and creative minds :)

If we're talking consoles... I was quite late into the console scene and my first was an N64. That and the GameCube are my favourites.

Is the Commodore 64 the best 8-bit? ;-) Yep! The C64 scene is still very much alive, and the fact it has hardware sprites makes it brilliant for any beginners to get something up and running fairly quickly. I tried programming the Speccy recently and I really found it hard work, so I'll be sticking with the C64 for a good while.



Winky Blinky

Move your joystick left when Mister Turpin winks and move it to the right when he blinks. Sounds simple? Well, it's harder than it sounds, especially with Mister Turpin's eye movements being hilariously funny. Best played with friends to compete for a high score. A fun little game that should give a few minutes of entertainment on rainy days.

SCORE

019

BEST

011



Craig Derbyshire Manchester, UK

What have you done at Pond Software:

Not much ATM, currently only done "I Am the Flashing C64 Cursor" which was for the 4k Reset game compo. I have a few projects in the works including a C64 version of Swing copters, which I hope to complete soon.

What got you started in making games:

Back in the 80's I dabbled with coding on the BBC micro, this was mainly because it was what we used at school and as part of my Computer Studies, I used to love playing with creating sprites and displaying them on screen. I used to also love typing in the listings from the magazines on my Sinclair ZX81 and tweaking the code for my own needs but never managed to create something from scratch. Fast forward 20 odd years and with the event of emulation, I was reintroduced to the world of the C64 which I instantly fell in love with and ended up buying several machines. I had dabbled with modern coding in Unity recently, but wanted to learn to code the C64 due to my recent love affair with the machine and found it much easier to understand how to code in assembler than I thought and so began to code some games.

What do you enjoy the most about making games: I find coding in assembler on the C64 incredibly satisfying, being in total control of the hardware makes one feel almost like a magician. To me it is all about solving little problems and finding solutions, nothing makes me smile more when you see all those lines of code turned into something that you can see on the screen and interact with, it's almost like magic!

Favourite games: Astro Blaster on Arcade, IK+ on c64

Favourite retro computers and consoles: C64, BBC Micro, Sega Saturn, PC Engine, Amiga 1200, Atari Lynx

Is the Commodore 64 the best 8-bit? ;-) The C64 is by far my most favourite 8 Bit !!



Dog

Dog is a 4KB game where you control a dog. Your horrific job is to defecate on a lawn while avoiding the human. If you get the dog to defecate in quick succession (not easy) you'll get a bonus. The guy chasing your dog makes angry facial expressions which changes from time to time, amazing for such a small game.



Anthony Stiller (everyone calls me Ant) Queensland, Australia

What have you done at Pond Software:

I'm the newest member of the team so they've got me making the tea (Yes, Roy! The kettle's just boiling!). Oh, I'm also working on Petunia Pickle's Pumpkin Peril (which is based on my RESET 64 4K Comp entry). This will be my first Pond release.

What got you started in making games:

Type-ins from the old Usborne computer books! From there it was Compute! and Compute!'s Gazette. I dabbled in SEUCK a little but only really sunk my teeth into C64 assembly coding back in late 2016 (you can teach an old dog new tricks, it seems).

What do you enjoy the most about making games:

Working within the constraints of an 8-bit machine is strangely very liberating. And coding in assembly is arcane sorcery. I particularly love doing sprite animation.

Favourite games: Elite, PSI-5 Trading Co., Citadel (the Martin Walker one), Ultima VI. I try to play a range of modern games as well for ... errr ... research.

Favourite retro computers and consoles: C64 (natch), but I really like most 8-bit and 16-bit machines. Oooh, I am rather partial to the SEGA Megadrive, too!

Is the Commodore 64 the best 8-bit? ;-) This is a trick question, right?



Bonkey Kong

At first I thought this was a clone of Donkey Kong but in this game you control Kong! Your goal is to kill the Mario looking characters that try and climb the ladders to reach the love of your life. You of course can't let that happen. By throwing barrels at those pesky little plumber and killing them stone dead you can stop them from reaching your girl.

They come faster and faster, making your job more difficult. They start to show more intelligence quickly by avoiding the barrels and then they come at you more than one plumber at a time. To make matters worse you can only throw one barrel at a time. All



the while the girl is screaming to be rescued. If those little moustached plumbers get to the top then it's all over as they whack Kong with a hammer and steal / rescue the girl. Fun, additive gameplay at its best.

Super Ski

Test your skiing skills on four different ski runs. Race downhill, keeping between the flag. As expected the controls are intuitive with the only controls are left and right. However you must avoid obstacles as well so watch out for those bears! One of the more enjoyable downhill racing games.

have been invaded by giant potato bugs! It's your job to save the potatoes and avoid the bugs. Once all the potatoes are collected you can progress to the next screen.

Other Games

Other games to check out from Pond Software are "I Am the Flashing C64 Cursor" and "C64ColQuiz".

Goblin!

Goblin is a fun platform game and like all good platformers there's a story behind it. In

this case, the Goblin town potato cellars

Last: 00000000 High: 00000000



C64ColQuiz (C) 2016 SDW Developments



C64ColQuiz



Goblin!



Astrostorm II (Coming Soon)



02780

Super Ski

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Upcoming Games

There are a number of upcoming games from Pond Software in the coming months. First up there's Humpy, a game where you try and keep your character from being knocked into the water. It seems to be another highly enjoyable game by Roy Fielding.

Petunia Pickle's Pumpkin Peril is where you play a witch who has to defend her pumpkin patch. Programming and graphics by Ant Stiller with title graphics and sound by Vanja Utne.

There is also a new Splorf game called Splorf Strikes Back but we don't know much about it as yet.

Other games coming are A Snail's Tale, Astrostorm II, Hocus Pocus and the Commodore 64 version of Swing Copters. Expect coverage of those games in future issues of Eight Bit Magazine.



Petunia Pickle's Pumpkin Peril Gameplay



Hocus Pocus (Coming Soon)



Humpy (Coming Soon)



Petunia Pickle's Pumpkin Peril Title Screen (Coming Soon)

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SPECTRUM NEXT

A New ZX Spectrum is coming your way, using real hardware and 21st century enhancements. We investigate the Spectrum Next...

The crowdfunding for the new ZX Spectrum has finished with 3,113 backers pledging £ 723,390 Sterling. It can certainly be seen as a success but why has this new piece of hardware got the Spectrum community so excited?

We briefly covered the Spectrum Next in Issue 1 of Eight Bit, where we reported that it will have enhanced graphics modes and 512 KB of RAM. However, thanks to such a successful crowdfunding campaign this has increased to 1MB plus a few extra enhancements. There were three main reasons why the crowdfunding was so successful, firstly, the hardware already exists and secondly, it is based on FPGA technology and not emulation. Lastly, the design is a work of art. Designed by Rick Dickinson, the same guy who designed the Spectrums before Amstrad's takeover in 1986. It was the combination of trust, style and hardware that made this the most successful Kickstarter so far for a retro computer.





WHAT IS FPGA

FPGA stands for Field-Programmable Gate Array. It's an integrated circuit that is based on a matrix of logic blocks that can be configured. In other words, the chip's logic can be programmed to create a circuit such as the CPU, video, audio and so on. It is similar to ASIC (Application Specific Integrated Circuit) as used on the Amstrad PLUS range but unlike ASIC, FPGA can be re-programmed.

FPGA is not emulation, real logic circuits are being used which means that you are getting a proper Spectrum computer and not just another box that emulates the original hardware.



HARDWARE SPECS

The specs have increased from the last time we looked at the computer, thanks for further developments and Kickstarter stretch goals.

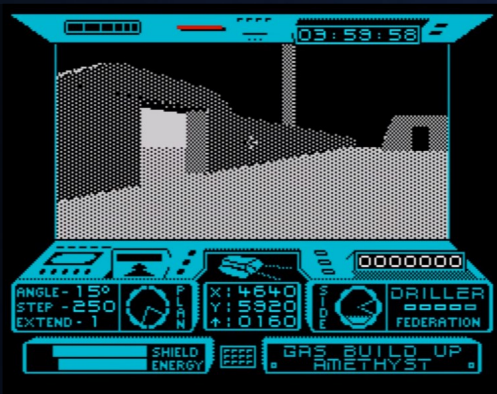
Instead of having the CPU operate at 3.5 MHz and a 'turbo' 7 MHz mode, there will also be a 14 MHz and dizzyingly a fast 28 MHz mode. Currently, there are some glitches in the 28MHz mode but that may be ironed out before it's released. Of course, the majority of games are unplayable as this speed, others like the *Freescape* game, *Driller* play amazingly well with smooth, fast movement that improves the game's enjoyability.

As expected the Next will have the original Speecy's screen mode but also a 256 colour option at the same screen resolution as the original Spectrum, 256 x 192. New for the Spectrum is hardware sprites. The Next will be able to handle 12 sprites per scanline with a total of 64 sprites. Sprites will have a size of 16 x 16 pixels in 256 colours with collision detection. Memory is now 1 MB instead of the planned 512 KB and will be expandable to 2 MB.

Audio will be provided by three AY-3-8912 audio chips compared to just one in the original Spectrum 128, with stereo output and FM sound. Controversially the Next will also have a SID audio chip added, as found on the Commodore 64. While everyone agrees that the SID sounds better than the AY-3-8912, many felt that it shouldn't be included as it's a Commodore chip and would take away from the feel of the Spectrum. It'll certainly be interesting hearing a Spectrum play SID tunes, that's for sure.

Software can be loaded into the Spectrum using an SD card slot that has a compatible DivMMC protocol. For those who don't know, the DivMMC is a device that connects to original Spectrums to allow loading from SD cards. The Next can also load software from cassette using the supplied mic and ear ports.

Interestingly, the expansion port is fully compatible with the original Spectrum allowing



DRILLER ON THE ZX SPECTRUM NEXT PLAYS AMAZINGLY WELL AT HIGHER PROCESSOR SPEEDS.

for retro peripherals to be added. It will also have two DB9 joystick ports which will be compatible with Cursor, Kempston and Interface 2 protocols. These will be added to the front of the machine, a change from the original Kickstarter. There will also be the ability to add an external keyboard and mouse via a PS/2 port.

Multiface functionality will be included with the Next allowing for direct memory access for game cheats etc. Video output will be RGB, VGA and HDMI.

SPECTRUM NEXT WEBSITE



Visit the ZX Spectrum Next website at www.specnext.com for the latest information, forum and online store.



KICKSTARTER VERSIONS OF THE NEXT

The board only option will be available soon. It will fit into an original Spectrum with a bit of work.

A fully built ZX Spectrum Next will be released in January 2018. It has all the functionality mentioned plus the ability to add a Real Time Clock (RTC) and WiFi as well as a Raspberry Pi accelerator.

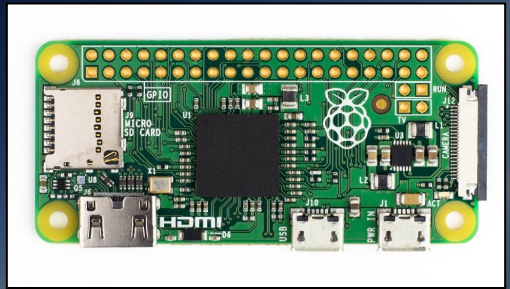
The Spectrum Next Plus has the RTC and WiFi added as standard. The ZX Next Accelerated will have an RTC, WiFi and a Raspberry Pi Zero.

RASPBERRY PI ZERO

The Raspberry Pi Zero is a small computer board with a Broadcom BCM2835 CPU running at 1 GHz and 512 MB of RAM. It can be used for processor intensive tasks. For example, it could be used to process intensive 3D environments, letting the Spectrum Next get on with other stuff. There's a lot of discussion on what else the Pi Zero could add to the Next, such as modern USB joystick input or making use of the Pi Zero's memory.

THE GAMES

There are already a number of games in development for the NEXT. First up are the games which were promised for reaching certain stretch goals. *Rex Next*, a remake of the 1988 platform shooter *Rex*. As expected it's going to be a showcase the Next's graphics capabilities. There's also a new *Dizzy* game, *Wonderful Dizzy*. It is directed by the Oliver Twins, the original creators of the *Dizzy* series and will be programmed by the team who remade *Crystal Kingdom Dizzy* recently for the Spectrum. The game, *No Fate* is being made by the same team who made *Castlevania: Spectral Interlude* which will be giving the Spectrum version away free and the enhanced Next version at a 50% discount for those who supported the Next's Kickstarter.



THE £5 RASPBERRY PI ZERO CAN BE USED AS AN ACCELERATOR BOARD FOR CPU INTENSIVE TASKS.

The recently release *Dreamworld Pogie* for the Nintendo Entertainment System will also be getting a Spectrum Next version. *Nodes of Yesod*, another remake for the Next, will also be released as part of a stretch goal. The original game was released in 1985 as a platform game where you controlled a guy in a spacesuit with a mole that chews through walls. Then there's *Nextipede* by Jonathan Caldwell which is a Centipede clone that uses the Timex 8 x 1 video mode to create interesting colour effects. We will be covering these games and more in future issues.

BUYING A ZX SPECTRUM NEXT

If you missed out on the Kickstarter you can still buy a Spectrum Next from their website at a slightly increased price. The board version costs UK £119 + VAT and will ship in Autumn 2017, after the Kickstarter pledges are honoured first. The ZX Spectrum Next costs UK £210 + VAT, ships in February 2018 and the ZX Spectrum Next Accelerated with all the bells and whistles will be UK £275 + VAT. See the Spectrum Next website for more information. All the cased versions of the Next will come in a beautifully designed box with a proper manual, just like the original Spectrum.

We will be reviewing a Kickstarter version in January 2018. Until then we will be sitting back, getting involved in the forums and building our excitement. After all, it isn't everyday that a new Spectrum comes along.

PROGRAMMING



SPRITES

**IN THE FIRST OF A NEW SERIES
JOHN KAVANAGH HAVE A LOOK AT
PROGRAMMING HARDWARE
SPRITES ON THE COMMODORE 64
AND THE AMSTRAD 464 / 6128
PLUS RANGE.**

WHAT IS A SPRITE

Sprites are an important element in most games on older computers and consoles. If you are interested in making a fast paced action game, they are required knowledge. Even if you're not intent on making a full blown game, sprites are fun to play with, especially hardware sprites.

A sprite is a two-dimensional graphical object that can be positioned anywhere on screen. For example, the Dizzy character from the Oliver Twins games of the same name.



DIZZY (SPRITE) FACES AN ARMOROG IN DIZZY III

A sprite can be made up of a certain size, depending on the requirements of the game or a fixed sized defined by hardware for computers that had it. Larger sprites can also be made up of multiple of smaller sprites.

In the Commodore 64 manual it briefly touches on how you can create single colour sprites. In the coming issues we will be digging a little deeper, dealing with multicolour sprites as well as animation. In this issue however, we will focus on hardware sprites on the C64 as well as the Amstrad PLUS range.

HARDWARE VS SOFTWARE

Hardware sprites have a massive advantage over software programmed sprites in that they don't take up any CPU time. This allows

the hardware to do all the work without taxing the CPU. In some systems a hardware sprite can have more colours than is typically allowed on screen e.g. Amstrad PLUS.



C64 TERMINATOR SPRITE

The disadvantage

is that hardware sprites are fixed in size and are limited in numbers. On the Amstrad PLUS the sprite size is 16 by 16 pixels, 24 x 21 single colour on the C64 and 12 x 21 pixels in multicolour mode. The Commodore can display 8 sprites at a time and the Amstrad, 16. On the other hand, software sprites can be any size the programmer wishes and you can have as many on screen as you want the larger they are and the more that are on screen, the harder the stress on the CPU.

COMMODORE 64 SPRITES VS AMSTRAD PLUS SPRITES

The original Amstrad CPC didn't have hardware sprites and was often at a disadvantage to the Commodore 64 for certain type of games. Especially when you consider that the CPC didn't had horizontal scrolling, meaning clever programming was required for smooth scrolling and displaying multiple sprites on screen at the same time.

In 1990, Amstrad released the PLUS range of computers, compatible with the original CPC



THE COMMODORE 64 HAD EXCEPTIONAL HARDWARE SPRITE CAPABILITIES ALLOWING FOR AMAZING GAMES

but with added capabilities, vertical and horizontal hardware scrolling, sprites, enhanced colour palette and DMA audio. However those extra enhancements were to be only available for GX4000 cartridge based games. Tape and disk games were never meant to have access to those extra features. Yet, despite Amstrad efforts, programmers figured out ways to use them.

The Commodore 64 always had hardware sprites which, along with its SID audio chip made it the world's best selling computer. While it didn't have the 4096 colour palette of the younger Amstrad PLUS, they can still be used to great effect.

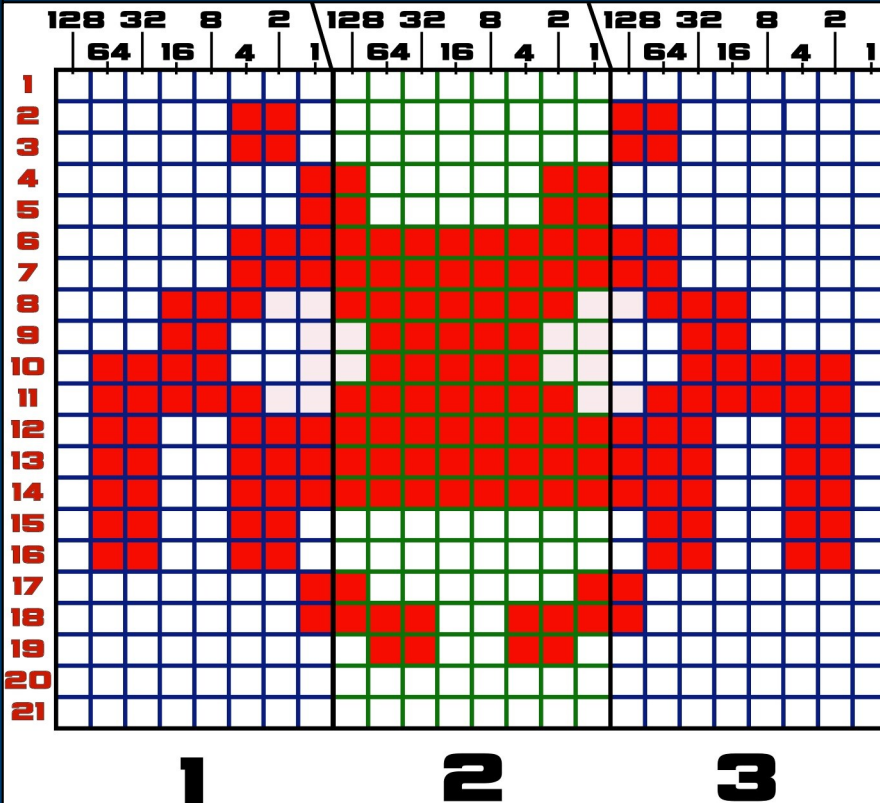
It was fairly easy to access the sprites functions from BASIC on the Commodore 64 by POKEing certain areas of memory. Although it would had been easier if there were specific sprite commands built into

BASIC. While sprites could be magnified 2x the original size, the Amstrad has the advantage of independent scaling of 2x and 4x. It also has the advantage of having 15 independent colours despite whatever 16 colours were used for the screen.

PROGRAMMING SPRITES ON THE COMMODORE 64

Before we get to move sprites around the screen, we first got to create one. The example graphic below is made up of 24 pixels wide by 21 pixels high, a total of 504 pixels. This makes up one of the eight available sprites.

The graphic data can be entered into the computer using BASIC INPUT statements. In the example below you can see that the grid



0, 0, 0 = 0
 (4+2), (0), (0)
 (4+2), (0), (0)
 (1), (128+2+1), (128+2+1)
 (4, 2, 1), (128+2+1)
 (4, 2, 1), (128+2+1)
 (16, 8, 4), (128+2+1)
 (16+8), (64+32+16)
 (64+32+16)
 (64+32+4)
 (64+32+4)
 (64+32+4)
 (64+32+4)
 (64+32+4)
 1, (128+1), 1
 1, (128+64)
 0, (64+32)
 0, 0, 0 = 0
 0, 0, 0 = 0

is divided into three sections as you enter three bytes per column line. Looking at the example sprite below, the first 8 pixels of row one hasn't any pixels filled in, it's the same with the second and third column of 8 pixels. So the DATA statement would read:

DATA 0,0,0

The second line of column 1 (the first 8 pixels) has the grid coloured in at 4 and 2, which equals 6. The second set of 8 pixels hasn't any coloured in pixels so the value is 0, the third column of eight pixels has 128 and 64 coloured in, equalling 192. So a DATA statement for row 2 would read:

DATA 6,0,192

And so on for each row, always adding up the

number of shaded cells in each section to get the value for that section.

Once we have all our numbers, -we have the first part of a simple sprite program:

**30 FOR D=0 TO 62 : READ A : POKE 832+D, A;
NEXT D**

**100 DATA 0,0,0
110 DATA 6,0,192
120 DATA 6,0,192
130 DATA 1,131,0
140 DATA 1,131,0
150 DATA 7,255,192
160 DATA 7,255,192
170 DATA 28,254,112
180 DATA 24,124,48
190 DATA 112,124,62**

**0, 0, 0
(128+64) = 6, 0, 192
(128+64) = 6, 0, 192
(1+1),0 = 1, 131,0
(1+1),0 = 1, 131,0
(3+64+32+16+8+4+2+1),(128+64) = 7, 255, 192
(3+64+32+16+8+4+2+1),(128+64) = 7, 255, 192
(28+64,32,16,8,4,2),(64+32+16) = 28, 254, 112
(1+32+16+8+4),(32+16) = 24, 124, 48
(1),(64+32_16+8_4),(32+16+8+4+2) = 112, 124, 62
(1+8+4),(128+64+32+16+8+4+2), (64+32+16+8+4+2) = 124, 254, 126
(1+2+1),(128+64+32+16+8+4+2+1),(128+64+32+4+2) = 103, 255, 230
(1+2+1),(128+64+32+16+8+4+2+1),(128+64+32+4+2) = 103, 255, 230
(1+2+1),(128+64+32+16+8+4+2+1),(128+64+32+4+2) = 103, 255, 230
(1+2+1), 0, (64+32+4+2) = 102, 0, 102
(1+2+1), 0, (64+32+4+2) = 102, 0, 102
(1+28) = 1, 129, 128
(1+32+4+2+1), 128 = 1, 231, 128
(1+4+2), 0 = 0, 102, 0
0, 0, 0
0, 0, 0**

200 DATA 124,254,126
210 DATA 103,255,230
220 DATA 103,255,230
230 DATA 103,255,230
240 DATA 102,0,102
250 DATA 102,0,102
260 DATA 1,129,128
270 DATA 1,231,128
280 DATA 0,102,0
290 DATA 0,0,0
300 DATA 0,0,0

The above program, it would appear to does nothing. You still need to add a few extra pieces in order to see it. What the above program does is to enter the sprite example into the Commodore's memory.

Sprites take up 63 bytes of memory (3 columns by 21 rows), although they are spaced 64 bytes apart. The first part of line 30 is a FOR NEXT statement which counts from 0 to 62 (for a total of 63 bytes). **READ A**, reads the DATA lines from 100 to 300 which loads the values into memory. If you make a error with the DATA values, the program will still run as long as a number between 0 and 255 is used. However your sprite wouldn't look right. **POKE 832+D,A** puts a value from the DATA statement into memory location 832 + D. The variable A is used because of the **READ A** statement. Once the program enters all the DATA lines it finishes.

POKES

Instead of having to remember a load of forgetful memory locations, we instead define the area of memory where the VIC II chip handles sprites. Add this line to your code:

10 VIC=53248

SPRITE POINTERS

The reason we used memory location 832 instead of a nice round number is because of the way sprite data is saved.

Memory location 2040 tells the computer where Sprite 0 is located, memory location 2041 for Sprite 1, all the way up to 2047 for the 8th sprite.

As each memory location can only store a number between 0 and 255, values entered are multiplied by 64. So entering:

20 POKE 2040, 13

would define the location of Sprite 0 data to be located at 13 which is memory address 832 (13 x 64).

SETTING THE COLOUR

You can set the colour of the sprite can be set by typing:

40 POKE VIC+39, 5

This sets the sprite to colour 5, which is green.

TURNING THE SPRITE ON

To display a sprite we much first instruct the VIC II chip to 'turn on' the sprite by typing:

50 POKE VIC+21,1

This sets sprite 0 to on.

POSITIONING THE SPRITE ON SCREEN

Type the following:

60 POKE VIC+0, 50
70 POKE VIC+1, 100
80 POKE VIC+16,0

Line 60 and 70 sets the horizontal coordinates, in this case, 50 pixels from the left of the screen and 100 from the top. Line 80 allows the sprite to move further than 255 pixels from the left of the screen. By **POKEing VIC+16 to 1** you will add 255 pixels to the horizontal coordinates. For example, setting **VIC+16 to 1** and **VIC+0 to 45** will set the horizontal coordinates to 300. In this example it is not required, so it is set to 0. Now type



to edit or re-run the program, e.g. **POKE VIC+0,120**

Just for fun you can change the pointer location of a sprite to see what you get.

POKE 2040,0

You'll get garbled sprite. What you actually seeing is program code trying to be displayed as a sprite. To get the original sprite back type:

POKE 2040,13

Now over to the Amstrad.

RUN and press RETURN to see the results.

As you can see from the screenshot there's a green alien sprite on your screen. It remains as you type over it and scroll the screen. In the next issue we will be looking at multicolour sprites and collision detection.

TIPS 'N' TRICKS

Since this is a tips n tricks issue, here are a few things to try:

Without resetting your computer, type:

POKE VIC+23,1

Now type: **POKE VIC+29,1**

As you can see these expand the sprite size horizontally and vertically by two. Just poke the value 0 instead of 1 to return to normal.

You can position the sprite at a different location without having

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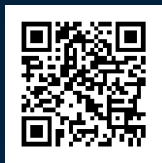


PROGRAMMING SPRITES ON THE AMSTRAD PLUS

As mentioned, when Amstrad created the PLUS range they didn't want people to be able to access the enhanced features. The reason for this was to make sure that any future tape and disk games created would still be backward compatible with the original Amstrad CPC. It was also another reason for people to pay extra for a cartridge based game. However, Amstrad didn't try hard

enough and with a bit of help the 4096 colours palette and hardware sprites could be accessed from the computer, giving us the chance to program with those enhanced features.

B-ASIC is a utility program, originally a part of a tutorial series from the French magazine, Amstrad Cent Pour Cent. Programmed by *Logon System*, it can be downloaded from: eightbitmagazine.com/downloads/



COMPARING SPECS

	COMMODORE 64	AMSTRAD 464 / 6128 PLUS
RELEASED	September 1982	September 1990
COUNTRY OF ORIGIN	United States	United Kingdom
CPU	MOS 6510, 1 MHz	Zilog Z80A, 4 MHz
GRAPHIC RESOLUTIONS	320 X 200 with any 2 colours out of 16 per 8x8 block 160 x 200 with any 4 colours out of 16 per 4x8 block	640 x 200 with 2 colours 320 x 200 with 4 colours 160 x 200 with 16 colours
BITMAP SCREEN SIZE	8 Kilobytes	16 Kilobytes
MAX COLOURS ON SCREEN	16	31 (16 + 15 for sprites)
COLOUR PALETTE	16	4096
NUMBER OF SPRITES	8	16
SPRITE SIZE	24 X 21 pixels (12 X 21 in multicolour mode)	16 x 16 pixels
SPRITE COLOURS	1 or 3 depending on graphic mode	15
TRANSPARENCY	Colour Key	Colour Key
SPRITE MAGNIFICATION	1x, 2x width and height	Width and height magnification of 1x, 2x and 4x
COLLISION DETECTION	Yes	No
HARDWARE SCROLLING	Vertical and Horizontal	Vertical and Horizontal



B-ASIC requires 128K (which came as standard on the 6128 PLUS) so 464 PLUS owners will need to use the older version, B-ASIC 1.4 or upgrade their computer to 128K.

I suggest downloading version 3.4 if you can, which is the most complete version. It also comes with documentation. B-ASIC gives you the ability to be able to access hardware sprites and other functions on the ASIC chip, directly from BASIC using RSX instructions.

RSX stands for Resident System eXtensions and are used to add extra commands to Locomotive Basic. All RSX commands has to start with a pipe symbol | (by pressing SHIFT + the key directly right of the P key).

To get those commands you need the B-ASIC.BIN file, which is on the disk image.

To load the file, type the following:

```
IF PEEK(&BC0E)<>&CD THEN OUT
&7F00,&C1:LOAD "BASIC.BIN",&C000:CALL
&C000
```



THE GAME FLUFF MADE GOOD USE OF THE AMSTRAD PLUS FEATURES. THE GAME PLAYS AT 50 FRAMES PER SECOND AND HAS UP TO 60 COLOURS ON SCREEN.

This loads the file BASIC.BIN into memory at location &C000 and runs it.

You should now have access to almost forty extra commands which we will cover in greater detail in a future issue. For now, this short program will get you started:

```
10 |SPRON,0
20 |SPRZOOM,0,3,3
30 |INKCOPY
40 FOR A=0 TO 15
50 FRAME
60 |SPRFILL,0,A
70 |SPRXY,0,RND(1)*640,RND(1)*200
80 FOR W=1 TO 100 : NEXT W
90 NEXT A
100 GOTO 40
```

Line 10, the first RSX command using the pipe symbol turns the sprite 0 on. Notice how if a value is required, there's a comma after the command. All RSX commands work this way. You can see the same in line 20, which sets the zoom level for sprite 0. Line 30 is to copy the current screen palette to the sprite palette.

Line 40 starts a FOR NEXT loops which positions the sprite to random locations on the screen. Line 50 contains the FRAME command, which makes the computer wait for frame flyback before updating the screen, this is to avoid the a tearing effect when the sprite moves or changes colour during screen update.

Line 60 fills the sprite with a certain colour, in this case the, whatever the value of variable A is. The sprite is displayed with |SPRXY in line 70. The 0 is for sprite 0 and then the X position and Y position. Line 80 is another FOR NEXT loop that does nothing but slows down the sprite as it pops up at different locations around the screen. Next issue we look at creating a proper looking sprite, super-sprites, plus saving and loading sprites into memory. We might even program a sprite designer so you can start creating beautiful multicolour sprites as easy as possible.

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CHIBI AKUMAS

Episode 1: Invasion!

Reviewed by George Bachaelor • Amstrad CPC • PRICE: FREE DOWNLOAD

Bullet hell shooters, if you're an avid gamer you probably have seen and played your fair share over the years but when it comes to the Amstrad CPC though, they are rare, so rare in fact that since 1984 when the CPC 464 was first released, there have only been two bullet hell shooting games ever made and they were both released last year, in 2016.

The first was released at the 2016 #CPCRETRODEV game creation competition called Dragon Attack, coded by Bitplane Technomantes and the second ever Amstrad CPC bullet hell game is called Chibi Akuma Episode 1: Invasion, coded by Keith Sear, an expat Brit, living and working in Japan, who describes the game as a "Spoof Gothic Horror shoot em up."

What or who is Chibi Akuma Episode 1: Invasion, I hear you ask? I was asking myself the same question when I first saw it. A quick look on google shows that the word 'Chibi' is Japanese, meaning a child-like character with exaggerated features, particularly in anime. 'Akuma', is Japanese for "Devil" or "Demon". So in English, it could mean something like 'little devil'.

That's exactly the type of character you play in Chibi Akuma Episode 1: Invasion. A young but very naughty girl known as Chibiko remains an undead child vampire, killed by divine intervention of God and banished from the underworld for her unforgivable misdeeds. You

might think Chibiko would be happy not being sent to Hell, but as life would have it a hoard of noisy, ugly, cliché, and badly drawn monsters are invading her land, and causing a ruckus in her castle (i know how Chibiko feels as it sounds just like my real life battle with all the roadworks outside my front door going on Since January this year and I just can't get any sleep!).

Chibiko is having none of it, she rises from her grave, taking flight in a left to right sideways scroller to use unholy magic and unleash hell in a bid to annihilate all the monsters at the source.

For a vampire, Chibiko looks rather cutesy, don't let that fool you as you quickly discover Chibiko is a vampire far from cute - throwing insults aplenty, using foul-mouthed language, going crazy with non-stop shooting, using smart bombs to blow up all sorts of evil creatures invading her castle. I would think that if this game had been released commercially back in the day it would have found it being censored



like Renegade from Ocean / Imagine was in 1987, do you remember they were forced to replace the red blood with blue?

Chibiko is attacked ferociously bullets are sprayed from her enemies at will, their firepower so intense it covers the whole screen. If you make to the end of a level there is some stupendously awesome-looking end of level bosses – sound like your kind of game? Well, it is my kind of game, one that is truly unique on the Amstrad CPC. Even more impressive is that it's hard to believe that coder Keith Sear only learnt Z80 programming last year and put the game together in 5 months during his spare time.

It's all sounding good so far but just how does it play you ask? There are a few things I don't like in this 4 level bullet hell shooting spree is the normal square shaped bullets they look naff as bullets, however I asked coder Keith Sear why are the bullets this way he replied "because there are so many bullets, I have to draw them fast by making them a 2x2 pixel square, I can draw 1 bullet by changing only 2 bytes, and only doing one 'next line' command, if they were a 4x4 pixel 'circle' I would have to use change 4 bytes and 3 next line commands, so the 'cost' of plotting the bullets would go up a lot, just to make it clear, the bullets are not 'sprites' - there is no bitmap data that is used to draw them - the bullet code knows how the screen works, and alters the bytes of the screen to save time. The other dislike about the bullets is that they are the same colour for both you and your enemy, meaning it can get confusing often.

The power-up curse cubes are a different colour so that sort of makes up for it. On the plus side, I found it to be a most enjoyable game, the only time damage hurts Chibiko is when enemy bullets hit



ZX SPECTRUM AND MSX
Spectrum and MSX versions coming soon, keep an eye on chibiakumas.com for updates.

her heart which is shown by a small red dot. The specific hit area means you can weave and dodge enemy fire quite easily and blast away almost to your heart's content. The speed of the game is quite fast without too much slowdown at all, which I was kind of expecting with so much happening on the screen. It's just so much fun shooting and blasting away at everything.

Graphically it's no Rembrandt, but in certain parts it does make your jaw drop. In particular, I loved the Spider Skull boss, know as 'Skulder, it's just so freakin' cool.

The cut scenes are fantastic, with lots of fun bits of humour. A fantastic tune plays throughout, which is really addictive. I am really looking forward to Chibi Akuma's Episode 2: Confrontation when it comes out around October this year as it is boasting even more features and even more humour.

Chibi Akuma Episode 1: Invasion, is much different than the average Amstrad CPC shoot em up. What sets it apart is that the game is jam-packed with features, in particular arcade gaming type features.

- Furious firepower saturated action with up to 256 enemy bullets onscreen at all times!
- Twin Movement speeds hold a fire button for slow precise movement to weave around the enemy fire.
- Don't take it in the back - Two fire buttons for Dual direction shooting action!
- Send More Firepower! Collect "Curse Cubes" to Max your your evil magic!
- If it moves, you can kill it: Use Smart-Bomb-Scrolls to Blast everything away - 3 per continue.
- Insane Coin munching arcade action: 99 continues so you can die, be resurrected and die again!
- 'Superior' technical capabilities! "High Res" 320x200 4 color mode 1 graphics.
- Raster palette switching, for 8 colors in 4 colour mode!
- Full screen scrolling gameplay - Edge to edge action with parallax (sort of!) - no 256px wide gaming here - eat that speccy users!
- CPC plus enhancements - 16 color sprites for the player character, and UI elements.
- Multiple graphics systems - Uses fast Pset sprites, "byte-key" transparency, double-height interlacing, and supersized compiled and compressed sprites!
- Works, and takes advantage of all CPC systems 464, 664 or 6128 with better animation and cartoon loading screens. Plus sprites work on 464 plus and 6128 plus!
- Unique 'features' - Cartoon Loading screens and Cut sequences.
- Over a dozen 96x96 mini screens in the introduction alone!
- An advanced Insult Simulator!

- 'Chibiko Scoring System (TM)' will review your gameplay - and tell you how badly you sucked!
- Lousy Humor! Bad Jokes in poor taste!
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EIGHT BIT SCORE

GRAPHICS

No Rembrandt but it has its own unique coolness, sprites and animation clear and it all looks rather nice in mode 1 at a screen resolution of 320x200.



AUDIO

Catchy possibly addictive. Some cool in-game firing and hit sounds.



PLAYABILITY

Smooth scrolling, heaps going on screen maybe too much? Pick up and play with ease, a little tricky getting to remember to switch and fire both ways.



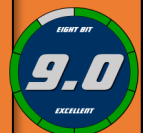
LASTABILITY

4 levels to complete and a lot of lives and you'll need them too.



OVERALL

Just good shooting fun.



One hungry family. One lazy bear. 350 apples.

Graham Axten's

the Bear essentials



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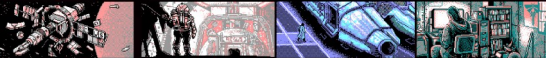
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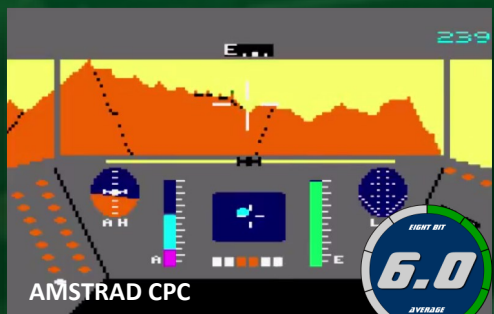
RESCUE ON FRACTALUS!

Reviewed by John Kavanagh • Atari 8-bit • Released 1985

A number of downed pilots must be rescued before they succumb to the toxic atmosphere and hostile environment of the planet Fractalus.

To rescue each pilot you must land your space ship close to their ship while avoiding enemy fire and jaggy mountains. Once landed, you must turn off your shields and engines as the pilot to be rescued runs towards your ship. As you hear banging on your ship by the pilot you must open the airlock to let him in. Be careful, as there

aliens pretending to be downed pilots, if they get into your ship it's game over. Occasionally you see them pop up in front of you, trying to smash your ship to pieces. While it's certainly a jump out of your seat moment, a quick turn on of the systems will fry the alien. Once enough pilots are rescued you can return to your mothership and start the next level. While the first few levels are easy enough when you get used to the controls, the difficulty level does increase as the game goes on.





THE TOXIC ATMOSPHERE OF FRACTALUS



A JAGGI (ALIEN) PRETENDING TO BE A DOWNED PILOT

The game uses fractal technology to create the mountains to good effect. The mountains move along at a fair pace, slightly sluggish but still impressive for an 8-bit computer. The game really takes advantage of the Atari's hardware, making good use of its fast processor and custom chips.

The game is full of atmosphere which really brings you into the game. The sound effects, while simple, are put to good use and the graphics, while blocky, are good. The pilots running towards the craft are done to good effect. The only let down is the simply drawn

cockpit of your Valkyrie spacecraft. It's also the only view in the game. A fun game, even if it is a bit basic. It's just a shame that the other versions for different computers weren't as fun.

OTHER VERSIONS

Other versions didn't fare as well as the Atari original. The ZX Spectrum version is extremely ugly, while the Commodore 64 version is slow in comparison to the Atari. The Amstrad CPC version has sluggish controls and a small viewing screen. The Apple version is not bad but still nowhere near as enjoyable as the Atari version. The CoCo version is better looking than the Atari but much too slow.



GRAPHICS

Impressive use fractal technology. The same technology that was used to create the Genesis effect on Star Trek II: The Wrath of Khan.



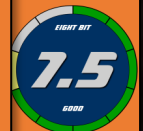
AUDIO

No music but a good use of sound effects to create tension and to absorb you into the game.



PLAYABILITY

Once the controls are mastered, the game plays well. Movement is impressively fast considering the strain on the CPU to produce fractals.



LASTABILITY

16 levels that keep you coming back for more.



OVERALL

A fun, atmospheric game that makes full use of the Atari's hardware.



The Last Bit

The latest retro news and rumours from around the world.

DOOMSDAY PHYSICAL EDITION

Reviewed in Issue 2 of Eight-Bit, the excellent Doomsday: Lost Echoes will now be available to purchase in a physical copy by the time you read this. There are two versions available, a 3-inch plus a 3.5-inch disk version for 25 Euro, or 2 x 3.5-inch disk version 20 Euro. You will also get a micro SD card containing the disk image as wallpapers, icons, concept art and more. It will be included a 24-page manual, stickers and

an A3 poster. All shrink-wrapped in a beautifully designed box. You can purchase it at: <https://www.polyplay.xyz/navi.php?qs=dooms>



C64 RELOADED MARK 2

Individual Computers are taking pre-orders for the C64 Reloaded MK2 motherboards. For those of you who don't know, the C64 Reloaded is a brand new motherboard to fit inside a C64's case. You then have to add the chips such as the CPU, audio and graphics chip. Unlike the previous version of the motherboard, the MK2 will automatically identify chips without having to set jumpers. It will automatically adjust voltages and if the screen output is NTSC or PAL. Fitting the chips is a doodle with the use of ZIF (Zero Insertion Force) sockets, so you can have fun trying different combinations. For example, the early version of the SID chip has better audio and some versions of the VIC II outputs a clearer image than others. Interestingly you also have the option of having two SID chips fitted at the same time. You also only need 5 chips in total, as RAM and the PLA is supplied on the board.

The new motherboard also has S-Video and 3.5 mm stereo outputs. There's also a USB Interface for a serial link to configure the board with a terminal program. Best of all, you won't need your unreliable C64 power brick and the whole board can be powered with a single 12-volt power supply.

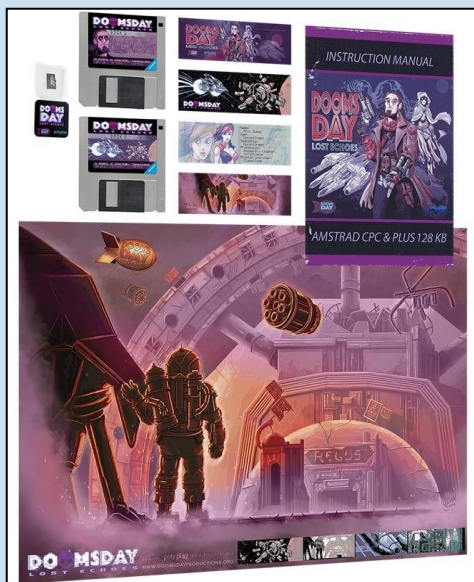
You can pre-order the motherboard up to the end of 2017 for 185 Euro at:

<https://icomp.de/shop-icomp/en/produkt-details/product/c64-reloaded-mk2.html>



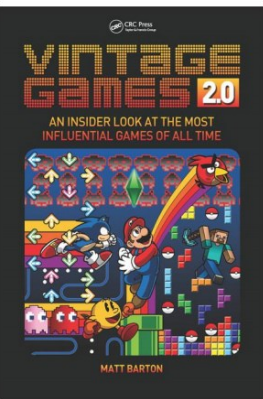
ULTIMATE 64

The Ultimate 64 is a FPGA implementation of the Commodore 64 AND Like the C64 Reloaded MK2, it is also designed to fit into a Commodore 64 case. Unlike the Reloaded MK2, no extra microchips are required.



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However, there is an option to add a real SD chip if you wanted. It will have a 1541 Ultimate II+ built into it which means you will be able to load disk images with 100% hardware accuracy. It will have connections for cartridge/expansion as well as for a tape player. Video output will be provided by HDMI.



The product expects to sell for under \$200, depending on numbers. For more information and to express your interest, visit: [http://1541ultimate.net/content/index.php?](http://1541ultimate.net/content/index.php?option=com_content&view=article&id=74&catid=9)

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AMSTRAD CPC RETRODEV 2017

The popular game programming competition for the CPC is in its fifth year running. This year there are over €1,100 Euro in prizes. Last year's

competition resulted in 34 new games for the CPC, some were really enjoyable to play, such as Outlaws. Check out this year's competition at: <http://cpcretrodev.byterearms.com/contest/cpcretrodev-2017/>



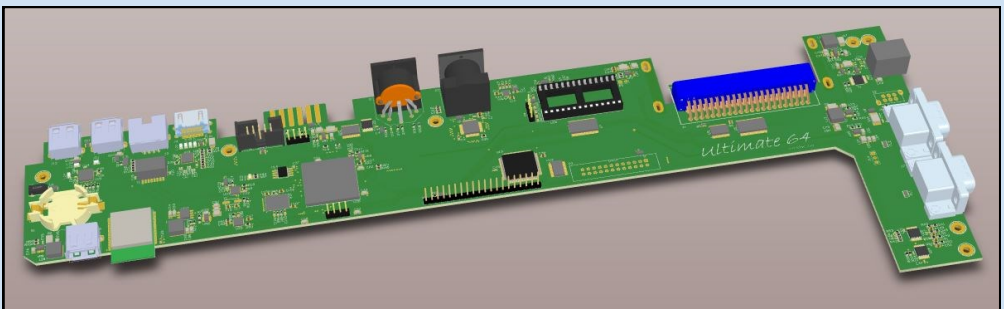
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Phil Reichert: Still waiting for the imminent release of the Commodore 65. Fingers crossed. Bubble Bobble will look great in 256 colours.

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SCENE WORLD AND C64.TV



Scene World #27 is out. Packed with interviews, tutorials and more. Download it now for your Commodore 64 (or emulator) at: <https://sceneworld.org/>

The people behind Scene World also recently launched a new website dedicated to the Commodore 64. Check it out at: <http://c64.tv>



LUNIK 15 FOR THE AMSTRAD CPC



Previously known by its codename Project Goat, Lunik 15 is a pseudo rocket simulator and a point and click adventure in one. The aim of the game is to return to Earth after crash landing on the moon. It is being programmed by DefectoDigital, the same people who brought you the excellent Heroes Rescue.

RESCUING ORC FOR C64

How far would you go to help a friend? That's the question asked in the new platform game for the Commodore 64. Your friend has gone missing and it's your job to find him. The game is spread over five different areas from perilous Rocky Mountains to the dark corridors of Bluestone Keep.

There will be a review of the game in Issue 5. For those of you who can't wait, the disk version is now available from: www.polyplay.xyz/navi.php?qs=rescuing+orc



with tape and cartridge versions are available on pre-order.



CRASH 2018 ANNUAL

Many Sinclair Spectrum users have fond memories of Crash magazine which was published between 1984 and 1992. Thanks to a very successful Kickstarter by Chris Wilkins, the magazine is back is a once-off annual. The editor of the magazine will be Roger Kean who was one of the editors of the original magazine. The artwork will be done by Oliver Frey, who of course, did the amazing artwork for the original magazine. So this is more than a homage to the original magazine, it's a continuation of it. The Kickstarter is over but you can pre-order it at: fusionretrobooks.com for £15 Sterling or for £25 if you want the perks to go with it.



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