VINTAGE TECHNOLOGY

History of computers, video games, calculators, radio, tv and audio in the digital age

Issue 1 : Volume 1 : July / August 2007

Space Invaders

An icon of the seventies

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History of the Microwave Oven

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VINTAGE TECHNOLOGY

WELCOME

Welcome to the first edition of ***Vintage Technology*** Magazine! I think it's great to unite all of these interesting technology subjects under the same publication as there are so many enthusiasts who have an interest in several of the areas.

VTM aims to explore the legacy of recent past technology, explore new 'electronica' which could become or already is collectable, be an enjoyable resource for collectors & historians and celebrate the history and personalities surrounding this subject.

I hope you enjoy this issue and wish you all the best with your collecting and historic endeavours .

Abi Waddell - editor

Contact:
Exaro Publishing
67 Marksbury, Bath, BA29HP
Email: info@vintagetechnology.co.uk

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Not all sections are included in this online edition (marked with *).

The historic value of Usenet

For all social, technical and contemporary historians, Usenet archives offer a wonderful source of first-hand primary information about many subjects of the time.

USENET, THE collective term for message posts or discussion threads on newsgroups, came into being in late 1979, shortly after the release of V7 Unix with UUCP. Most of these archives can be found on groups.google.com and date back to 1981.

Usenet began when two Duke University students in North Carolina, Tom Truscott and Jim Ellis, thought of hooking computers together to exchange information with the Unix community. Steve Bellovin, a student at the University of North Carolina, put together the first version of the news software using shell scripts and installed it on the first two sites: "unc" and "duke." At the beginning of 1980 the network consisted of those two sites and "phs" (another machine at Duke), and was mentioned at the January Usenix conference. In 1981 at U. C. Berkeley student, Mark Horton and high school student Matt Glickman, rewrote the news software to add functionality and to cope with the ever-increasing volume of news. This rewrite was the "B" News version. The first public release was version 2.1 in 1982. In March 1986 a package was released implementing news transmission, posting, and reading using the Network News Transfer Protocol (NNTP). This was publicly released on August 20, 1992.

The number of Usenet articles posted per year has greatly increased over the years:

1981:	4 000
1982:	27 000
1983:	62 000
1984:	108 000
1985:	158 000
1990:	1 203 000
1995:	21 064 000
2001:	149 808 000

It is thought that there are many more and perhaps earlier posts than that kept by Google, but these messages would need to be located and then extracted from tapes which have at present not been found. There are in addition, many small collections of Usenet articles that were saved by many dedicated individuals in the Usenet community.

The following shows excerpts of some interesting historical posts:

Oldest post: Newsgroup: net.general
Date: 1981-05-11
From sdcarl!rusty
To: ucbvax^mark
Subject: newsgroup fa, net, etc.
Won't we need to change the .ngfile also?
Also is ALL an acceptable newsgroup
on the left side of the dot such that ALL. ALL will catch everything?
Rusty is right (or is that "Rusty is Wright"?) – we have ALL in our .ngfile
so I tend to forget this. ALL.ALL may or may not work, but ALL certainly does.
Mark
I plan to make the change on Tuesday unless something horrible happens.

First cell phone deployment in Chicago:
Newsgroup: fa.telecom
Date: 1982-12-17
Date: 24 Oct 1982 1434-PDT
Sender: GEOFF at SRI-CSL
Subject: Cellular Article on the Chicago grant.

The Federal Communications Commission gave American Telephone &Telegraph Co. the go-ahead Thursday to begin building a cellular mobile telephone system in Chicago.

The commission's action opens the way for Chicago to become the first city in the nation with the revolutionary system that is expected to increase the use of portable telephones greatly.

An AT&T spokesman said the company hopes to have the service available by late 1983.

The FCC decision came as a major disappointment to a pair of firms vying for a chance to compete with AT&T in the Chicago market: Graphic Scanning Co. and Rogers Radio Communication Services Inc. They had sought a delay to keep AT&T subsidiary AMPS Inc. (Advance Mobile Phone Services) from getting what they have termed an unfair 'head start.'

The FCC plans to allow only two cellular systems per city and had already decreed that half of the radio frequencies being made available would be reserved for local telephone companies. The telephone companies have negotiated agreements between themselves so that only one application was made from each city for their half of the spectrum. All other applicants were left to fight among themselves for the lone remaining license, a process that could require lengthy FCC hearings.

The other applicants, generally radio paging companies, say they fear the AT&T will be dominating the market before they can get a chance to put their systems into action.

Bud Kahn, executive vice president of Rogers Radio Communication Co., one of the companies in the portable phone chase, complained that AT&T would have a "double head start" in Chicago because it is already operating an experimental cellular system here. He said AMPS would have the advantage of being able to retain the 2,000 customers who participate in that experimental system.

Kahn said he expects the cellular phone service market in Chicago to attract between 100,000 and 200,000 users and have a value in excess of $100 million.

Its attraction is that it will make mobile phone service available to a great many more people. The cellular system will also provide technically superior service and privacy, both of which are lacking in present mobile systems.

The FCC sought to calm those complaining about AT&T's "head start" by stipulating that AMPS will not be able to begin serving customers until it finishes its construction and applies for an operator's license. But the complainants said they doubted the FCC would allow AT&T to invest the necessay $18 million for construction and equipment and then tell the company it would have to wait to use it. "We trust that there will not be any other delays," AT&T spokesman Pic Wagner said.

The FCC has urged Graphic Scanning and Rogers Radio to make some sort of settlement between themselves, Kahn said. However, no talks have taken place, he said.

First mention of a fax machine:
Newsgroup: net.wanted
Date: 1983-02-22
Our research group is interested in

buying a "fascimile" machine that runs at 19.2k bits/sec. We have found a few outlets that sell machines that are slower than that (they are designed to be used over phone lines), but no fast ones.

Does anyone know the name (phone no/address) of a firm that sells a fax that is that fast?

Judy McMullan, University of Waterloo

First mention of Windows:
Newsgroup: net.micro.pc
Date:1983-11-12
According to a report in the Toronto Globe & Mail, Nov. 11, Technology section,

Sharp Electronics has just introduced the PC-5000, a PC compatible running MS-DOS that weighs <10 lbs and has an 80ch. x 8 line LCD display. It has from 128-256K memory, removable bubble memory cart. (no size figure given), and a "dot matrix printer with thermal and carbon-ribbon printing" (not clear whether this is standard or not).

From the same paper, one sees that the maker of the Hyperion PC compatible portable "intends to endorse Microsoft Windows, an operating system for personal computers made by Microsoft Inc. of Bellevue, Wash."

"When run on the Hyperion, MS-Windows will extend the function of the MS-DOS operating system to include management of bit-mapped screen graphics and a mouse cursor control device. MS-Windows will enable the user to view unrelated

applications programs simultaneously, allowing data transfer from one application program to another."

This is the first I've heard of this, which appears to be Microsoft's answer to Lisa(tm Apple) and VisiON (tm Visicorp). (MS- are tm's of Microsoft).*

Have more details on the system been made available? It appears, from this description, that it does not embrace the fairly complicated attempts to make user interfaces automatically consistent adopted by VisiON (Basic Interaction Techniques, etc.), but rather just extends MS-DOS into a multi-window system.

This allows some use of the existing sw base, I would guess. Also a nice way for Microsoft to reward those who have played by MS-DOS' rules and haven't accessed the screen directly.

First mention of Y2K problem:
Newsgroups: net.bugs, net.flame, net.puzzle
Date: 1985-01-18

I have a friend that raised an interesting question that I immediately tried to prove wrong. He is a programmer and has this notion that when we

reach the year 2000, computers will not accept the new date. Will the computers assume that it is 1900, or will it even cause a problem? I violently opposed this because it seemed so meaningless. Computers have entered into existence during this century, and has software, specifically accounting software, been prepared for this turnover? If this really comes to pass and my friend is correct, what will happen? Is it anything to be concerned about? I haven't given it much thought, but this programmer has. I thought he was joking but he has even lost sleep over this. When I say 'friend,' I'm NOT referring to myself, if it seemed that way.

Spencer L. Bolles

Discussing Pacman tactics:
Newsgroups: net.games.pacman
Date: 1982-02-26
I used to play the game quite frequently. I know the answer to only some of your questions. The fruit appears twice a frame. The fruit will go away after s set number of seconds. I have never thought of timing it.

As the game progresses, the more

frames you clear, the faster the monsters turn back to their original colors. If the monsters are blue and the pacman has eaten the last fruit, then all monsters are reset to their original color and the frame is reset. After a monster has been eaten, then the monster will find the quickest route to the cage and will immediately come

out of the cage. ie... You have just eaten a monster. If the monster was eaten

at the front of the cage, it will come out quickly. If you eat him on the other side of the board, it may take the monster a while to get out.

Through the tunnel, the monsters should slow down to almost half their speed,

This tunnel is used quite frequently for this reason. The pacman should not be able to turn into a wall. In the real game, it will wait for a path that it can turn down. If the pacman is heading for a wall and hits it, then it will stop. There should not be any other way to stop the pacman.

I think that is all I can come up with now. If you have any other questions about the game, I will try and answer them.

Rich

"Usenet archives offer a wonderful source of first-hand primary information about many subjects of the time."

"...it does not embrace the fairly complicated attempts to make user interfaces automatically consistent adopted by VisiON (Basic Interaction Techniques, etc.), but rather just extends MS-DOS into a multi-window system."

"...I thought he was joking but he has even lost sleep over this." ■

The influence of pre-Altair microcomputer kits

The Altair wasn't the first popular hobbyist computer kit. **Abi Waddell** looks at other earlier computer kits.

WHEN PEOPLE think back to the time when the personal microcomputer first came about they may mention the Apple 1 or the MITS Altair as these were the most popular and well known of the early microcomputers. The Altair was widely publicised and many were sold and the Apple 1 – although not so well known at the time, became famous in later years as being the first computer produced by the company Apple.

In fact there were many microcomputers made before 1975, when the Altair was widely sold, which deserve to be mentioned especially as it could be seen that the Altair and other computers after this time gained inspiration from these earlier systems.

From the late 1960s there was a sentiment that the masses should be able to have access to the powerful, expensive computers used in industry.

The "paperclip computer" was introduced in 1967 in a book called How To Build a Working Digital Computer and it described how you could build a simple computer with things around the house, like paperclips for switches and a tin can for drum memory.

National Radio Institute 832

In 1971, the National Radio Institute offered the 832 computer kit for $503 as part of a home study course on computers. This computer did not have a digital processor and used switches and lights.

Scebli 8H

In 1973 Scelbi Computer Consulting introduced the Scelbi 8H minicomputer – 'Scelbi' standing for "SCientific, ELectronic, and BIological" computer. This computer was based on the Intel 8008 microprocessor and was available in kit form. Several hundred were sold at about $500 each, but it did not become a big market success. Scelbi aimed the 8H, available both in kit form and fully assembled, at scientific, electronic, and biological applications. It had 1 KB of internal memory and had both teletype and oscilloscope interfaces. An additional 15 KB was available for US$ 2760. The company sold about 200 machines, losing $500 per unit until it was taken out of production in 1975.

TV Typewriter II

Southwest Technical Products introduced various kits in 1974/5 one of which was the TV Typewriter II. Don Lancaster was the creator of the original TV Typewriter in 1973 is probably one of the most interesting of kits. Advertised in Radio-Electronics, it showed how the reader could build a device that could allow characters to be typed and displayed on a normal TV set. Don himself said that there were many uses for the device:

".. it's a computer terminal for timesharing services, schools, and experimental uses. It's a ham radio Teletype terminal. Coupled to the right services, it can also display news, stock quotations, time, and weather. It's a communications aide for the deaf. It's a teaching machine, particularly good for helping preschoolers learn the alphabet and words. It also keeps them busy for hours as an educational toy.

It's a super sales promoter, either locally or on a store wide basis. It's easily converted to a title machine for a video recorder. It's a message generator or "answer back" unit for advanced two way cable TV systems. Tied to a cassette recorder, it's an electronic notebook and study aid, or a custom catalog. It's an annunciator for plant, schools, and hospitals that tells not only that someone is needed, but why and where. And, if all that isn't enough, it's easy to convert into a 12 or 16 place electronic calculator. You can also make a clock out of it, and, with extensive modification, you can even make a 32 register, 16 place serial digital computer out of the beast!"

> *"…many projects were abandoned half way through."*

The cost was around $120 for the basic unit and you had to send off for the 16 page package of construction details. Radio-Electronics sold thousands of copies for $2.00 each.

Mark-8

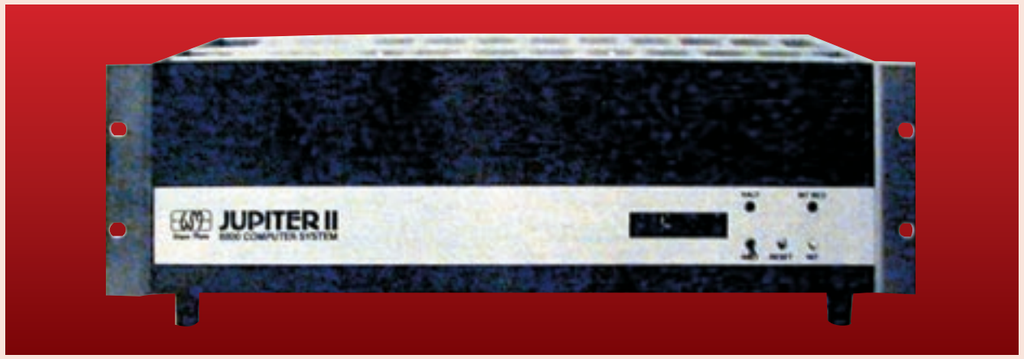
The Mark-8 was launched in 1974 and based on the Intel 8008 CPU. Designed by graduate student Jonathan Titus, it was announced in the July 1974 issue of Radio-Electronics magazine as a 'build it yourself' project. It was called a personal minicomputer as opposed to 'microcomputer' as this latter term wasn't really a common description then. The reader had to buy a $5 booklet containing circuit board layouts and DIY construction project descriptions, with Titus himself arranging for $50 circuit board sets to be made by a New Jersey company for delivery to hobbyists. Prospective Mark-8 builders had to also gather the various electronics parts themselves from a number of different sources.

Around 2000 booklets and some hundred circuit board sets were eventually sold.

To build the Mark-8 proved very challenging and required a lot of electrical engineering skill – perhaps more than the average hobbyist had and thus many projects were abandoned half way through. One such person managed to build a working Mark-8 however – Dr Robert Suding. He formed the digital group which sold plans for improving the Mark 8 and new software. They also offered video and cassette interfaces.

After it's announcement, hobbyist clubs and newsletters were formed such as Hal Singer's Micro-8 and Hal Chamberlin's The Computer Hobbyist.

After this time, in 1975, there was a bumper crop of diy computer kits, including the famous Altair 8800.



KIM-1

The Kim-1 (short for Keyboard Input Monitor) was produced by Mos Technology Inc. and was popular because it was cheaper (using the cheaper Motorola 6502 processor). The creators originally intended it to be used by engineers who wanted a system capable of using the new 6502 chip, but was found to be very popular with hobbyists. A complete system could be constructed for under $500 with the purchase of the kit for only $245, and then adding a used terminal and a cassette tape drive. The Kim-1 had 1K RAM, an LED display, calculator-style keypad and built-in software which could run a cassette tape for storage, drive the LED display, and run the keypad.

As soon as the power was turned on, the monitor would run and the user could immediately start interacting with the machine via the keypad. This was one of the first single-board computers, needing only an external power supply to enable its use as a stand-alone experimental computer – a fact, which made it popular.

A Kim-1 user, Bob Leedom, managed to create a baseball game and a tiny version of Adventure, with monsters, treasures, 26 rooms, and more!

Jupiter

The Jupiter kit could interface with a TV for use as a monitor. Software included System Monitor, Debug (in ROM), text editor, assembler and BASIC. The Jupiter II kit was pricier than the Kim-1 at $1225 but could interface with a TV for use as a monitor and came with a text editor, assembler and Basic among other software.

Mike-2

Another lesser-known kit was the MIKE 2 Martin Research. It used an 8008 processor, a 20-pad keyboard and a 7-segment display. RAM memory was slightly more at 4K and it cost $395 per kit.

Jolt

At the end of 1975, Byte magazine advertised the Jolt computer by Microcomputer Associates Inc. At $249 it was the cheapest computer kit on the market. By now computer companies such as these were offering software and peripherals along with the basic kit, and usually offered a fully assembled version of the basic computer kit – but of course at a higher price.

Consumers could buy an I/O card, extra memory or a power supply to go with their Jolt computer.

Sphere 1

Also at this time the Sphere Corporation introduced the Sphere I computer kit, featuring a Motorola 6800 CPU, 4KB RAM, ROM monitor, keyboard, and video interface, for $650.The computer could also run extended Basic.

It is not certain whether the Altair inspired these last few kits described, but their creators had almost certainly been riding the DIY computer wave which had started a few years earlier. The interest and passion had most likely been sparked before the Altair came into being, but the Altair had kick-started a popular consumer industry. ■

History of the 'Space Invaders' arcade game

The history of the original Space Invaders arcade game is interesting because it illustrates many recurring phenomenon in the games industry.

THE FIRST, is that the theme was taken from other areas of popular culture. The idea of shooting at things came from the earlier pong games, but the concept of shooting at aliens probably came from science fiction films such as Star Trek and Star Wars, and this was also used in earlier arcade games such as Computer Space.

In the case of Space Invaders, in February 1978, a programmer called Toshihiro Nishikado, working for Taito in Japan, finalized a primitive spaceship shoot'em up video game. Originally, the player had to shoot down soldiers who tried to cross the screen but, at the time, it was politically unwise to encourage killing humans so the soldiers were then replaced with an alien invasion.

Four months later, Taito, a company that had been selling video games since 1971, launched the first Space Invaders coin operated cabinet. The game became immediately a national passion. It was so popular in Japan that it caused a severe shortage of the 100-Yen coins needed to play the game, until the coins' production was quadrupled. Many incidents of juvenile crime surrounded the release of this game. A girl was caught stealing $5000 from her parents and gangs of youths were reported to have robbed grocery stores just so they would have money to play the game. The original Space Invaders brought in over $500 million in revenue for Taito, making it, even today, one of the most profitable and successful games of all time.

Beside arcades shops which featured nothing but Space Invader machines, one found Space Invaders cabinets everywhere in Japan: restaurants, ice cream and pizza shops, laundries... When restaurants complained that customers were playing instead of eating, Taito simply supplied them with sit-down cocktail cabinets, further fuelling the Space Invaders hysteria.

'...gangs of youths were reported to have robbed grocery stores just so they would have money to play the game.'

Another common pattern was that this was a game that popularised the arcade game industry whilst bringing it to the masses. It was also one of the most cloned games.

Although very basic even by the 1980s, the game was immensely popular. The aliens, arranged in a tight row and column formation, marched left and right across the screen, dropping down one level each time they hit the side. You controlled a lone laser base, defending the planet by firing back at the hostile armies. You could also move left and right, using four convenient shields to play a dangerous game of fire and retreat as the aliens unleashed their own laser assault. As the invaders were knocked out one by one, their march grew faster and faster, until a lone invader sped across the screen. If you managed to hit them all, a new wave of invaders would take to the sky. But if the aliens hit ground zero, it was game over for you and for the Earth.

In 1980, the game was licensed from Taito by Midway for production and use in the United States. The mania wasn't quite as intense but was still a phenomenal success.

The same year, it was released on the Atari 2600, as Atari won an exclusive license to market a home version of the Taito game, making it the first ever home conversion of an arcade game. Several dozen thousands 2600 consoles were then sold only for playing Space Invaders. This was a pattern that many home video console companies followed, for instance Coleco licensing Donkey Kong for the Colecovision console.

The Space Invaders phenomenon worried some parents who feared that video games caused kids to be violent and anti-social. In Texas, some of them asked the Supreme Court to ban the illicit machines from their Bible-belt community.

Taito released a handful of sequels over the years starting with Deluxe Space Invaders (also known as Space Invaders Part II which was released by both Midway and Taito) in mid 1980. It was pretty much the same game at the incredibly popular original, but added some extra features such as multiplying aliens, a flashing bonus ship, and intermissions between certain stages of play.

Deluxe Space Invaders made history, though, by adding in the first hidden "easter egg" in video game history. Adding to a small glitch from the original Space Invaders, Deluxe added a spectacular (for the time anyway) special effect to the game. If a player managed to whittle down the invaders to just one and that one invader was an alien from the first attack row, the game treated the player with a big, colourful explosion that became known as the 'rainbow' trick. This trick not only gained a high number of bonus points for the gamer, but gained publicity at the time. The difficulty of the trick made newspaper headlines when it was actually pulled off - something that is unheard of today.

Return of the Invaders, a 1985 release, presented new, more powerful invaders, along with the occasional challenge stage. 1991's Super Space Invaders (a.k.a. Majestic Twelve) gave your laser base a few handy power-ups, along with boss aliens and a bizarre new challenge stage that involved protecting cattle from alien abduction.

The series' last instalment to date was Space Invaders '95, a graphically enhanced take on the now-legendary original.

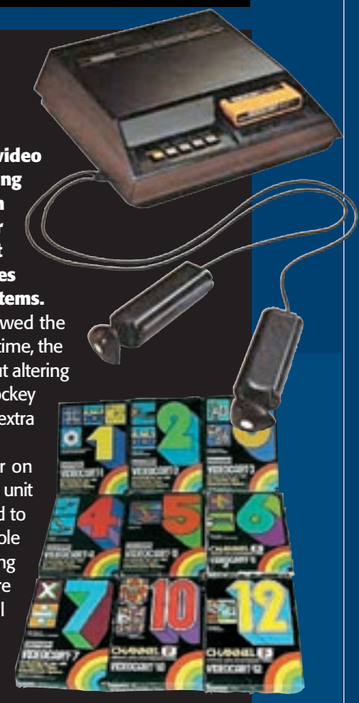
Space Invaders eventually lost its arcade supremacy to later hits like Asteroids, Centipede and Pac-Man, but these games might never have made the big time without Space Invaders' breakout success.

Later, Activision, Inc. acquired the rights to develop and produce interactive games based on Space Invaders for the PC, PlayStation, Nintendo 64 and Nintendo Gameboy systems worldwide, excluding Japan, making Space Invader still alive more than 20 years after it was launched.

In 2002 Taito and Digital Bridges, a world leader in the creation and distribution of mobile entertainment solutions, announced that Taito has developed a Java cellular phone version of Space Invaders, which is being hosted and delivered by Digital Bridges. Available now to AT&T Wireless mMode(sm) customers, Space Invaders is one of the world's most famous games ever created.

Let's hope that this ever-popular game remains with present and future gamers... ■

Fairchild Channel F video game system



THE CHANNEL F was the first programmable video game system, having plug-in cartridges containing ROM and microprocessor code rather than dedicated circuits. Not a very popular or entertaining system, it was nonetheless important at the time for having a number of original features which were copied by later more successful systems.

Unique to the console is a `hold' button that allowed the player to freeze the game and also change either the time, the speed or both during the course of the game, without altering the score. Another feature which was used for the Hockey game was `overtime' which allowed one minute of extra play should there be a tie-break in the score.

Detached controllers were just starting to appear on `pong' units as opposed to having them directly on the unit itself. The Channel F controllers which were attached to the unit with dedicated wires, were gripped by the whole hand and enabled movement in all directions, including the twisting left and right for `paddle' movement. There was no fire button, the joystick had 8 way digital movement, forward/backwards, left/right, pull knob down/pull up and twist counter-/clockwise.

Fairchild released twenty-six different cartridges for the system, with up to four games being on each cartridge. The games included sports, such as Hockey, Tennis and Baseball, educational, such as Maths Quiz, board games, such as Checkers, and shooting games, such as Space War. The cartridges had labels that contained the game instructions on them and each were given a sequential number. In this respect Fairchild started a trend in trying to boost game sales by numbering them and so appealing to consumers who wanted to complete their collection.

The Channel F console's popularity lowered when the Atari released their VCS in 1977 as the VCS had much better graphics, games and sound. Fairchild responded to the Atari VCS by changing the name of their console to the `Fairchild Channel F' from its original name of the `Fairchild Video Entertainment System', but this did not raise flagging sales.

In 1978, Zircon International Inc. bought the rights for the Channel F and released it as the Channel F System 2. This new system had some minor modifications: slightly different cosmetic design, sound output through TV speakers and the controller holders at the back of the unit. But this new model did not succeed either, as this time, Atari VCS, Intellivision and Odyssey² were already on the market...

Casio Calculators

Casio Computer Co. Ltd announced that its total worldwide sales of electronic calculators passed the one billion mark at the end of 2006.

ESTABLISHED IN 1957, it has always been at the forefront of new technologies, producing many 'firsts', such as the world's first fully electric compact relay calculator, the Casio 14-A, which used electric relays in place of mechanical gears.

In September 1965, Casio released the 001, the world's first electronic calculator with a memory function. The following year, Casio commenced exports to the United States and Europe, taking its first step as a manufacturer for the global market. Casio calculators were well received around the world, and total production reached the 100,000 mark by 1969.

In the latter half of the 1960s, there was a surge in the number of new manufacturers entering the calculator market. At its peak there were more than 50 manufacturers competing with each other, and the phrase "calculator wars" was coined. The competition, however, was confined to the limited market for calculators used in the office.

In 1972, the company created the world's first personal calculator, the Casio Mini, which was sold for the then-revolutionary price of only 12,800 yen. It was a huge hit, selling 1 million units in ten months. This made calculators affordable and accessible to individual consumers for the first time. The Mini was inexpensive enough that, for the first time, electronic calculators began showing up in the hands of school children — an event that forever changed the way the school system dealt with mathematics. Today, a calculator is an indispensable part of the mathematics curriculum in most schools.

At the time the Mini was being developed, just prior to Hewlett Packard revolutionizing the calculator world with the feature packed (and very hand-held) HP-35, it was quite a challenge to cram all that was needed to make a useful calculator into a hand-held package. Another challenge that the designers had to face was making a handheld device that could get sufficient battery life given the power requirements of display technology such as the Vacuum

Fluorescent displays used back in the early 1970's. Later versions of this basic design, such as the Sperry-Remington 661D improved upon the functionality of the early Casio-designed handhelds by adding support for zero or 2 digits behind the decimal point, and added a decimal point key to the keyboard to allow entry of numbers with digits behind the decimal point.

The compromises in the Casio Mini are quite evident. Straight away one notices that the machine has only a 6-digit display. Six tiny 8-segment (the 8th segment is never used) Vacuum Fluorescent display tubes made up the display of the machine. The reason for the small number of digits is simple -- cost. The display is generally one of the more expensive parts of a calculator, and reducing the number of display elements cuts the cost to the end-user. Another factor that contributed to the six-digit display is power requirements. The machine has no concept whatsoever of a decimal point. It works purely on integer math, with no provision for entering a decimal point, nor displaying one — (although the VF tubes have decimal points, they are not used).

With the huge popularity of the Casio Mini, Casio's cumulative sales of calculators reached the one million-unit mark in 1972, and skyrocketed to two million that very same year. Casio's worldwide calculator sales then reached 10 million in 1974. This was the turning point — from here on, price competition among calculator makers reached a climax, with one company after another withdrawing from the market. In 1980 the total number of all calculators sold by Casio reached 100 million units.

> *"Casio's worldwide calculator sales reached 10 million in 1974."*

Next, the market saw fierce competition to develop smaller and thinner products. In 1983, Casio developed the SL-800, which at 0.8 mm was as thin as a credit card. This put an end to the "smaller and thinner" race.

After Casio achieved the ultimate in thinness with the SL-800, changes in product trends led to a focus on functionality. In 1985, Casio developed the fx-7000G, the first scientific calculator to incorporate a graphing function.

Casio in the 1980s produced many calculators with built-in games showing that even calculators weren't impervious to the arcade games crazes of the time.

"Astro Destroyer" was a Space Invaders type game with a Game & Watch sized LCD. This game/calculator was available from Sears and other higher-end retailers for about $50 in 1982.

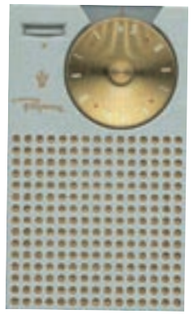
Casio's Championship Derby 2 was a horse racing game calculator where the object was to simply push the buttons quickly enough to get your horse ahead to win the race. There are obstacles that your horse and jockey must hurdle, and your competition is not all that easy. There's a little map of the track in the upper right corner indicating where you are in the race.The card game calculator was solar powered and may have been used alongside a deck of cards. The baseball game's graphics on its mini calculator display rivalled game-only handheld units. The game & watch-style boxing game had time and alarm functions added.

In 2004, the company developed a scientific calculator capable of displaying fractions, square roots, and other symbols as they are shown in textbooks.

Casio continues to produce innovative products to this day. Casio's offerings include timepieces, digital cameras, cellular phones, electronic dictionaries, calculators, musical instruments, system equipment, and electronic components such as LCDs. The CASIO group employs more than 10,000 people worldwide with net sales in excess of 570 billion yen in the fiscal year ended March 2006. ■

The First Transistor Radio

The must-have accessory for the fifties teenager and for today's radio collector



THE REGENCY TR1 was the first transistor radio made and at its launch in 1954 was the smallest.

Measuring just 13 x 8 x 3 cm and weighing 12 ounces, it was small enough to fit in a shirt pocket. It used an Eveready 412 (22.5V) battery and used 4 transistors from Texas Instruments. It was also the first widely sold transistorised product, hearing aids being the main commercial beneficiary of transistors up until this time.

In 1954, Texas Instruments approached RCA (and other noteworthy radio manufacturers of the era), but they expressed little interest in selling transistor (or "transistorized") radios. However, a small Indianapolis company, the Regency Division of Industrial Development Engineering Associates was especially interested.

The radio was to utilise four Texas Instruments "grown-junction" germanium (not silicon) transistors and receive AM broadcasts only. The TR-1 was sold at a cost of $49.95, with optional extras such as a leather case and earphone.

It was very well designed and came in attractive colours appealing to both men and women. The first radios came in black, red, grey and white and was followed soon after by other colours such as lavender and pearlescent blue. The timing was excellent – rock n' roll music was just getting popular and it's portability and price would have appealed to teenagers and youths.

It is interesting to draw a comparison between the design of the TR-1 (fresh colours, small rectangle shape with a large circle on the front) and the Apple Ipod MP3 players today – also small, rectangular, nice colours with a large circle on the front. Perhaps this is a coincidence but the general design has been successful so far and it is not difficult to understand how these radios have become very well sought after by collectors. ■

What's my TV/Radio worth?

THE FOLLOWING gives a rough guide to the value of your British radio i.e. what someone (but not dealers) might pay if the radio is cosmetically and functionally in good condition. Expect to receive less than these values if selling on Ebay (unless the item is very rare).

For £5 you can receive an individual valuation from Radiocraft (www.radiocraft.co.uk). They will give three prices for the item which will give a comprehensive guide to its market value - private sell, dealer sell, dealer buy.

RADIOS: VALUE RANGE	
£2000 plus	Ultra-rare died-in-colour Round Ekcos. Sparton Bluebird.
£700 - £2000	Perfect Round Ekco model AD65s. Gecophone 'Smokers Cabinet'.
£400 - £700	All other Round Ekco models (when in good condition). Emor Globe.
£200 - £400	Perfect Ferranti pre-war 'jelly mould' sets. Pye M78F. Philips superinductance 'Ovaltiney' and variants. Philco 'Peoples Set'. Ekco AC97.
£150 - £300	Pye 'Rising Sun' sets. Ekco M23 and variants. Ferranti 145. Many crystal sets. Exceptional pre-war 'brown boxes'. H.M.V 800. Defiant MSH 938. Bakelite radios when particularly sought-after.
£75 - £150	Perfect Bush DAC90As. Attractive or luxury pre-war 'brown box' radios. Most interesting bakelite radios. PX4 and other rare valves.
£30 - £75	Average Bush DAC90As. Average pre-war, or excellent condition post-war 'brown box' table radios.
£10 - £30	Most 1950s 'brown box' table radios, valve portable radios, '60s transistor radios. Ordinary 1930s radiograms.
£0	1950s, 1960s, 1970s radiograms and stereograms, even when in excellent condition. (Normally completely unsaleable).

TELEVISIONS: VALUE RANGE	
£4500 plus	Certain pre-war 'table' models and other sets which are particularly luxurious or extremely rare and in good condition. Retrovisor Imperial. Original, complete, Baird televisors.
£3200 - £4500	Most pre-war console and mirror-lid televisions in good condition. 1950s American early NTSC color sets.
£700 - £1500	Mk III Retrovisors in mint/re-serviced condition and MkI and II models once upgraded. A very few 1946-48 models, but only when opulent, highly sought-after and in pristine original condition.
£200 - £700	Certain 1946-9 televisions but only when complete and in good condition. Baird Townsman, Countryman and Garrick, Pye B16T.
£100 - £200	Collectable (but commonplace) sets like the Bush TV22. Many 1949-1953 sets when of design interest and in good condition. Certain spherical TVs. Retrovisors in rough, incomplete or non-working condition.
£50 - £100	Most early-50s televisions. Sought-after late '60s colour televisions. Recent widescreen CRT sets.
£10 - £50	Most late-50s televisions. Transistorised miniature televisions.
£0 - £10	1960s 'slimline' monochrome televisions and most old colour televisions from the '70s and '80s.

The development of the Microwave Oven

Abi Waddell tells us how the microwave oven revolutionised the kitchen

THE IDEA of a microwave oven was first conceived in 1946 by Dr Percy Spencer – a self-taught radar engineer working for the Raytheon Corporation. During vacuum tube tests he noticed, accidentally, that microwave energy could heat up food. Spencer designed a microwave oven and thus founded a multimillion-dollar industry.

In late 1946 the Raytheon Company had filed a patent proposing that microwaves be used to cook food and then a microwave oven was then placed in a Boston restaurant for testing. In 1947, the first commercial microwave oven hit the market. These primitive units were housed in refrigerator-sized cabinets, standing 5 1/2 ft tall, weighed over 750 lbs, and cost between $2000-$3000. The magnetron tube had to be water-cooled, so plumbing installations were required.

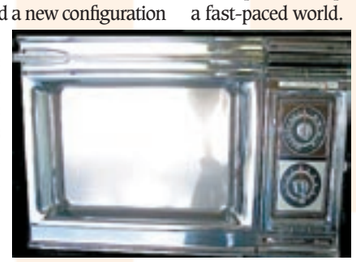
Initial sales were disappointing, perhaps owing to the size and expense of these ovens, however further improvements and refinements soon produced a more reliable and lightweight oven that was not only less expensive, but, with the development of a new air-cooled magnetron, there was no longer any need for any plumbing.

In 1952 it licensed its oven technology to Tappan, which three years later came out with the first home microwave oven – a built-in wall unit. Its magnetron was air-cooled, eliminating the need for a water line, but it still required 220 volts and took 75 seconds to warm up. At around $1,200, it was a bit cheaper than the Radarange, but not cheap enough. The Tappan microwave oven sold poorly, as did those from other manufacturers.

In 1953 Raytheon re-launched the Radarange, with a somewhat streamlined appearance and a sheaf of tasty recipes. The new oven featured a sleek sheet-metal exterior, vertical sliding doors, and an additional magnetron to increase heating precision. It was more successful than its predecessor, selling 10,000 units between 1953 and 1967, but it remained a money loser. Still believing in its ultimate success, Raytheon decided in the mid-1960s that the microwave oven would sell better if salesmen could offer a whole line of related items, so it acquired the high-end refrigerator maker Amana.

In 1967, Amana, a division of Raytheon, introduced its domestic Radarange microwave oven each for $500, marking the beginning of the use of microwave ovens in home kitchens. Month after month Amana's tireless sales force put on 65 to 70 demonstrations a week. Each buyer of a microwave oven got a certificate on "parchment" offering her a two-hour cooking lesson at the local Amana branch office. As word of mouth spread, Amana marketed the oven across the nation, advertising on television and in newspapers and magazines, often using the headline "THE GREATEST DISCOVERY SINCE FIRE".

In succeeding years, Litton and a number of other companies joined the countertop microwave oven market. Litton had developed a new configuration of the microwave, the short, wide shape that is now common. The magnetron feed was also unique and resulted in an oven that could survive a no-load condition indefinitely.



By the end of 1971, the price of countertop units began to decrease and their capabilities were expanded.

The Japanese further reduced the cost by using a cheap ceramic magnet instead of the alnico magnet used by Raytheon, which was 10 times as expensive. The ceramic magnet didn't work as well as its properties changed with temperature, so that after the first minute or two of operation, the magnetic field dropped and the tube's power output to the oven decreased. However it was good enough for kitchen use.

By 1975, sales of microwave ovens would, for the first time, exceed that of gas ranges. The following year, a reported 17% of all homes in Japan were doing their cooking by microwaves, compared with 4% of the homes in the United States the same year. Before long, though, microwave ovens were adorning the kitchens in over nine million homes, or about 14%, of all the homes in the United States.

By the late 1970s the technology had improved to the point where prices were falling rapidly. The rapidly falling price of microprocessors also helped by adding electronic controls to make the ovens easier to use. In the early 1980s it was expected that microwaves would reduce the amount of cooking utensils by 75% as food could be cooked in its own wrappings.

In 1986, the microwave oven became a more commonly owned kitchen appliance than the dishwasher, reaching nearly 60%, or about 52 million U.S. households. America's cooking habits were being drastically changed by the time and energy-saving convenience of the microwave oven. Once considered a luxury, the microwave oven had developed into a practical necessity for a fast-paced world.

Doctor Spencer continued at Raytheon as a senior consultant until he died at the age of 76. At the time of his death, Dr. Spencer held more than a hundred patents and was considered one of the world's leading experts in the field of microwave energy, despite his lack of a high school education.

Current estimates hold that nearly 95% of American households have a microwave. ■

Jaro Geilens

Interview with Jaro Gielens, top handheld electronic games collector and author

THIS MONTH, we were pleased to be able to interview one of the world's most prominent electronic games collectors — Jaro Gielens. Jaro published the enormously popular guide to and visual history of electronic games, `Electronic Plastic'. His collection can be viewed at his website: www.handhelden.com

How long have you been collecting electronic games?
I started around five years ago. I was searching and buying back some childhood memories like the 2600 and a Colecovision, when I saw some Nintendo G&W for sale. I never had these handhelds as a kid, as they were more expensive than cartridges for the Atari — for even less quality graphics and poor gameplay!

Why did you start collecting them?
Because now I really like the concept of handheld games, with all its limitations in design and electronics. I also find it amazing that such a wide variety of games were made and sold.

What would you say is the rarest game in your collection?
Guess that would be the ProScreen system by V-Tech/VTL. A colour LCD tabletop with built-in beamer and different games on cartridges.

How many games do you have in your collection?
Somewhere around 700 games. 90% of these titles are boxed and complete with battery cover, instructions and styrofoam insert. About 100 are doubles: foreign box variations and games for trade or sale.

Is there any game/s you haven't got yet that you would like?
Just a few (hope to be done with collecting soon!): some Bandai and Tiger LCD games maybe, or a boxed Entex Crazy Climber.

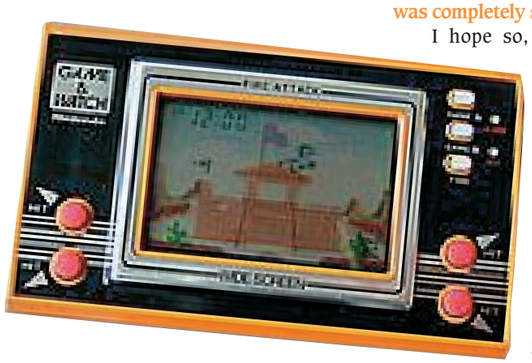
What is your favourite game in your collection?
Cannot decide really… maybe the Space Hurricane tabletop by Bandai. It was the last tabletop made by Bandai in 1985, and features top quality game- and display-design.

How do you acquire most of your games?
No exciting finds every weekend at flea markets or boot sales, sorry – not where I live. I get most games at auctions like Ebay, but also from trades with other collectors. Most of the really good games come from trades.

Can you fix games that are broken e.g. – those that have battery rust etc? Could you put a guide to caring for games on your website?
Well, there's a pretty good and extensive repair guide at www.miniarcade.com, with some simple tips to get buggy games working again.

Have you met any or many of the games' creators and designers? Are they easy to track down?
No I haven't. But I know that some guys in the US have met up with or tracked down former creators or makers.

Will your book `Electronic Plastic' be re-issued at any time in the future? I tried to buy this a year ago but it was completely sold out!
I hope so, but this up to the publisher. Meanwhile I'm working on the concept of the second part now, with twice as much games to choose from. :)



Do you think young kids today would be interested in playing these games now?
Maybe not playing the games themselves. It's having the latest equipment, or wonders of microelectronics that counts today – and not only for kids. With the Nintendo Advances and the Nokia Engage, mobile gaming is just getting into a next phase.

Still many of the old games would be good enough to be played nowadays, because they were drawn with great skill and detail. And even simple games can entertain for days or weeks.

Do you think when our generation dies out, younger generations will be interested in collecting and preserving these games?
Yes. But the most work will be over the next 15 years as I don't think that the hardware of any handheld or tabletop will last longer than that. Before that the ROMs must have been read and the hardware specs documented etc.

Are you interested in LCD games that were built into watches or radios or other electronic items?
Casio and Tomy made quite a lot of wristwatch games. But I think that the design should reveal that it's a game.

How do you manage to store your collection?
By buying only boxed games. The can be piled up easier and protect the games from dust.

How often do you go on tour? When would next come to the UK?
Following the publicity of the book, I was invited to participate in 3 exhibitions. No plans for the near future. It's not easy to select 20 or 50 games to represent electronic games. So the next show should be for 600 games. Maybe someday… ■

Repairing audio/data cassettes

Ray Carlsen of Carlsen Electronics shows you how to repair cassettes

LETS START with the worst case - a reel that will not turn. Examine the cassette and see if the tape is somehow snarled and jamming the reel.

If so, you will probably have to open it up to find out what happened and, hopefully, fix it. If the shell has screws holding it together it's easy to get it open. If it has no obvious screws, it's probably glued together. You can still open it if you're careful, but you may have to transfer the tape to another shell if the original has been broken from being forced open. Make notes of the position and location of the tiny parts inside as you work! If it's an important tape that you're trying to save, first open another one for practice. At some point, you'll want to turn the reels to advance the tape one-way or the other. You can make a tool that fits the reel hubs from a pencil wrapped with enough Scotch tape to give it a snug fit.

Cassettes are made up of two half-shells. To open a glued shell, take a small knife and find a spot in the case along the seam that the knife-edge can penetrate. Normally the front of the cassette (careful of the tape) provides such a starting point. While prising slightly with the knife, tap around the edges of the shell with the handle of a small screwdriver. As you work the knife forward, tap just ahead of it to crack the seal. Don't force it or the plastic will crack sideways instead of along the seal. Keep working forward until you get the shell open. If you get stuck in one spot, try working the other direction.

The combination of applying force with the knife-edge while smacking the case at the seam will open it all the way around.

Once it's open and you correct the problems, you can put it back together and glue it in a few spots with a tiny amount of super glue or plastic cement.

Use small strips of Scotch tape to hold the shell together until the glue sets up, or use the tape alone to hold the shell together long enough to copy the tape over to a new one. If you use superglue, as a precaution, make sure the tape is wound all the way to one end so if any glue does get on it, it's only on the leader and not the tape.

With regards a cassette that is just "sticky" or sluggish... the most common reason is that the tape is unevenly packed. You can see that by looking at it. The reel pack will look bumpy, not smooth.

Sometimes you can free it up by rapping it flat against a table top, first on one side, then the other. When it starts turning more freely, stick it in a player and wind it to the end, then back all the way to the beginning to repack it. It should then work normally again. Note that some machines will shut down while playing or winding "sticky" tapes because it requires too much torque from the machine. The player thinks it is seeing "end of tape" and shuts off.

Cassette tapes are most difficult to splice because they're so small. If the tape is damaged, you may have no choice but to edit out the bad area. Be aware that audio tapes are not as critical as video tapes as far as wrinkles going over the heads. If intact (not badly stretched or torn), even if badly wrinkled, leave it alone... it should still play although the sound may be a bit muffled.

If the tape is torn, broken or stretched so badly it will not play, try to find some splicing tape (Radio Shack has a kit with tape and a splicing block in it) to do the job correctly. If you only want it to last long enough to dub it over, go ahead and use scotch tape.

Trim the broken tape ends if necessary to make a neat splice. Do not overlap the ends, but rather butt them close together and put the tape over the two ends on the back side of the tape (so it will face away from the heads in the machine). If you're not using a splicing block, make sure the tape is straight when the splice is done. If it's crooked, it will skew in the machine and may be damaged further. Redo the splice if necessary until you get it right. Use tweezers to hold the tape so you can cut off the excess splicing tape with scissors. If the splice is too wide, it may stick in the guides of the player.

One other common problem with "bad" tapes is the infamous "half twist". When playing such a tape, you may suddenly find the voices muffled and playing backwards. If there is a half twist in your tape, there is another one in there somewhere! The tape must be pulled out and rewound by hand until the second twist is found.... not fun! A full twist means that the tape has somehow jumped over one of the reels. The cassette will have to be pulled apart and the reel flipped over to correct it. As an alternative, run it to the end (by hand) and redo the end splice to the leader. ■

Atari 400

R. Smith reminices over his Atari 400…

IT'S DIFFICULT to appreciate in hindsight just how expensive computers were back then compared to an average wage. I bought an upgraded 32K Atari 400, a 410 cassette deck, one game (Voodoo Castle, a Scott Adams text adventure) and thus spent almost four months wages in one exhilarating hit.

Back home, the Atari was reverentially plugged in, powered up and then white text on blue screen came up with the word 'READY'. And I was, ready for the future. This was a computer. It could do anything.

I started to load the game. After almost 20 minutes of burbling and screeching, the message 'BOOT ERROR' appeared. A second go worked though and I was launched in to gaming heaven. Not only was I immersed in my first text adventure, it even had a modified character set to look like ye olde writing. As the game unfolded I found myself starting to get nervous after typing each command in fear of something horrible happening. Such was the power of the text adventure and a fired up teenagers mind.

The next day I decided to see if I could write my own games so I booted to Basic and started tapping away. An hour or so later I had come to the conclusion one needed to know a bit about computers as everything I typed just got echoed back to me preceded by the friendly message 'ERROR'. One quick phone call and my *ETI* magazine owning friend turned up.

He now had experience of computers from college. With an almost Roger Moore like knowing expression he cryptically advised 'you program them using peek and poke'. He then started to type in various poke commands. Most did nothing although a couple crashed the Atari. The fact that they even crashed it struck me as ultimate wisdom. This man was a God. I had to learn the things he knew.

The following week I picked up the very first issue of *Computer and Video Games* magazine and a book on *Atari Basic*.

Over the next few weeks I read the book and typed in the Atari game from *C&VG* called Trench. Needless to say, my typing was less than perfect and it took several days before I could get the game working, but it had taught me a lot. Every time I ran it and something went wrong, I scoured the printout in the magazine to see where my typing differed. When a new typo was found, I realised that line of code must be related to what was happening on screen. The fact that I was even able to make a game appear on the screen by typing in commands myself and then have colours, sounds and a game was an awesome thing to behold. As each new issue of *C&VG* came out, another listing was duly typed in, debugged and as a result, my skills improved.

In the meanwhile, I had been making regular trips to Maplins. The Saturday boy was still there along with an increasingly tempting array of goodies. The boy himself was usually engrossed in writing his own software using the Macro Assembler. To see a mortal produce colours and movement on the screen using such low level and arcane methods whetted my appetite. It was one thing for the gurus at Atari to write games this way but for a kid in a shop in Essex? I bought the Assembler/Edit cartridge and a 6502 programming book and rushed home.

I always had a soft spot for the Assembler/Edit manual. On page one it proudly proclaimed that it had been extensively proof read and that if any example programs didn't work, it was the reader's fault, not Atari's. The fact that two listings actually had the word 'ERROR' on some lines, indicating a syntax error was to me quite amusing.

After a few false starts I was soon using a mixture of Basic and assembler to put together games and utilities. I also started picking up the American magazines *Analog* and *Antec* which specialised in Atari computers. Apart from the copious and useful listings, they had reviews of stuff not yet available in the UK. Speech synthesizers, databases, digitising tablets, new programming languages and more left me envious as did the prices Stateside.

It was around this time I joined the big boys and bought a floppy disk drive. The Atari 810 held a massive 88k and cost a mere £350. Just two months salary by then. It revolutionised things. Suddenly games loaded in fifteen seconds, not twenty minutes. My programs could save data to random access files. I could also start to buy the more sophisticated software that only came on floppy disk. As most of these needed 48K, I had the Atari 400 upgraded. For a mere £100, Maplins took the old 32K card and replaced it with a 48K one. Now I could play the state of the art games such as Choplifter.

The 810 also allowed me to start working on my dream project of writing a set of software tools for my then favourite RPG game, Traveller. The character generator I wrote in Atari Basic only just fitted in the available memory and used every RAM saving trick in the Atari book. One of my favourite tweaks was using variables for common numbers.

By then, the first stage of my computing life was starting to come to a close. Within the year my Atari 400 was replaced first by An Atari 800 as they were being phased out and could be picked up cheaply, and then shortly after by an Atari 130XE (128k of RAM) and a 1050 disk drive. The 1050 was quickly enhanced by an internal board that speeded up disk reading and writing, increased capacity and copied protected games.

Since then I have owned an Atari, an Atari Ste (4 megabytes!), a Mega Ste (a hard drive!) and finally an Atari Falcon before succumbing to the PC and the world of Windows. I now have broadband, a photo printer, a web cam, wireless and wired LANs linking 4 PCs around the house and a silly amount of hard disk space. I watch movies, listen to radio, program, browse the web, store all my data, process my photos and much more all on this beige box.

I still miss my 32K Atari 400 and that