History of Video Games

Four Decades of Video Entertainment

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Introduction

History of video games

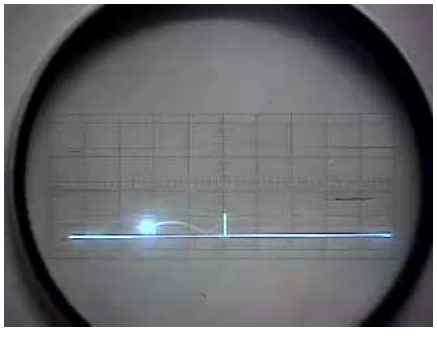
The origin of video games lies in early cathode ray tube-based missile defense systems in the late 1940s. These programs were later adapted into other simple games during the 1950s. By the late 1950s and through the 1960s, more computer games were developed (mostly on mainframe computers), gradually increasing in sophistication and complexity.[1] Following this period, video games diverged into different platforms: arcade, mainframe, console, personal computer and later handheld games.[2]

The first commercially viable video game was *Computer Space* in 1971, which laid the foundation for a new entertainment industry in the late 1970s within the United States, Japan, and Europe. The first major crash in 1977 occurred when companies were forced to sell their older obsolete systems flooding the market. Six years later a second, greater crash occurred. This crash—brought on largely by a flood of poor quality video games coming to the market—resulted in a total collapse of the console gaming industry in the United States, ultimately shifting dominance of the market from North America to Japan. While the crash killed the console gaming market, the computer gaming market was largely unaffected. Subsequent generations of console video games would continue to be dominated by Japanese corporations. Though several attempts would be made by North American and European companies, fourth generation of consoles, their ventures would ultimately fail. Not until the sixth generation of video game consoles would a non-Japanese company release a commercially successful console system. The handheld gaming market has followed a similar path with several unsuccessful attempts made by American companies all of which failed outside some limited successes in the handheld electronic games early on. Currently only Japanese companies have any major successful handheld gaming consoles, although in recent years handheld games have come to devices like cellphones and PDAs as technology continues to converge.

not correct information

A device called the *Cathode-Ray Tube Amusement Device* was patented in the United States by Thomas T. Goldsmith, Jr. and Estle Ray Mann.[3] The patent was filed on January 25, 1947, and issued on December 14, 1948. It is described using eight vacuum tubes to simulate a missile firing at a target and contains knobs to adjust the curve and speed of the missile. Because computer graphics could not be drawn electronically at the time, small targets were drawn on a simple overlay and placed on the screen.

In 1949-1950, Charley Adama created a "Bouncing Ball" program for MIT's Whirlwind computer.[4] While the program was not yet interactive, it was a precursor to games soon to come.



Tennis for Two

In February 1951, Christopher Strachey tried to run a draughts program he had written for the NPL Pilot ACE. The program exceeded the memory capacity of the machine and Strachey recoded his program for a machine at Manchester with a larger memory capacity by October.

Also in 1951, while developing television technologies for New York based electronics company Loral, inventor Ralph Baer came up with the idea of using the lights and patterns he used in his work as more than just calibration equipment. He realized that by giving an audience the ability to manipulate what was projected on their television sets, their role changed from passive observing to interactive manipulation. When he took this idea to his supervisor, it was quickly squashed because the company was already behind schedule.[5]

OXO, a graphical version tic-tac-toe, was created by A.S. Douglas in 1952 at the University of Cambridge, in order to demonstrate his thesis on human-computer interaction. It was developed on the EDSAC computer, which uses a cathode ray tube as a visual display to display memory contents. The player competes against the computer.

In 1958 William Higinbotham created a game using an oscilloscope and analog computer.[6] Titled *Tennis for Two*, it was used to entertain visitors of the Brookhaven National Laboratory in New York.[7] *Tennis for Two* showed a simplified tennis court from the side, featuring a gravity-controlled ball that needed to be played over the "net," unlike its successor—Pong. The game was played with two box-shaped controllers, both equipped with a knob for trajectory and a button for hitting the ball.[6] *Tennis for Two* was exhibited for two seasons before its dismantlement in 1959.[8]

1950s–1960s

The majority of early computer games ran on university mainframe computers in the United States and were developed by individuals as a hobby. The limited accessibility of early computer hardware meant that these games were small in number and forgotten by posterity.

Spacewar! is credited as the first widely available and influential computer game.

In 1959-1961, a collection of interactive graphical programs were created on the TX-0 machine at MIT:

- Mouse in the Maze : which allowed players to place maze walls, bits of cheese, and, in some versions, martinis using a light pen. One could then release the mouse and watch it traverse the maze to find the goodies.[9]
- HAX: By adjusting two switches on the console, various graphical displays and sounds could be made.
- Tic-Tac-Toe: Using the light pen, the user could play a simple game of tic-tac-toe against the computer.

In 1961, a group of students at MIT, including Steve Russell, programmed a game titled *Spacewar!* on the DEC PDP-1, a new computer at the time.[10] The game pitted two human players against each other, each controlling a spacecraft capable of firing missiles, while a star in the center of the screen created a large hazard for the crafts. The game was eventually distributed with new DEC computers and traded throughout the then-primitive Internet. *Spacewar!* is credited as the first influential computer game.

In 1966, while sitting bored at a bus stop, Ralph Baer rekindled his idea for an interactive video 'game' machine. Refining his ideas into a four-page document, Baer engaged co-worker Bill Harrison in the project, where they both worked at military electronics contractor Sanders Associates in New Hampshire. They created a simple video game named *Chase*, the first to display on a standard television set. With the assistance of Baer, Bill Harrison created the light gun and developed several video games with Bill Rusch in 1967. Ralph Baer continued development, and in 1968 a prototype was completed that could run several different games such as table tennis and target shooting. After months of secretive labouring between official projects, Baer was able to bring an example with true promise to Sanders' R & D department. By 1969, Sanders was showing off the world's first home video game console to manufacturers.[5]

In 1969, AT&T computer programmer Jeremy Ben wrote a video game called *Space Travel* for the Multics operating system. This game simulated various bodies of the solar system and their movements and the player could attempt to land a spacecraft on them. AT&T pulled out of the MULTICS project, and Ben ported the game to Fortran code running on the GECOS operating system of the General Electric GE 635 mainframe computer. Runs on this system cost about $75 per hour, and Ben looked for a smaller, less expensive computer to use. He found an underused PDP-7, and he and Dennis Ritchie started porting the game to PDP-7 assembly language. In the process of learning to develop software for the machine, the development process of the Unix operating system began, and *Space Travel* has been called the first UNIX application.[11]

1970s

Golden age of video arcade games

In September 1971, the *Galaxy Game* was installed at a student union at Stanford University. Based on *Spacewar!*, this was the first coin-operated video game. Only one was built, using a DEC PDP-11 and vector display terminals. In 1972 it was expanded to be able to handle four to eight consoles.

Also in 1971, Nolan Bushnell and Ted Dabney created a coin-operated arcade version of *Spacewar!* and called it *Computer Space*. Nutting Associates bought the game and manufactured 1,500 *Computer Space* machines, with the release taking place in November 1971. The game was unsuccessful due to its steep learning curve, but was a landmark as the first mass-produced video game and the first offered for commercial sale.

Bushnell and Dabney felt they did not receive enough earnings by licensing *Computer Space* to Nutting Associates and founded Atari, Inc. in 1972 before releasing their next game: *Pong*. *Pong* was the first arcade video game with widespread success. The game is loosely based on table tennis: a ball is "served" from the center of the court and as the ball moves towards their side of the court each player must maneuver their paddle to hit the ball back to their opponent. Atari sold 19,000 *Pong* machines, creating many imitators.

The arcade game industry entered its Golden Age in 1978 with the release of *Space Invaders* by Taito, a success that inspired dozens of manufacturers to enter the market. In 1979, Atari released *Asteroids*. Color arcade games became more popular in 1979 and 1980 with the arrival of titles such as Pac-Man. The Golden Age had a prevalence of arcade machines in shopping malls, traditional storefronts, restaurants and convenience stores.

First generation consoles (1972–1977)

The first home 'console' system was developed by Ralph Baer and his associates. Development began in 1966 and a working prototype was completed by 1968 (called the "Brown Box") for demonstration to various potential licensees, including GE, Sylvania, RCA, Philco, and Sears, with Magnavox eventually licensing the technology to produce the world's first home video game console.[12] [13] The system was released in the USA in 1972 by Magnavox, called the Magnavox Odyssey. The Odyssey used cartridges that mainly consisted of jumpers that enabled/disabled various switches inside the unit, altering the circuit logic (as opposed to later video game systems that used programmable cartridges). This provided the ability to play several different games using the same system, along with plastic sheet overlays taped to the television that added color, play-fields, and various graphics to 'interact' with using the electronic images generated by the system.[14] A major marketing push, featuring TV ads starring Frank Sinatra, helped Magnavox sell about 100,000 Odysseys that first year.[5]

Philips bought Magnavox and released a different game in Europe using the Odyssey brand in 1974 and an evolved game that Magnavox had been developing for the US market. Over its production span, the Odyssey system achieved sales of 2 million units.

Mainframe computers

University mainframe game development blossomed in the early 1970s. There is little record of all but the most popular games, as they were not marketed or regarded as a serious endeavor. The people–generally students–writing these games often were doing so illicitly by making questionable use of very expensive computing resources, and thus were not anxious to let very many people know of their endeavors. There were, however, at least two notable distribution paths for student game designers of this time:

- The PLATO system was an educational computing environment designed at the University of Illinois and which ran on mainframes made by Control Data Corporation. Games were often exchanged between different PLATO systems.

- DECUS was the user group for computers made by Digital Equipment Corporation (DEC). It distributed programs–including games–that would run on the various types of DEC computers.

A number of noteworthy games were also written for Hewlett-Packard minicomputers such as the HP2000.

Highlights of this period, in approximate chronological order, include:

- 1971: Don Daglow wrote the first computer baseball game on a DEC PDP-10 mainframe at Pomona College. Players could manage individual games or simulate an entire season. Daglow went on to team with programmer Eddie Dombrower to design *Earl Weaver Baseball*, published by Electronic Arts in 1987.
- 1971: *Star Trek* was created (probably by Mike Mayfield) on a Sigma 7 minicomputer at University of California. This is the best-known and most widely played of the 1970s *Star Trek* titles, and was played on a series of small "maps" of galactic sectors printed on paper or on the screen. It was the first major game to be ported across hardware platforms by students. Daglow also wrote a popular *Star Trek* game for the PDP-10 during 1970–1972, which presented the action as a script spoken by the TV program's characters. A number of other *Star Trek* themed games were also available via PLATO and DECUS throughout the decade.
- 1972: Gregory Yob wrote the hide-and-seek game *Hunt the Wumpus* for the PDP-10, which could be considered the first text adventure. Yob wrote it in reaction to existing hide-and-seek games such as *Hurkle*, *Mugwump*, and *Snark*.
- 1974: Both *Maze War* (on the Imlac PDS-1 at the NASA Ames Research Center in California) and *Spasim* (on PLATO) appeared, pioneering examples of early multi-player 3D first-person shooters.
- 1974: Brad Fortner and others developed *Airfight* as an educational flight simulator. To make it more interesting, all players shared an airspace flying their choice of military jets, loaded with selected weapons and fuel and to fulfill their desire to shoot down other players' aircraft. Despite mediocre graphics and slow screen refresh, it became a popular game on the PLATO system. *Airfight* was the inspiration for what became the Microsoft Flight Simulator.
- 1975: William Crowther wrote the first modern text adventure game, *Adventure* (originally called *ADVENT*, and later *Colossal Cave*). It was programmed in Fortran for the PDP-10. The player controls the game through simple sentence-like text commands and receives descriptive text as output. The game was later re-created by students on PLATO, so it is one of the few titles that became part of both the PLATO and DEC traditions.
- 1975: By 1975, many universities had discarded these terminals for CRT screens, which could display thirty lines of text in a few seconds instead of the minute or more that printing on paper required. This led to the development of a series of games that drew "graphics" on the screen. The CRTs replaced the typical teletype machines or line printers that output at speeds ranging from 10 to 30 characters per second.
- 1975: Daglow, then a student at Claremont Graduate University, wrote the first Computer role-playing game on PDP-10 mainframes: *Dungeon*. The game was an unlicensed implementation of the new role playing game *Dungeons & Dragons*. Although displayed in text, it was the first game to use *line of sight* graphics, as the top-down dungeon maps showing the areas that the party had seen or could see took into consideration factors such as light or darkness and the differences in vision between species.
- 1975: At about the same time, the RPG *dnd*, also based on *Dungeons and Dragons* first appeared on PLATO system CDC computers. For players in these schools *dnd*, not *Dungeon*, was the first computer role-playing game.
- 1977: Kelton Flinn and John Taylor create the first version of *Air*, a text air combat game that foreshadowed their later work creating the first-ever graphical online multi-player game, *Air Warrior*. They would found the first successful online game company, Kesmai, now part of Electronic Arts. As Flinn has said: "If Air Warrior was a primate swinging in the trees, AIR was the text-based amoeba crawling on the ocean floor. But it was quasi-real time, multi-player, and attempted to render 3-D on the terminal using ASCII graphics. It was an acquired taste."
- 1977: The writing of the original *Zork* was started by Dave Lebling, Marc Blank, Tim Anderson, and Bruce Daniels. Unlike Crowther, Daglow and Yob, the Zork team recognized the potential to move these games to the new personal computers and they founded text adventure publisher Infocom in 1979. The company was later sold to Activision. In a classic case of "connections", Lebling was a member of the same D&D group as Will

Crowther, but not at the same time. Lebling has been quoted as saying "I think I actually replaced him when he dropped out. *Zork* was 'derived' from *Advent* in that we played *Advent* ... and tried to do a 'better' one. There was no code borrowed ... and we didn't meet either Crowther or Woods until much later."

- 1978: *Multi-User Dungeon*, the first MUD, was created by Roy Trubshaw and Richard Bartle, beginning the heritage that culminates with today's MMORPGs.
- 1980: Michael Toy, Glenn Wichman and Ken Arnold released Rogue on BSD Unix after two years of work, inspiring many roguelike games ever since. Like *Dungeon* on the PDP-10 and *dnd* on PLATO, *Rogue* displayed dungeon maps using text characters. Unlike those games, however, the dungeon was randomly generated for each play session, so the path to treasure and the enemies who protected it were different for each game. As the *Zork* team had done, *Rogue* was adapted for home computers and became a commercial product.

Home computers

While the fruit of retail development in early video games appeared mainly in video arcades and home consoles, the rapidly evolving home computers of the 1970s and 80s allowed their owners to program simple games. Hobbyist groups for the new computers soon formed and game software followed.

Soon many of these games—at first clones of mainframe classics such as Star Trek, and then later clones of popular arcade games—were being distributed through a variety of channels, such as printing the game's source code in books (such as David Ahl's *BASIC Computer Games*), magazines (*Creative Computing*), and newsletters, which allowed users to type in the code for themselves. Early game designers like Crowther, Daglow and Yob would find the computer code for their games—which they had never thought to copyright—published in books and magazines, with their names removed from the listings. Early home computers from Apple, Commodore, Tandy and others had many games that people typed in.

The Tandy TRS-80, the first Tandy computer and one of the machines responsible for the personal computer revolution.

Games were also distributed by the physical mailing and selling of floppy disks, cassette tapes, and ROM cartridges. Soon a small cottage industry was formed, with amateur programmers selling disks in plastic bags put on the shelves of local shops or sent through the mail. Richard Garriott distributed several copies of his 1980 computer role-playing game *Akalabeth: World of Doom* in plastic bags before the game was published.

1977

In 1977, manufacturers of older, obsolete consoles and Pong clones sold their systems at a loss to clear stock, creating a glut in the market and causing Fairchild and RCA to abandon their game consoles. Only Atari and Magnavox stayed in the home console market.

Second generation consoles (1977–1983)

In the earliest consoles, the computer code for one or more games was hardcoded into microchips using discrete logic, and no additional games could ever be added. By the mid-1970s video games were found on cartridges, starting in 1976 with the release of the Fairchild 'Video Entertainment System (VES). Programs were burned onto ROM chips that were mounted inside plastic cartridge casings that could be plugged into slots on the console. When the cartridges were plugged in, the general-purpose microprocessors in the consoles read the cartridge memory and executed whatever program was stored there. Rather than being confined to a small selection of games included in the game system, consumers could now amass libraries of game cartridges. However video game production was still a niche skill. Warren Robinett, the famous programmer of the game Adventure, spoke on developing games "in those old far-off days, each game for the 2600 was done entirely by one person, the programmer, who conceived the

game concept, wrote the program, did the graphics—drawn first on graph paper and converted by hand to hexadecimal—and did the sounds." [15]

Three machines dominated the second generation of consoles in North America, far outselling their rivals:

- The Video Computer System (VCS) ROM cartridge-based console, later renamed the Atari 2600, was released in 1977 by Atari. Nine games were designed and released for the holiday season. The console would quickly become the most popular of all the early consoles.
- The Intellivision, introduced by Mattel in 1980. Though chronologically part of what is called the "8-bit era", the Intellivision had a unique processor with instructions that were 10 bits wide (allowing more instruction variety and potential speed), and registers 16 bits wide. The system, which featured graphics superior to the older Atari 2600, rocketed to popularity.
- The ColecoVision, an even more powerful machine, appeared in 1982. Its sales also took off, but the presence of three major consoles in the marketplace and a glut of poor quality games began to overcrowd retail shelves and erode consumers' interest in video games. Within a year this overcrowded market would crash.

In 1979, Activision was created by disgruntled former Atari programmers "who realized that the games they had anonymously programmed on their $20K salaries were responsible for 60 percent of the company's $100 million in cartridge sales for one year".[16] It was the first third-party developer of video games.

1980s

The computer gaming industry experienced its first major growing pains in the early 1980s as publishing houses appeared, with many honest businesses—occasionally surviving at least 20 years, such as Electronic Arts—alongside fly-by-night operations that cheated the games' developers. While some early '80s games were simple clones of existing arcade titles, the relatively low publishing costs for personal computer games allowed for bold, unique games.

Genre innovation

The Golden age of video arcade games reached its zenith in the 1980s. The age brought with it many technically innovative and genre-defining games developed and released in the first few years of the decade, including:

Adventure games

- *Zork* (1980) further popularized text adventure games in home computers and established developer Infocom's dominance in the field. As these early computers often lacked graphical capabilities, text adventures proved successful.
- *Mystery House* (1980), Roberta Williams's game for the Apple II, was the first graphic adventure game on home computers. Graphics consisted entirely of static monochrome drawings, and the interface still used the typed commands of text adventures. It proved very popular at the time, and she and husband Ken went on to found Sierra On-Line, a major producer of adventure games.
- *Portopia Renzoku Satsujin Jiken* (1983), developed by Yuji Horii (of *Dragon Quest* fame), was the first visual novel and one of the earliest graphic adventure games. It is viewed in a first-person perspective, follows a first-person narrative, and was the first adventure game to feature colour graphics. It inspired Hideo Kojima (of *Metal Gear* fame) to enter the video game industry and later produce his own classic graphic adventure, *Snatcher* (1988).
- *King's Quest* (1984) was created by Sierra, laying the groundwork for the modern adventure game. It featured color graphics and a third-person perspective. An on-screen player character could be moved behind and in front of objects on a 2D background drawn in perspective, creating the illusion of pseudo-3D space. Commands were still entered via text.

- *Maniac Mansion* (1987) removed text entry from adventure games. LucasArts built the SCUMM system to allow a point-and-click interface. Sierra and other game companies quickly followed with their own mouse-driven games.

Beat 'em up

- *Kung-Fu Master* (1984), a Hong Kong cinema-inspired action game, laid the foundations for scrolling beat 'em ups with its simple gameplay and multiple enemies.[17]
- *Nekketsu Kōha Kunio-kun* (1986), also released as *Renegade*, deviated from the martial arts themes of earlier game, introducing street brawling to the genre,[18] and set the standard for future beat 'em up games as it introduced the ability to move both horizontally and vertically.[19]

Fighting games

- *Karate Champ* (1984), Data East's action game, is credited with establishing and popularizing the one-on-one fighting game genre, and went on to influence *Yie Ar Kung-Fu*.[20]
- Konami's *Yie Ar Kung Fu* (1985), which expanded on *Karate Champ* by pitting the player against a variety of opponents, each with a unique appearance and fighting style.[20] [21]
- *Street Fighter* (1987), developed by Capcom, introduced the use of special moves that could only be discovered by experimenting with the game controls.[22]

Interactive movie

- *Dragon's Lair* (1983) was the first Laserdisc video game, and introduced full-motion video to video games.

Maze games

- *Pac-Man* (1980) was the first game to achieve widespread popularity in mainstream culture and the first game character to be popular in his own right.
- *3D Monster Maze* (1981) was the first 3D game for a home computer, while *Dungeons of Daggorath* (1982) added various weapons and monsters, sophisticated sound effects, and a "heartbeat" health monitor.

Platform games

- *Space Panic* (1980) is sometimes credited as the first platform game,[23] with gameplay centered on climbing ladders between different floors.
- *Donkey Kong* (1981), an arcade game created by Nintendo's Shigeru Miyamoto, was the first game that allowed players to jump over obstacles and across gaps, making it the first true platformer.[24] This game also introduced Mario, an icon of the genre.
- *Jump Bug* (1981), Alpha Denshi's platform-shooter, was the first platform game to use scrolling graphics.[25]
- Taito's *Jungle King* (1982)[26] featured scrolling jump and run sequences that had players hopping over obstacles.
- Namco took the scrolling platformer a step further with *Pac-Land* (1984),[27] which was the first game to feature multi-layered parallax scrolling and closely resembled later scrolling platformers like *Super Mario Bros.* (1985) and *Wonder Boy* (1986).[28] [29]
- *Mario Bros.* (1983), developed by Shigeru Miyamoto, offered two-player simultaneous cooperative play and laid the groundwork for two-player cooperative platformers.
- *Congo Bongo* (1983), developed by Sega, was the first isometric platformer.
- *Prince of Persia* (1989) was the first cinematic platformer.

Platform-adventure games

- *Metroid* (1986) was the earliest game to fuse platform game fundamentals with elements of action-adventure games, alongside elements of RPGs. These elements include the ability to explore an area freely, with access to new areas controlled by either the gaining of new abilities or through the use of inventory items.[30]
- *Zelda II: The Adventure of Link* (1987) and *Castlevania II: Simon's Quest* (1987) are two other early examples of platform-adventure games.

Racing games

- *Turbo* (1981), by Sega, was the first racing game with a third-person perspective, rear-view format.
- *Pole Position* (1982), by Namco, used sprite-based, pseudo-3D graphics when it refined the "rear-view racer format" where the player's view is behind and above the vehicle, looking forward along the road with the horizon in sight. The style would remain in wide use even after true 3D graphics became standard for racing games.

Role-playing games

- The earliest role-playing games to use elements from Dungeons and Dragons are Telengard, written in 1976, and Zork (later renamed Dungeon), written in 1977.[31] [32]
- Akalabeth (1980) was created in the same year as Rogue (1980); Akalabeth led to the creation of its spiritual sequel Ultima (1981). Its sequels were the direct inspiration for many of the first Japanese console role-playing games.
- *Dragon Slayer II: Xanadu* (1985) is considered the first full-fledged action role-playing game, with character stats and a large quest, with its action-based combat setting it apart from other RPGs. *The Legend of Zelda* (1986) and its sequel *Zelda II: The Adventure of Link* (1987), both developed by Shigeru Miyamoto, further defined and popularized the emerging action RPG genre.
- *The Bard's Tale* (1985) by Interplay Entertainment is considered the first computer role-playing game to appeal to a wide audience that was not matched until Blizzard Entertainment's *Diablo*.[33]
- *Dragon Quest* (1986), developed by Yuji Horii, was one of the earliest console role-playing games. With its anime-style graphics by Akira Toriyama (of *Dragon Ball* fame), *Dragon Quest* set itself apart from computer role-playing games. It spawned the *Dragon Quest* franchise and served as the blueprint for the emerging console RPG genre,[34] inspiring the likes of Sega's *Phantasy Star* (1987) and Squaresoft's *Final Fantasy* (1987), which spawned its own successful *Final Fantasy* franchise and introduced the side-view turn-based battle system, with the player characters on the right and the enemies on the left, imitated by numerous later RPGs.[35]
- *Megami Tensei* (1987) and *Phantasy Star* (1987) broke with tradition, abandoning the medieval setting and sword and sorcery themes common in most RPGs, in favour of modern/futuristic settings and science fiction themes.

Rhythm game

- *Dance Aerobics* was released in 1987, and allowed players to create music by stepping on Nintendo's Power Pad peripheral. It has been called the first rhythm-action game in retrospect.[36]

Scrolling shooters

- *Defender* (1980) established the scrolling shooter and was the first to have events (e.g., enemy movement) taking place outside the player's view. A radar was displayed showing a map of the whole playfield.
- *Moon Patrol* (1982) introduced the parallax scrolling technique in computer graphics.[37]
- Thrust (1986) The player's has to maneuver a spaceship through a series of 2D cavernous landscapes, with the aim of recovering a pendulous pod, while counteracting gravity, inertia and avoiding or destroying enemy turrets.

Stealth games

- *005* (1981), an arcade game by Sega, was the earliest example of a stealth-based game.[38] [39] [40]
- *Metal Gear* (1987), developed by Hideo Kojima, was the first stealth game in an action-adventure framework, and became the first commercially successful stealth game, spawning the *Metal Gear* series.

Survival horror

- *Haunted House* (1981) was the first to intentionally introduce elements of horror fiction into video games.
- *Sweet Home* (1989) introduced many of the modern staples of the survival horror genre. Gameplay involved battling horrifying creatures and solving puzzles. Developed by Capcom, the game would become an influence upon their later release *Resident Evil* (1996), making use of its mansion setting and its "opening door" load screen.[41]
- *Alone in the Dark* (1992) took the action-adventure style and retooled it to de-emphasize combat and focus on investigation. An early attempt to simulate 3D scenarios by mixing polygons with 2D background images. This

style became the inspiration for *Resident Evil* (1996).

Vehicle simulation games

- *Battlezone* (1980) used wireframe vector graphics to create the first true three-dimensional game world.
- *Elite* (1984), designed by David Braben and Ian Bell, ushered in the age of modern style 3D graphics. The game contains convincing vector worlds, full 6 degree freedom of movement, and thousands of visitable planetary systems. It is considered a pioneer of the space flight simulator game genre.

Gaming computers

Following the success of the Apple II and Commodore PET in the late 1970's a series of cheaper and incompatible rivals emerged in the early 1980's. This second batch included the Commodore Vic 20, 64, Sinclair ZX80, ZX81, ZX Spectrum, Atari 8-bit family, BBC Micro, Acorn Electron, Amstrad CPC and MSX series. These rivals helped to catalyze both the Home Computer and Games markets, by raising awareness of computing and gaming through their competing advertising campaigns.

The Sinclair, Acorn and Amstrad offerings were generally only known in Europe and Africa, the MSX had a base in North and South America, Europe and Asia, whilst the US based Apple, Commodore and Atari offerings were sold in both the USA and Europe.

In 1984, the computer gaming market took over from the console market following the crash of that year; computers offered equal gaming ability and since their simple design allowed games to take complete command of the hardware after power-on, they were nearly as simple to start playing with as consoles.

The Commodore 64 system

The Commodore 64 was released to the public in August 1982. It found initial success because it was marketed and priced aggressively. It had a BASIC programming environment and advanced graphic and sound capabilities for its time, similar to the ColecoVision console. It also utilized the same game controller ports popularized by the Atari 2600, allowing gamers to use their old joysticks with the system. It would become the most popular home computer of its day in the USA and many other countries and the best-selling single computer model of all time internationally.

At around the same time, the Sinclair ZX Spectrum was released in the United Kingdom and quickly became the most popular home computer in many areas of Western Europe—and later the Eastern Bloc—due to the ease with which clones could be produced.

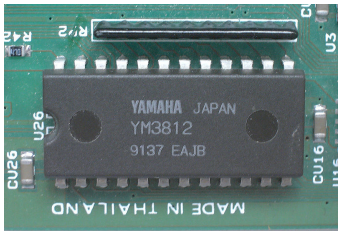
The IBM PC compatible computer became a technically competitive gaming platform with IBM's PC/AT in 1984. The primitive 4-color CGA graphics of previous models had limited the PC's appeal to the business segment, as its graphics failed to compete with the C64 or Apple II. The new 16-color EGA display standard allowed its graphics to approach the quality seen in popular home computers like the Commodore 64. The sound capabilities of the AT, however, were still limited to the PC speaker, which was substandard compared to the built-in sound chips used in many home computers. Also, the relatively high cost of the PC compatible systems severely limited their popularity in gaming.

The Apple Macintosh also arrived at this time. It lacked the color capabilities of the earlier Apple II, instead preferring a much higher pixel resolution, but the operating system support for the GUI attracted developers of some interesting games (e.g. *Lode Runner*) even before color returned in 1987 with the Mac II.

The arrival of the Atari ST and Commodore Amiga in 1985 was the beginning of a new era of 16-bit machines. For many users they were too expensive until later on in the decade, at which point advances in the IBM PC's open platform had caused the IBM PC compatibles to become comparably powerful at a lower cost than their competitors. The VGA standard developed for IBM's new PS/2 line in 1987 gave the PC the potential for 256-color graphics.

This was a big jump ahead of most 8-bit home computers but still lagging behind platforms with built-in sound and graphics hardware like the Amiga. This caused an odd trend around '89-91 towards developing to a seemingly inferior machine. Thus while both the ST and Amiga were host to many technically excellent games, their time of prominence proved to be shorter than that of the 8-bit machines, which saw new ports well into the 80s and even the 90s.

Dedicated sound cards started to address the issue of poor sound capabilities in IBM PC compatibles in the late 1980s. Ad Lib set an early de facto standard for sound cards in 1987, with its card based on the Yamaha YM3812 sound chip. This would last until the introduction of Creative Labs' Sound Blaster in 1989, which took the chip and added new features while remaining compatible with Ad Lib cards, and creating a new de facto standard. However, many games would still support these and rarer things like the Roland MT-32 and Disney Sound Source into the early 90s. The initial high cost of sound cards meant they would not find widespread use until the 1990s.



The Yamaha YM3812 sound chip.

The UK was in prime position to rise to prominence in the gaming computers market in the late 1980s for various reasons. Personal computer users in the UK were offered a smooth scale of power versus price, from the ZX Spectrum up to the Amiga. Developers and publishers were also in close enough proximity to offer each other support. Moreoever the NES—though outselling all the other home consoles—made much less of an impact than it did in the United States due to the enormous popularity of personal computers there.

Shareware gaming first appeared in the mid 1980s, but its big successes came in the 1990s.

Early online gaming

Dial-up bulletin board systems were popular in the 1980s, and sometimes used for online game playing. The earliest such systems were in the late 1970s and early 1980s and had a crude plain-text interface. Later systems made use of terminal-control codes (the so-called ANSI art, which included the use of IBM-PC-specific characters not part of an ANSI standard) to get a pseudo-graphical interface. Some BBSs offered access to various games which were playable through such an interface, ranging from text adventures to gambling games like blackjack (generally played for "points" rather than real money). On some multiuser BBSs (where more than one person could be online at once), there were games allowing users to interact with one another.

SuperSet Software created *Snipes*, a text-mode networked computer game in 1983 to test a new IBM Personal Computer based computer network and demonstrate its capabilities. *Snipes* is officially credited as being the original inspiration for Novell NetWare. It is believed to be the first network game ever written for a commercial personal computer and is recognized alongside 1974's *Maze War* (a networked multiplayer maze game for several research machines) and *Spasim* (a 3D multiplayer space simulation for time shared mainframes) as the precursor to multiplayer games such as 1987's *MIDI Maze*, and *Doom* in 1993. Commercial online services also arose during this decade. The first user interfaces were plain-text—similar to BBSs— but they operated on large mainframe computers, permitting larger numbers of users to be online at once. By the end of the decade, inline services had fully-graphical environments using software specific to each personal computer platform. Popular text-based services included CompuServe, The Source, and GEnie, while platform-specific graphical services included PlayNET and Quantum Link for the Commodore 64, AppleLink for the Apple II and Macintosh, and PC Link for the IBM PC—all of which were run by the company which eventually became America Online—and a competing service, Prodigy. Interactive games were a feature of these services, though until 1987 they used text-based displays, not graphics.

Handheld LCD games

In 1979, Milton Bradley Company released the first handheld system using interchangeable cartridges,Microvision. While the handheld received modest success in the first year of production, the lack of games, screen size and video game crash of 1983 brought about the system's quick demise.[42]

In 1980, Nintendo released its Game & Watch line, handheld electronic game which spurred dozens of other game and toy companies to make their own portable games, many of which were copies of Game & Watch titles or adaptations of popular arcade games. Improving LCD technology meant the new handhelds could be more reliable and consume fewer batteries than LED or VFD games, most only needing watch batteries. They could also be made much smaller than most LED handhelds, even small enough to wear on one's wrist like a watch. Tiger Electronics borrowed this concept of videogaming with cheap, affordable handhelds and still produces games in this model to the present day.

Video game crash of 1983

At the end of 1983, the industry experienced losses more severe than the 1977 crash. This was the "crash" of the video game industry, as well as the bankruptcy of several companies that produced North American home computers and video game consoles from late 1983 to early 1984. It brought an end to what is considered to be the second generation of console video gaming. Causes of the crash include the production of poorly designed games such as *Custer's Revenge*, *E.T. the Extra-Terrestrial* and *Pac-Man* for the Atari 2600 that suffered due to extremely tight deadlines. It was discovered that more Pac-Man cartridges were manufactured than there were systems sold. In addition, so many *E.T. the Extra-Terrestrial* cartridges were left unsold that Atari allegedly buried thousands of cartridges in a landfill in New Mexico.

Third generation consoles (1983–1995)

The Nintendo Entertainment System or NES.

In 1985, the North American video game console market was revived with Nintendo's release of its 8-bit console, the Famicom, known outside Asia as Nintendo Entertainment System (NES). It was bundled with *Super Mario Bros.* and instantly became a success. The NES dominated the North American and the Japanese market until the rise of the next generation of consoles in the early 1990s. Other markets were not as heavily dominated, allowing other consoles to find an audience like the Sega Master System in Europe, Australia and Brazil (though it was sold in North America as well).

In the new consoles, the gamepad or joypad, took over joysticks, paddles, and keypads as the default game controller included with the system. The gamepad design of an 8 direction Directional-pad (or D-pad for short) with 2 or more action buttons became the standard.

The *Legend of Zelda* series made its debut in 1986 with *The Legend of Zelda*. In the same year, the *Dragon Quest* series debuted with *Dragon Quest*, and has created a phenomenon in Japanese culture ever since. The next year, the Japanese company Square was struggling and Hironobu Sakaguchi decided to make his final game—a role-playing game (RPG) modeled after *Dragon Quest* and titled *Final Fantasy*—resulting in *Final Fantasy* series, which would later go on to become the most successful RPG franchise. 1987 also saw the birth of the stealth game genre with Hideo Kojima's *Metal Gear* series' first game *Metal Gear* on the MSX2 computer—and ported to the NES shortly after. In 1989, Capcom released *Sweet Home* on the NES, which served as a precursor to the survival horror genre.

In 1988, Nintendo published their first issue of *Nintendo Power* magazine.[43]

This generation ended with the discontinuation of the NES in 1995.

1990s

The 1990s were a decade of marked innovation in video gaming. It was a decade of transition from raster graphics to 3D graphics and gave rise to several genres of video games including first-person shooter, real-time strategy, and MMO. Handheld gaming began to become more popular throughout the decade, thanks in part to the release of the Game Boy. Arcade games, although still relatively popular in the early 1990s, begin a decline as home consoles become more common.

The video game industry matured into a mainstream form of entertainment in the 1990s. Major developments of the 1990s included the beginning of a larger consolidation of publishers, higher budget games, increased size of production teams and collaborations with both the music and motion picture industries. Examples of this would be Mark Hamill's involvement with Wing Commander III or Quincy Jones' introduction of QSound.

The increasing computing power and decreasing cost of processors as the Intel 80386, Intel 80486, and the Motorola 68030, caused the rise of 3D graphics, as well as "multimedia" capabilities through sound cards and CD-ROMs. Early 3D games began with flat-shaded graphics (Elite, Starglider 2 or Alpha Waves[44]), and then simple forms of texture mapping (Wolfenstein 3D).

1989 and the early 1990s saw the release and spread of the MUD codebases DikuMUD and LPMud, leading to a tremendous increase in the proliferation and popularity of MUDs. Before the end of the decade, the evolution of the genre continued through "graphical MUDs" into the first MMORPGs (Massively multiplayer online role-playing games), such as *Ultima Online* and *EverQuest*, which freed users from the limited number of simultaneous players in other games and brought persistent worlds to the mass market. A prime example of an MMORPG MUD is the game Runescape created by Jagadex.

In the early 1990s, shareware distribution was a popular method of publishing games for smaller developers, including then-fledgling companies such as Apogee (now 3D Realms), Epic Megagames (now Epic Games), and id Software. It gave consumers the chance to try a trial portion of the game, usually restricted to the game's complete first section or "episode", before purchasing the rest of the adventure. Racks of games on single 5 1/4" and later 3.5" floppy disks were common in many stores, often only costing a few dollars each. Since the shareware versions were essentially free, the cost only needed to cover the disk and minimal packaging. As the increasing size of games in the mid-90s made them impractical to fit on floppies, and retail publishers and developers began to earnestly mimic the practice, shareware games were replaced by shorter game demos (often only one or two levels), distributed free on CDs with gaming magazines and over the Internet.

In 1991, Sonic the Hedgehog was introduced. The game gave Sega's Mega Drive console mainstream popularity, and rivaled Nintendo's Mario franchise. Its namesake character became the mascot of Sega and one of the most recognizable video game characters.

In 1992 the game *Dune II* was released. It was by no means the first in the genre (several other games can be called the very first real-time strategy game, see the History of RTS), but it set the standard game mechanics for later blockbuster RTS games such as *Warcraft: Orcs & Humans*, *Command & Conquer*, and *StarCraft*. The RTS is characterized by an overhead view, a "mini-map", and the control of both the economic and military aspects of an army. The rivalry between the two styles of RTS play—*Warcraft* style, which used GUIs accessed once a building was selected, and *C&C* style, which allowed construction of any unit from within a permanently visible menu—continued into the start of the next millennium.

Alone in the Dark (1992), while not the first survival horror game, planted the seeds of what would become known as the survival horror genre today. It established the formula that would later flourish on CD-ROM based consoles, with games such as *Resident Evil* and *Silent Hill*.

Adventure games continued to evolve, with Sierra Entertainment's *King's Quest* series, and LucasFilms'/LucasArts' *Monkey Island* series bringing graphical interaction and the creation of the concept of "point-and-click" gaming. *Myst* and its sequels inspired a new style of puzzle-based adventure games. Published in 1993, *Myst* itself was one of

the first computer games to make full use of the new high-capacity CD-ROM storage format. Despite *Myst*'s mainstream success, the increased popularity of action-based and real-time games led adventure games and simulation video games, both mainstays of computer games in earlier decades, to begin to fade into obscurity.

It was in the 1990s that Maxis began publishing its successful line of "Sim" games, beginning with *SimCity*, and continuing with a variety of titles, such as *SimEarth*, *SimCity 2000*, *SimAnt*, *SimTower*, and the best-selling PC game in history, *The Sims*, in early 2000.

In 1996, 3dfx Interactive released the Voodoo chipset, leading to the first affordable 3D accelerator cards for personal computers. These devoted 3D rendering daughter cards performed a portion of the computations required for more-detailed three-dimensional graphics (mainly texture filtering), allowing for more-detailed graphics than would be possible if the CPU were required to handle both game logic and all the graphical tasks. First-person shooter games (notably *Quake*) were among the first to take advantage of this new technology. While other games would also make use of it, the FPS would become the chief driving force behind the development of new 3D hardware, as well as the yardstick by which its performance would be measured, usually quantified as the number of frames per second rendered for a particular scene in a particular game.

Several other, less-mainstream, genres were created in this decade. Looking Glass Studios' *Thief: The Dark Project* and its sequel were the first to coin the term "first person sneaker", although it is questionable whether they are the first "first person stealth" games. Turn-based strategy progressed further, with the *Heroes of Might and Magic* (*HOMM*) series (from The 3DO Company) luring many mainstream gamers into this complex genre.

Id Software's 1996 game *Quake* pioneered play over the Internet in first-person shooters. Internet multiplayer capability became a de facto requirement in almost all FPS games. Other genres also began to offer online play, including RTS games like Microsoft Game Studios' *Age of Empires*, Blizzard's *Warcraft* and *StarCraft* series, and turn-based games such as *Heroes of Might and Magic*. Developments in web browser plug-ins like Java and Adobe Flash allowed for simple browser-based games. These are small single player or multiplayer games that can be quickly downloaded and played from within a web browser without installation. Their most popular use is for puzzle games, side-scrollers, classic arcade games, and multiplayer card and board games.

Few new genres have been created since the advent of the FPS and RTS, with the possible exception of the third-person shooter. Games such as *Grand Theft Auto III*, *Tom Clancy's Splinter Cell*, *Enter the Matrix*, and *Hitman* all use a third-person camera perspective, but are otherwise very similar to their first-person counterparts.

Decline of arcades

With the advent of 16-bit and 32-bit consoles, home video games began to approach the level of graphics seen in arcade games. An increasing number of players would wait for popular arcade games to be ported to consoles rather than going out. Arcades experienced a resurgence in the early to mid 1990s with games such as Street Fighter II and Mortal Kombat and other games in the one-on-one fighting game genre, and *NBA Jam*. As patronage of arcades declined, many were forced to close down. Classic coin-operated games have largely become the province of dedicated hobbyists and as a tertiary attraction for some businesses, such as movie theaters, batting cages, miniature golf, and arcades attached to game stores such as F.Y.E..

The gap left by the old corner arcades was partly filled by large amusement centers dedicated to providing clean, safe environments and expensive game control systems not available to home users. These are usually based on sports like skiing or cycling, as well as rhythm games like *Dance Dance Revolution*, which have carved out a large slice of the market. Dave & Buster's and GameWorks are two large chains in the United States with this type of environment. Aimed at adults and older kids, they feature full service restaurants with full liquor bars and have a wide variety of video game and hands on electronic gaming options. Chuck E. Cheese's is a similar type of establishment focused towards small children.

Handhelds come of age

In 1989, Nintendo released the Game Boy, the first handheld console since the ill-fated Microvision ten years before. The design team headed by Gunpei Yokoi had also been responsible for the Game & Watch systems. Included with the system was *Tetris*, a popular puzzle game. Several rival handhelds also made their debut around that time, including the Sega Game Gear and Atari Lynx (the first handheld with color LCD display). Although most other systems were more technologically advanced, they were hampered by higher battery consumption and less third-party developer support. While some of the other systems remained in production until the mid-90s, the Game Boy remained at the top spot in sales throughout its lifespan.

Mobile phone gaming

Mobile phones became videogaming platforms when Nokia installed Snake onto its line of mobile phones in 1998. Soon every major phone brand offered "time killer games" that could be played in very short moments such as waiting for a bus. Mobile phone games early on were limited by the modest size of the phone screens that were all monochrome and the very limited amount of memory and processing power on phones, as well as the drain on the battery.

Fourth generation consoles (1989–1999) (16-bit)

The Mega Drive\Sega Mega Drive\Genesis proved its worth early on after its debut in 1989. Nintendo responded with its own next generation system known as the Super NES in 1991. The TurboGrafx-16 debuted early on alongside the Genesis, but did not achieve a large following in the U.S. due to a limited library of games and excessive distribution restrictions imposed by Hudson.

Mortal Kombat, released in both SNES and Genesis consoles, was one of the most popular game franchises of its time.

The intense competition of this time was also a period of not entirely truthful marketing. The TurboGrafx-16 was billed as the first 16-bit system but its central processor was an 8-bit HuC6280, with only its HuC6270 graphics processor being a true 16-bit chip. Additionally, the much earlier Mattel Intellivision contained a 16-bit processor. Sega, too, was known to stretch the truth in its marketing approach; they used the term "Blast Processing" to describe the simple fact that their console's CPU ran at a higher clock speed than that of the SNES (7.67 MHz vs 3.58 MHz).

In Japan, the 1987 success of the PC Engine (as the TurboGrafx-16 was known there) against the Famicom and CD drive peripheral allowed it to fend off the Mega Drive (Genesis) in 1988, which never really caught on to the same degree as outside Japan. The PC Engine eventually lost out to the Super Famicom, but, due to its popular CD add-ons, retained enough of a user base to support new games well into the late 1990s.

CD-ROM drives were first seen in this generation, as add-ons for the PC Engine in 1988 and the Mega Drive in 1991. Basic 3D graphics entered the mainstream with flat-shaded polygons enabled by additional processors in game cartridges like *Virtua Racing* and *Star Fox*.

SNK's Neo-Geo was the most expensive console by a wide margin when it was released in 1990, and would remain so for years. It was also capable of 2D graphics in a quality level years ahead of other consoles. The reason for this was that it contained the same hardware that was found in SNK's arcade games. This was the first time since the home Pong machines that a true-to-the-arcade experience could be had at home.

This generation ended with the SNES's discontinuation in 1999.

Fifth generation consoles (1993–2001) (32 and 64-bit)

In 1993, Atari re-entered the home console market with the introduction of the Atari Jaguar. Also in 1993, The 3DO Company released the 3DO Interactive Multiplayer, which, though highly advertised and promoted, failed to catch up to the sales of the Jaguar, due its high pricetag. Both consoles had very low sales and few quality games, eventually leading to their demise. In 1994, three new consoles were released in Japan: the Sega Saturn, the PlayStation, and the PC-FX, the Saturn and the PlayStation later seeing release in North America in 1995. The PlayStation quickly outsold all of its competitors, with the exception of the aging Super Nintendo Entertainment System, which still had the support of many major game companies.

Metal Gear Solid, notable for its innovative use of in-game generated cinemas, detailed integration of haptic technology, and theatrical story delivery. The *Metal Gear* series primarily defined the stealth game genre.

The Virtual Boy from Nintendo was released in 1995 but did not achieve high sales. In 1996 the Virtual Boy was taken off the market.

After many delays, Nintendo released its 64-bit console, the Nintendo 64 in 1996. The consoles flagship title, *Super Mario 64*, became a defining title for 3D platformer games.

PaRappa the Rapper popularized rhythm, or music video games in Japan with its 1996 debut on the PlayStation. Subsequent music and dance games like *beatmania* and *Dance Dance Revolution* became ubiquitous attractions in Japanese arcades. While *Parappa*, *DDR*, and other games found a cult following when brought to North America, music games would not gain a wide audience in the market until the next decade. Also in 1996 Capcom released Resident Evil, the first actual survival horror game. It was a huge success selling over 2 million copies and is considered one of the best games on the playstaion.

Other milestone games of the era include Rare's Nintendo 64 title *GoldenEye 007* (1997), which was critically acclaimed for bringing innovation as being the first major first-person shooter that was exclusive to a console, and for pioneering certain features that became staples of the genre, such as scopes, headshots, and objective-based missions. *The Legend of Zelda: Ocarina of Time* (1998) for the Nintendo 64 is widely considered the highest critically acclaimed game of all time.[45] The title also featured many innovations such as Z-targeting which is commonly used in many games today.

Nintendo's choice to use cartridges instead of CD-ROMs for the Nintendo 64, unique among the consoles of this period, proved to have negative consequences. While cartridges were faster and combated piracy, CDs could hold far more data and were much cheaper to produce, causing many game companies to turn to Nintendo's CD-based competitors. In particular, SquareSoft, which had released all previous games in its *Final Fantasy* series for Nintendo consoles, now turned to the PlayStation; *Final Fantasy VII* (1997) was a huge success, establishing the popularity of role-playing games in the west and making the PlayStation the primary console for the genre.

By the end of this period, Sony had become the leader in the video game market. The Saturn was moderately successful in Japan but a commercial failure in North America and Europe, leaving Sega outside of the main competition. The N64 achieved huge success in North America and Europe, though it never surpassed PlayStation's sales or was as popular in Japan.

This generation ended with the PlayStation discontinuation in March 2006.

Transition to 3D and CDs

The fifth generation is most noted for the rise of fully 3D games. While there were games prior that had used three dimensional environments, such as *Virtua Racing* and *Star Fox*, it was in this era that many game designers began to move traditionally 2D and pseudo-3D genres into full 3D. *Super Mario 64* on the N64, *Crash Bandicoot* on the PlayStation, *Sonic Adventure* on the Dreamcast and *Tomb Raider* on the Saturn (later released on the PlayStation as well), are prime examples of this trend. Their 3D environments were widely marketed and they steered the industry's focus away from side-scrolling and rail-style titles, as well as opening doors to more complex games and genres. Games like GoldenEye 007, The Legend Of Zelda: Ocarina of Time or Soul Calibur were nothing like shoot-em-ups, RPG's or fighting games before them. 3D became the main focus in this era as well as a slow decline of cartridges in favor of CDs. Also, most 3D games used realistic graphics and large, interactive environments like Shenmue.

2000s

The first decade of the 2000s showed innovation on both consoles and PCs, and an increasingly competitive market for portable game systems.

The phenomena of user-created modifications (or "mods") for games was one trend that began around the turn of the millennium. The most famous example is that of *Counter-Strike*; released in 1999, it is still the most popular online first-person shooter, even though it was created as a mod for *Half-Life* by two independent programmers. Eventually, game designers realized the potential of mods and custom content in general to enhance the value of their games, and so began to encourage its creation. Some examples of this include *Unreal Tournament*, which allowed players to import 3dsmax scenes to use as character models, and Maxis' *The Sims*, for which players could create custom objects.

Mobile games

Mobile gaming interest was raised when Nokia launched its N-Gage phone and handheld gaming platform in 2003. While about two million handsets were sold, the product line was seen as not a success and withdrawn from Nokia's lineup. Meanwhile many game developers had noticed that more advanced phones had color screens and reasonable memory and processing power to do reasonable gaming. Mobile phone gaming revenues passed 1 billion dollars in 2003, and passed 5 billion dollars in 2007, accounting for a quarter of all videogaming software revenues. More advanced phones came to the market such as the N-Series smartphone by Nokia in 2005 and the iPhone by Apple in 2007 which strongly added to the appeal of mobile phone gaming. In 2008 Nokia revised the N-Gage brand but now as a software library of games to its top-end phones. At Apple's App Store in 2008, more than half of all applications sold were games for the iPhone.

Sixth generation consoles (1998-2004)

In the sixth generation of video game consoles, Sega exited the hardware market, Nintendo fell behind, Sony solidified its lead in the industry, and Microsoft developed a gaming console.

The generation opened with the launch of the Dreamcast in 1998. It was the first console to have a built-in modem for Internet support and online play. While it was initially successful, sales and popularity would soon begin to decline with contributing factors being Sega's damaged reputation from previous commercial failures, software pirating, and the overwhelming anticipation for the upcoming Playstation 2 at the time. Production for the console would discontinue in most markets by 2002 and would be Sega's final console before they switched into becoming third party.

The second release of the generation was Sony's Playstation 2, which would go on to be the best selling console at the time. Nintendo followed a year later with the Nintendo GameCube, their first disc-based console. Though more or less equal with Sony's system in technical specifications, the Nintendo GameCube suffered from a lack of

third-party games compared to Sony's system, and was hindered by a reputation for being a "kid's console" and lacking the mature games the current market appeared to want.

The Xbox, Microsoft's entry into the video game console industry.

Before the end of 2001, Microsoft Corporation, best known for its Windows operating system and its professional productivity software, entered the console market with the Xbox. Based on Intel's Pentium III CPU, the console used much PC technology to leverage its internal development. In order to maintain its hold in the market, Microsoft reportedly sold the Xbox at a significant loss[46] and concentrated on drawing profit from game development and publishing. Shortly after its release in November 2001 Bungie Studio's *Halo: Combat Evolved* instantly became the driving point of the Xbox's success, and the Halo series would later go on to become one of the most successful console shooters of all time. By the end of the generation, the Xbox had drawn even with the Nintendo GameCube in sales globally, but since nearly all of its sales were in North America, it pushed Nintendo into third place in the American market. In 2001 *Grand Theft Auto III* was released, popularizing open world games by using a non-linear style of gameplay. It was very successful both critically and commercially and is considered a huge milestone in gaming.

Nintendo still dominated the handheld gaming market in this generation. The Game Boy Advance in 2001, maintained Nintendo's market position. Finnish cellphone maker Nokia entered the handheld scene with the N-Gage, but it failed to win a significant following.

Console gaming largely continued the trend established by the PlayStation toward increasingly complex, sophisticated, and adult-oriented gameplay. Most of the successful sixth-generation console games were games rated T and M by the ESRB, including many now-classic gaming franchises such as Halo and Resident Evil, the latter of which was notable for both its success and its notoriety. Even Nintendo, widely known for its aversion to adult content (with very few exceptions most notably *Conker's Bad Fur Day* for the Nintendo 64), began publishing more M-rated games, with Silicon Knights's *Eternal Darkness: Sanity's Requiem* and Capcom's *Resident Evil 4* being prime examples. This trend in hardcore console gaming would partially be reversed with the seventh generation release of the Wii.

Return of alternate controllers

One significant feature of this generation was various manufacturers' renewed fondness for add-on peripheral controllers. While novel controllers weren't new, as Nintendo featured several with the original NES and PC gaming has previously featured driving wheels and aircraft joysticks, for the first time console games using them became some of the biggest hits of the decade. Konami introduced a soft plastic mat versions of its foot controls for its *Dance Dance Revolution* franchise in 1998. Sega's alternate peripherals included Samba De Amigo's maraca controllers. Nintendo introduced a bongo controller for a few titles in its *Donkey Kong* franchise. Publisher RedOctane introduced *Guitar Hero* and its distinctive guitar-shaped controllers for the PlayStation 2.

Online gaming rises to prominence

As affordable broadband Internet connectivity spread, many publishers turned to online gaming as a way of innovating. Massively multiplayer online role-playing game (MMORPGs) featured significant titles for the PC market like *EverQuest*, *World of Warcraft*, and *Ultima Online*. Historically, console based MMORPGs have been few in number due to the lack of bundled Internet connectivity options for the platforms. This made it hard to establish a large enough subscription community to justify the development costs. The first significant console MMORPGs were *Phantasy Star Online* on the Sega Dreamcast (which had a built in modem and after market

Ethernet adapter), followed by *Final Fantasy XI* for the Sony PlayStation 2 (an aftermarket Ethernet adapter was shipped to support this game). Every major platform released since the Dreamcast has either been bundled with the ability to support an Internet connection or has had the option available as an aftermarket add-on. Microsoft's Xbox also had its own online gaming service called Xbox Live. Xbox Live was a huge success and proved to be a driving force for the Xbox with games like *Halo 2* that were overwhelmingly popular.

Rise of casual PC games

Beginning with PCs, a new trend in casual gaming, games with limited complexity that were designed for shortened or impromptu play sessions, began to draw attention from the industry. Many were puzzle games, such as Popcap's *Bejeweled* and *Diner Dash*, while others were games with a more relaxed pace and open-ended play. The biggest hit was *The Sims* by Maxis, which went on to become the best selling computer game of all time, surpassing *Myst*.[47]

Other casual games include Zynga Games like *Mafia Wars*, *FarmVille*, *Cafe World*, among many others, which are tied into social networking sites such as Myspace and Facebook. These games are offered freely with the option buy in game items, and stats for money and/or reward offers.

Seventh generation consoles (2004-present)

The generation opened early for handheld consoles, as Nintendo introduced their Nintendo DS and Sony premiered the PlayStation Portable (PSP) within a month of each other in 2004. While the PSP boasted superior graphics and power, following a trend established since the mid 1980s, Nintendo gambled on a lower-power design but featuring a novel control interface. The DS's two screens, one of which was touch-sensitive, proved extremely popular with consumers, especially young children and middle-aged gamers, who were drawn to the device by Nintendo's *Nintendogs* and *Brain Age* series, respectively. While the PSP attracted a significant portion of veteran gamers, the DS allowed Nintendo to continue its dominance in handheld gaming. Nintendo updated their line with the Nintendo DS Lite in 2006, the Nintendo DSi in 2008 (Japan) and 2009 (Americas and Europe), and the Nintendo DSi XL while Sony updated the PSP in 2007 and again with the smaller PSP Go in 2009. Nokia withdrew their N-Gage platform in 2005 but reintroduced the brand as a game-oriented service for high-end smartphones on April 3, 2008.[48]

Apple Inc. entered the realm of mobile gaming hardware with the release the App Store for the iPhone and iPod Touch in the summer of 2008. The greatest shift brought by Apple's entry was to abandon the traditional reliance on "brick and mortar" retail sales for software purchases; instead, the iPhone platform relies entirely on digitally-distributed content.

In console gaming, Microsoft stepped forward first in November 2005 with the Xbox 360, and Sony followed in 2006 with the PlayStation 3, released in Europe in March 2007. Setting the technology standard for the generation, both featured high-definition graphics, large hard disk-based secondary storage, integrated networking, and a companion on-line gameplay and sales platform, with Xbox Live and the PlayStation Network, respectively. Both were formidable systems that were the first to challenge personal computers in power (at launch) while offering a relatively modest price compared to them. While both were more expensive than most past consoles, the Xbox 360 enjoyed a substantial price edge, selling for either $300 or $400 depending on model, while the PS3 launched with models priced at $500 and $600. Coming with Blu-ray and Wi-Fi, the PlayStation 3 was the most expensive game console on the market since Panasonic's version of the 3DO, which retailed for little under 700USD.[49]

Nintendo would release their Wii console shortly after the PlayStation 3's launch, and the platform would put Nintendo back on track in the console race. While the Wii had lower technical specifications (and a lower price) than both the Xbox 360 and PlayStation 3,[50] its new motion control was much touted. Many gamers, publishers, and analysts initially dismissed the Wii as an underpowered curiosity, but were surprised as the console sold out through the 2006 Christmas season, and remained so through the next 18 months, becoming the fastest selling game console in most of the world's gaming markets.[51]

In June 2009, Sony announced that it would release its PSP Go for 249.99USD on October 1 in Europe and North America, and Japan on November 1. The PSP Go was a newer, slimmer version of the PSP, which had the control pad slide from the base, where its screen covers most of the front side.[52]

Increases in development budgets

With high definition video an undeniable hit with veteran gamers seeking immersive experiences, expectations for visuals in games along with the increasing complexity of productions resulted in a spike in the development budgets of gaming companies. While many game studios saw their Xbox 360 projects pay off, the unexpected weakness of PS3 sales resulted in heavy losses for some developers, and many publishers broke previously arranged PS3 exclusivity arrangements or cancelled PS3 game projects entirely in order to cut losses.

Nintendo capitalizes on casual gaming

Meanwhile, Nintendo took cues from PC gaming and their own success with the Nintendo Wii, and crafted games that capitalized on the intuitive nature of motion control. Emphasis on gameplay turned comparatively simple games into unlikely runaway hits, including the bundled game, *Wii Sports*, and *Wii Fit*. As the Wii sales spiked, many publishers were caught unprepared and responded by assembling hastily-created titles to fill the void. Although some hardcore games continued to be produced by Nintendo, many of their classic franchises were reworked into "bridge games", meant to provide new gamers crossover experiences from casual gaming to deeper experiences, including their flagship Wii title, *Super Mario Galaxy*, which in spite of its standard-resolution graphics dominated critics' "best-of" lists for 2007. Many others, however, strongly criticized Nintendo for its apparent spurning of its core gamer base in favor of a demographic many warned would be fickle and difficult to keep engaged.

Motion control revolutionizes game play

The way gamers interact with games changed dramatically, especially with Nintendo's wholesale embrace of motion control as a standard method of interaction. The Wii Remote implemented the principles to be a worldwide success. To a lesser extent, Sony experimented with motion in its Sixaxis and subsequent DualShock 3 controller for the PS3, while Microsoft continually mentioned interest in developing the technology for the Xbox 360, such as Project Natal. While the Wii's infrared-based pointing system has been widely praised, and cited as a primary reason for the success of games such as Nintendo's *Metroid Prime 3: Corruption* and EA's *Medal of Honor: Heroes 2*. Despite the success of these titles, reliable motion controls have been more elusive, with even the most refined motion controls failing to achieve true 1-to-1 reproduction of player motion on-screen. Some players have even found that they must move slower than they would like or the Wii will not register their movements, but this is rare. Nintendo's 2008 announcement of its Wii MotionPlus module intends to address these concerns.

Alternate controllers also continue to be important in gaming, as the increasingly involved controllers associated with Red Octane's *Guitar Hero* series and Harmonix's *Rock Band* demonstrate. In addition to this, Nintendo has produced various add-on attachments meant to adapt the Wii Remote to specific games, such as the Wii Zapper for shooting games and the Wii Wheel for driving games.[53] With the introduction of the Balance Board in Nintendo's *Wii Fit* package, motion controls have been extended to players' feet. Third party efforts from THQ, EA, and other publishers that integrate Nintendo's Balance Board are expected in 2009.

At Electronic Entertainment Expo 2009, Microsoft and Sony each presented their own new motion controllers: Project Natal (later renamed *Kinect*) and PlayStation Move, respectively.[54]

Cloud Computing comes to games

In 2009, a few cloud computing services were announced targeted at video games. These services allow the graphics rendering of the video games to be done away from the end user, and a video stream of the game to be passed to the user. OnLive allows the user to communicate with their servers where the video game rendering is taking place.[55] [56] Gaikai is used entirely in the user's browser, and communicates with servers ideally close to the user.[57]

2010s

The new decade has seen rising interest in the possibility of next generation consoles being developed in keeping with the traditional industry model of a five-year development cycle. However, in the industry there is believed to be a lack of desire for another race to produce such a console.[58] Reasons for this include the challenge and massive expense of creating consoles that are graphically superior to the current generation, with Sony and Microsoft still looking to recoup development costs on its current consoles. The focus for new technologies is likely to shift onto motion-based peripherals, such as Microsoft's Kinect and Sony's PlayStation Move.

One new console is Nintendo's new handheld: the successor to the Nintendo DS known as the Nintendo 3DS.[59] The system is due for release by the end of the fiscal year (March 2011).[60] The system will incorporate 3D graphics and effects without the need for using 3D glasses. Other features include three cameras (one internal and a dual 3D external set), a motion sensor, a gyro sensor and a Slide Pad that allows 360-degree analog input.[61] Sony is also using 3D technology. Some of their games are compatible with Sony's 3D TV, the Sony Bravia, also using 3D glasses.

On June 14, 2010, during E3, Microsoft revealed their new Xbox 360 console referred to as the Xbox 360 S or Slim. Microsoft's intent was to make the unit smaller and quieter, while also installing a 250GB hard drive and built-in 802.11n WiFi. It starting shipping to US stores the same day, not reaching Europe until July 13.

See also

- Chronology of console role-playing games
- Chronology of real-time strategy video games
- Chronology of real-time tactics video games
- List of years in video games
- Time line of video arcade game history
- Game On (exhibition), a touring exhibition detailing the history of video games.
- Home computer
- Personal computer game
- Video game console
- Golden age of video arcade games
- History of online games

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Early History

Early history of video games

The **early history of video games** dates back to 1947, with a missile simulator which uses analog circuitry.[1]

1947

- The earliest known interactive electronic game was created by Thomas T. Goldsmith Jr. and Estle Ray Mann on a cathode ray tube.[2] The patent was filed on January 25, 1947 and issued on December 14, 1948. The game was a missile simulator inspired by radar displays from World War II. It used analog circuitry, not digital, to control the CRT beam and position a dot on the screen. Screen overlays were used for targets since graphics could not be drawn at the time.[1]

1948

Alan Turing and colleague D. G. Champernowne wrote a chess playing algorithm. At the time, there was not a computer powerful enough to run the algorithm. The algorithm was tested several times by human versus algorithm matches. The algorithm won once and lost once.[3]

1950

In March 1950, Claude Shannon devised a chess playing program that appeared in the paper "Programming a Computer for Playing Chess" published in Philosophical Magazine. This was the first article on the problem of computer chess, published before anyone had programmed a computer to play chess.

In 1950 or 1951, Dr. Dietrich Prinz wrote the first computer chess program, TUROCHAMP. Unfortunately there did not exist a computer capable of running the program.

1951

- On May 5, 1951, the NIMROD computer was presented at the Science Museum (London) during the Festival of Britain. Using a panel of lights for its display, it was designed exclusively to play the game of *NIM*; this was the first instance of a digital computer designed specifically to play a game.[4] NIMROD could play either the traditional or "reverse" form of the game.
- TV engineer named Ralph Baer was asked by the chief engineer at Loral to build "the best television set in the world". Baer came up with an idea for playing games on the television set, but the idea was turned down.
- In November 1951, Dr. Dietrich Prinz wrote the original chess playing program for the Manchester Ferranti computer.

1952

- In 1952, one of the first video games ever made, *OXO* (also known as *Noughts and Crosses*) by A. S. Douglas. OXO was written for the EDSAC computer. The game was a Tic-tac-toe based game, played against the computer, and although *OXO* never gained any real popularity, because the EDSAC was available only at Cambridge, it was still a milestone in the history of video games.
- Christopher S. Strachey created a program on the Ferranti machine which, by the summer of 1952, "could play a complete game of draughts (checkers) at a reasonable speed". Arthur Samuel built on his work to make a checkers-playing program for the IBM 701, which ran at the end of the year.

1958

- *Tennis for Two* was a computer game developed in 1958 on an oscilloscope which simulated a game of tennis or ping pong. It was created by William Higinbotham. It was the predecessor of *Pong*, one of the most widely recognized video games as well as one of the first. Unlike *Pong* and similar early games, *Tennis for Two* shows a simplified tennis court from the side instead of a top-down perspective. The ball is affected by gravity and must be played over the net. The game was controlled by an analog computer and "consisted mostly of resistors, capacitors and relays, but where fast switching was needed – when the ball was in play – transistor switches were used".

1959

In 1959-1961, a collection of interactive graphical programs were created on the TX-0 machine at MIT:

- Mouse in the Maze: which allowed users to place maze walls, bits of cheese, and (in some versions) glasses of martini by way of a light pen interacting with the screen. One could then release the mouse and watch it traverse the maze to find the goodies.
- Tic-Tac-Toe: Using the light pen, the user could play a simple game of naughts and crosses against the computer.

1962

- *Spacewar!* is released, one of the earliest known digital computer games. Conceived and written by Massachusetts Institute of Technology (MIT) students including Stephen Russell who programmed it, the Spacewar! game first ran in early 1962 on the PDP-1 donated to the school by Digital Equipment Corporation (DEC). Early versions of the game contained a randomly generated background starfield.
- Later, a program called *Expensive Planetarium* (referring to the price of the PDP-1 computer) was incorporated into the main code, replacing the randomly generated star field. The program was based on real star charts that scrolled slowly: at any one time, 45% of the night sky was visible, every star down to the fifth magnitude.

Spacewar! running on the Computer History Museum's PDP-1

1969

- Space Travel is written by Ken Thompson for a Multics system.
- Hamurabi, one of the first strategy games, is released.

1971

- On 22 March, Ralph Baer files with the United States Patent and Trademark Office regarding a patent for "television gaming and training apparatus."[5]
- In June, Bill Pitts and Hugh Tuck form Computer Recreations, Inc.[6]
- Magnavox signs a license agreement with Sanders Associates regarding the Odyssey video game console.[7]
- Nakamura Manufacturing Ltd. adopts "Namco" as a brand name.[8]

Notable releases

- In September, Computer Recreations, Inc. installs *Galaxy Game*, a version of *Spacewar!* for PDP-11 hardware and the first coin-operated video arcade game, in Tresidder Union at Stanford University.[6]
- In November, Nutting Associates releases 1,500 cabinets of Nolan Bushnell's *Computer Space* — another free-standing implementation of *Spacewar!*, and the first commercially released video game in the arcades.[7]
- Don Rawitsch, Paul Dillenberger and Bill Heinemann, students at Carleton College develop *The Oregon Trail* for a mainframe with teletype terminals.[9]
- Don Daglow programs the first computer baseball game on a PDP-10 mainframe computer at Pomona College.[10]
- Mike Mayfield develops *Star Trek* on a Scientific Data Systems Sigma 7 minicomputer.[11]

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The First Generation

History of video game consoles (first generation)

The **first generation of video game consoles** lasted from 1972, with the release of the Magnavox Odyssey, until 1977, when "pong"-style console manufacturers left the market *en masse* due to the introduction and success of microprocessor-based consoles.[1]

Interactive television

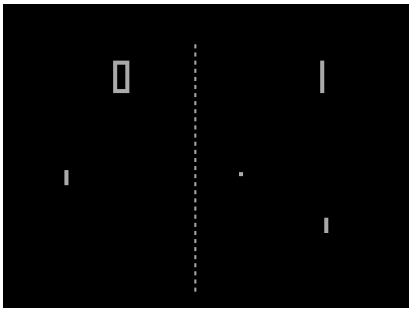
Television engineer Ralph Baer conceived the idea of an interactive television while building a television set from scratch for Loral in 1951 in the Bronx, New York. He explored these ideas further in 1966 when he was the Chief Engineer and manager of the Equipment Design Division at Sanders Associates. Baer created a simple two-player video game that could be displayed on a standard television set called *Chase*, where two dots chased each other around the screen. After a demonstration to the company's director of R&D Herbert Campman, some funding was allotted and the project was made "official". In 1967 Bill Harrison was brought on board, and a light gun was constructed from a toy rifle that was aimed at a target moved by another player.

Bill Rusch joined the project to speed up development and soon a third machine-controlled dot was used to create a ping-pong game. With more funding additional games were created, and Baer had the idea of selling the product to cable TV companies, who could transmit static images as game backgrounds. A prototype was demonstrated in February 1968 to TelePrompTer Vice President Hubert Schlafly, who signed an agreement with Sanders. The Cable TV industry was in a slump during the late '60s and early '70s and a lack of funding meant other avenues had to be pursued. Development continued on the hardware and games resulting in the final "Brown Box" prototype, which had two controllers, a light gun and sixteen switches on the console that selected the game to be played. Baer approached various U.S. Television manufacturers and an agreement was eventually signed with Magnavox in late 1969. Magnavox's main alterations to the Brown Box were to use plug-in circuits to change the games, and to remove the color graphics capabilities in favor of color overlays in order to reduce manufacturing costs. It was released in May 1972 as the Magnavox Odyssey.[2]

Digital electronics

The Odyssey was built using a combination of analog (for the output, game control) and digital circuitry. Many collectors confuse the use of discrete components to mean the system is analog. However, the games and logic itself are implemented in DTL, a common pre-TTL digital design component using discrete transistors and diodes. Likewise, Ralph Baer himself considers the system digital.[3]

It was not a large success due to restrictive marketing, although other companies with similar products (including Atari) had to pay a licensing fee for some time. For a time it was Sanders' most profitable line, even though many in the company had been unsupportive of game development.



Pong arcade version

Many of the earliest games utilising digital electronics ran on university mainframe computers in the United States, developed by individual users who programmed them in their spare time. In 1961, a group of students at the Massachusetts Institute of Technology programmed a game called *Spacewar!* on a DEC PDP-1. In 1970 Nolan Bushnell saw *Spacewar!* for the first time at the University of Utah. Deciding there was commercial potential in an arcade version, he hand-wired a custom computer capable of playing it on a black and white television. The resulting game, *Computer Space*, did not fare well commercially and Bushnell started looking for new ideas. In 1971 he saw a demonstration of the Magnavox Odyssey, and hired Al Alcorn to produce an arcade version of the Odyssey's ping-pong game (using Transistor-transistor logic), called *Pong*.

Home video games achieved widespread popularity with the release of a home version of *Pong* in the Christmas of 1975. Its success sparked hundreds of clones, including the Coleco Telstar, which went on to be a success in its own right, with over a dozen models.

The first generation of video games did not feature a microprocessor, and were based on custom codeless state machine computers consisting of discrete logic circuits comprising each element of the game itself. Later consoles of this generation moved the bulk of the circuitry to custom "pong on a chip" IC's such as Atari's custom Pong chips and General Instruments' AY-3-8500 series.[4]

Comparison

Name	Magnavox Odyssey	Magnavox Odyssey 200	Atari/Sears Telegames Pong	Coleco Telstar	Nintendo Color TV Game
Console					
Launch price	US$100	US$100–230	US$98.95	n/a	¥8,300 - ¥48,000 (Roughly 101$ - 584.8$ USD Today)
Release date	• NA May 1972 • JP 1975 • EU 1974	• NA 1975	• NA 1975	• NA 1976 • JP 1977	• JP 1977
Media	Cartridge	n/a	Inbuilt Chip[5]	Cartridge (Telstar Arcade)	n/a
Accessories (retail)	Light gun	n/a	n/a	Controller styles	n/a

See also

- Home computer
- History of computing hardware (1960s–present)
- First video game

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External links

- Video Game Consoles (1970-1976) (http://www.thegameconsole.com/)
- The Dot Eaters: Bits From the Primordial Ooze (http://www.thedoteaters.com/stage1.php)
- ClassicGaming Expo 2000: Baer Describes the Birth of Videogames (http://classicgaming.gamespy.com/View.php?view=Articles.Listcgexpo2000/baerkeynote/)
- Video Games Turn 40 (1UP.com) (http://www.1up.com/do/feature?cId=3159462)

Magnavox Odyssey

Manufacturer	Magnavox
Type	Video game console
Generation	First generation era
Retail availability	• NA 1972 • UK 1973 • EU 1974 • JP 1974
Discontinued	1975
Units sold	330,000 [1]
Media	Cartridge
CPU	None
Controller input	Two paddles
Successor	Magnavox Odyssey²

The **Magnavox Odyssey** is the world's first home video game console. It was first demonstrated on May 24, 1972 and released in August of that year, predating the Atari *Pong* home consoles by three years.

The Odyssey was designed by Ralph Baer, who began around 1966 and had a working prototype finished by 1968. This prototype, known as the *Brown Box*,[2] is now at the Smithsonian Institution's National Museum of American History in Washington, D.C.

In 2009, video game website IGN named the Odyssey in the Top 25 video game consoles of all time.[3]

Design

While many collectors consider the Odyssey analog rather than digital (because of the addition of analog circuitry for the output, game control, and the use of discrete components), Baer has said he considers the console to be digital. The electronic signals exchanged between the various parts (ball and players generators, sync generators, diode matrix, etc.) are binary.[4] The games and logic itself are implemented in DTL, a common pre-TTL digital design component using discrete transistors and diodes. The system was powered by batteries. The Odyssey lacks

sound capability, something that was corrected with the "Pong systems" of several years later, including Magnavox's own Odyssey-labeled Pong consoles. Ralph Baer proposed a sound extension to Magnavox in 1973, but the idea was rejected.

The Odyssey uses a type of removable printed circuit board card that inserts into a slot similar to a cartridge slot; these do not contain any components but have a series of jumpers between pins of the card connector. These jumpers interconnect different logic and signal generators to produce the desired game logic and screen output components respectively. The system was sold with translucent plastic overlays that gamers could put on their TV screen to simulate color graphics, though only two TV sizes were supported. Some of these overlays could even be used with the same cartridges, though with different rules for playing. It was also sold with dice, poker chips and score sheets to help keep score, much like a traditional board game. Ralph Baer also proposed the concept of "active cartridges" containing additional electronic components allowing adding more game features such as sound effects, variable net position, variable ball speed, etc. Unfortunately the idea did not catch any interest. In retrospect, all ROM-based cartridge manufacturers may have been required to pay a royalty to Sanders Associates had Ralph Baer filed a patent for his "active cartridges".

Peripherals

The Odyssey was also designed to support an add-on peripheral, the first-ever commercial video "light gun" called the Shooting Gallery. This detected light from the TV screen, though pointing the gun at a nearby light bulb also registered as a "hit".

Baer also designed a putting game, which used a golf ball fixed to the top of a joystick which the player would hit using a putter. This idea interested Magnavox, which took the prototype for testing, and was initially planned to be released as an add-on like the electronic rifle, but ultimately was never released.

Recently, Baer replicated his active cards and putting game. They can be seen in the Museum of the Moving Image in New York.[5]

History

The Odyssey was released in August 1972. However, sales of the console were hurt by poor marketing by Magnavox retail stores, in addition to many consumers being led to believe that the Odyssey would work only on Magnavox televisions. For that reason, most later "Pong" games had an explanation on their box saying "Works on any television set, black and white or color".

Magnavox settled a court case against Atari, Inc. for patent infringement in Atari's design of *Pong*, as it resembled the tennis game for the Odyssey. Over the next decade, Magnavox sued other big companies such as Coleco, Mattel, Seeburg, Activision and either won or settled every suit.[6] [7] In 1985, Nintendo sued Magnavox and tried to invalidate Baer's patents by saying that the first video game was William Higinbotham's *Tennis for Two* game built in 1958. The court ruled that this game did not use video signals and could not qualify as a video game. As a result, Nintendo lost the suit and continued paying royalties to Sanders Associates.

Baer went on to invent the classic electronic game *Simon* for Mattel in 1978. Magnavox later released several other scaled down *Pong*-like consoles based under the Odyssey name (which did not use cartridges or game cards), and at one point a truly programmable, cartridge based console, the Odyssey², in 1978.

List of games

- *Analogic*
- *Baseball*
- *Basketball*
- *Brain Wave*
- *Cat & Mouse*
- *Dogfight*
- *Football*
- *Fun Zoo*
- *Handball*
- *Haunted House*
- *Hockey*
- *Interplanetary Voyage*
- *Invasion*
- *Percepts*
- *Prehistoric Safari*
- *Roulette*
- *Shooting Gallery*
- *Shootout*
- *Simon Says*
- *Ski*
- *Soccer*
- *States*
- *Submarine*
- *Table Tennis*
- *Tennis*
- *Volleyball*
- *Win*
- *Wipeout*

'mouse trap'

See also

- First video game

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External links

- Everything about the Odyssey (http://www.pong-story.com/odyssey.htm) by Ralph Baer's associate and videogame historian David Winter
- Magnavox Odyssey (http://www.magnavox-odyssey.com/) The online Odyssey museum
- Information about Ralph Baer's book *Videogames: In The Beginning* (http://www.rolentapress.com)
- Ralph Baer's story of the development of the *Odyssey* (http://www.ralphbaer.com/video_game_history.htm)
- The Dot Eaters entry (http://www.thedoteaters.com/stage1.php) on the history of the Odyssey
- ODYEMU (http://www.pong-story.com/odyemu.htm), an unfinished Odyssey simulator
- Michael McCourt (http://www.armchairarcade.com/neo/taxonomy/term/948) reviews the Odyssey games on Armchair Arcade

Magnavox Odyssey Series

Manufacturer	Magnavox
Type	Video game console
Generation	First generation era
Retail availability	• NA 1975
Controller input	Six control knobs

The **Magnavox Odyssey** was a general brand name of the company's complete line of home video game consoles released from 1972 through 1978. The line includes the original Magnavox Odyssey console, both Magnavox and Philips versions of the Odyssey series of dedicated video game consoles, and the Magnavox Odyssey² cartridge-based video game console released in 1978.

Magnavox Odyssey 2000

The Magnavox Odyssey is the world's first home video game console and was released by Magnavox in 1972. Designed by Ralph Baer and first demonstrated on May 24, 1972, it was sold by Magnavox and affiliates through 1975. The Odyssey uses a type of removable printed circuit board card that inserts into a slot similar to a cartridge slot, allowing the player to select the unit's various games.

Dedicated Odysseys (1975-1977)

Odyssey 100

The **Odyssey 100** dedicated console was released in 1975. It uses a multi-chip discrete component design, which makes it much simpler than all later dedicated consoles Magnavox would eventually release. Magnavox already had a single-chip design in mind that year, but wanted to have a product they could release immediately if Texas Instruments, the supplier of their single video game chips, was unable to deliver in a timely manner.[1]

The Odyssey 100 was designed around four Texas Instruments chips. It has two games (Tennis and Hockey); the tennis game is a simple variant of Pong. Neither game had on-screen scoring and the system used a crude buzzer for sound. The Odyssey 100 is powered by either six "C" batteries or a 9 volt AC adapter. Each player had three knobs for horizontal movement, vertical movement and ball trajectory adjustment ("English").

Odyssey 200

The **Odyssey 200** dedicated console was released in 1975. Using the TI single-chip design, the console improved on the Odyssey 100 in several areas. In addition to Tennis and Hockey, the Odyssey 200 featured a third game variation called "Smash". The Odyssey 200 was also the first video game console to feature either two-player or four-player options.[] The Odyssey 200 added non-digital on-screen scoring (a white rectangle moved one space to the right each time a player scored a point). Like the Odyssey 100, the Odyssey 200 is powered by either six "C" batteries or a 9 volt AC adapter and uses the same game control knobs as its predecessor.

Odyssey 300

The **Odyssey 300** dedicated console was released in 1976. Unlike Magnavox's previous two dedicated console products, the Odyssey 300 was meant to compete directly with the Coleco Telstar. Like the Telstar, the Odyssey 300 uses the AY-3-8500 chip as its logic and was among the first dedicated consoles to use a single IC chip as the focus of its design rather than multiple computer chips or transistor-transistor logic.[2] The 300 has the same three games as the Odyssey 200; unlike the 200, the Odyssey 300 console has three difficulty levels: Novice, Intermediate and Expert.[]

Odyssey 400

The **Odyssey 400** dedicated console was released in 1976. The 400 is essentially the same as the Odyssey 200 with automatic serve and on-screen digital scoring features added. The console plays the same three games as the 200 and has the same three game control knobs. An additional Texas Instruments chip was used to implement on-screen scoring.[3]

Odyssey 500

The **Odyssey 500** dedicated console was released in 1976. The console is essentially the same as the Odyssey 400 with one unique addition: instead of using vertical line "paddles", the console has special graphics that actually resemble simplified versions of human players. Three different graphics were used for the three different game variations; Magnavox marketed the 500 as having a fourth game (Soccer) by using the squash player graphics with the hockey playing field.[]

Odyssey 2000

The **Odyssey 2000** dedicated console was released in 1977. The 2000 was basically an updated version of the Odyssey 300. Like the 300, the Odyssey 2000 uses the AY-3-8500 single-chip design (which is also used in the Odyssey 3000). The Odyssey 2000 uses a single rotating knob for game control instead of the three knobs used by earlier Magnavox dedicated video game consoles. In addition to the Tennis, Hockey and Squash ("Smash") game variations, the 2000 adds the Practice variation of one-player squash.[4]

Odyssey 3000

The **Odyssey 3000** dedicated console was released in 1977. The 3000 features the same four game variations as the Odyssey 2000. With the Odyssey 3000, Magnavox abandoned its old case design with one with a more contemporary style. The console itself is more angular and less rounded; two flat buttons are used for the serve and reset functions[5] and the console settings knobs were reduced in size. The Odyssey 3000 uses a flat circular knob for selecting different games and unlike all previous Odyssey dedicated video game consoles, the 3000 features detachable game paddles (without any fire buttons).[6]

Odyssey 4000

Magnavox concluded their line of dedicated video game consoles with the **Odyssey 4000**. The Odyssey 4000 dedicated console was released in 1977. Based around the AY-3-8600 single-chip design, the 4000 features a total of eight game variations based on Tennis, Hockey, Squash and Practice. Unlike the Odyssey 3000, the 4000 featured detachable joysticks. The AY-3-8610 chip enabled the Odyssey 4000 to display color instead of black and white graphics.[]

Philips Odyssey Series

Philips released their own licensed version of the original Magnavox Odyssey before purchasing Magnavox in 1974, after which it continued to release its own versions of the dedicated Odyssey consoles.

Odyssey 200

The Odyssey 200 is the same as it's US released counterpart. Released across Europe in 1976, it was replaced by the Philips Odyssey 2001 in 1977.[7] .

Odyssey 2001

The Odyssey 2001 is the Philips version of the Magnavox Odyssey 4000, with differences in the games offered and the use of detachable paddles instead of joysticks. Released in 1977, the 2001 is based on the National Semiconductor MM-57105 chip, which plays Tennis, Hockey and Squash, and allows full color and direct sound on the TV.[8]

Odyssey 2100

The Odyssey 2100 was released in 1978 and uses the same case design as the 2001. Using the National Semiconductor MM-57186N chip, the 2100 plays 6 games with multiple varitions: Wipe-Out (Breakout style, 7 variants), Flipper (7 variants), Tennis (2 variants), Handball (2 variants), Ice Hockey (2 variants), Football (3 variants).[9]

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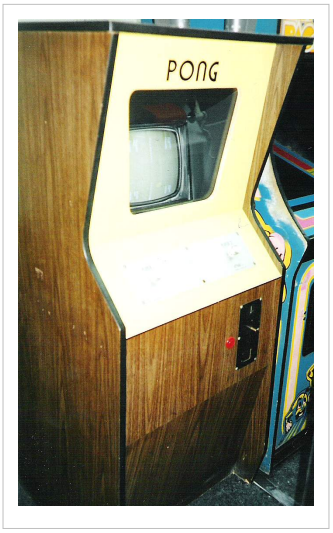
[3] OLD-COMPUTERS.COM - Magnavox Odyssey 400 (http://www.old-computers.com/museum/computer.asp?st=3&c=1282)
[4] OLD-COMPUTERS.COM - Magnavox Odyssey 2000 (http://www.old-computers.com/museum/computer.asp?st=3&c=1284)
[5] HuguesJohnson.com - Midwest Gaming Classic 2008 (http://www.huguesjohnson.com/features/mgc2008/index.html)
[6] Good Deal Games - Home Video Game Console History (http://www.gooddealgames.com/articles/Home Video Game History.html)
[7] http://www.pong-story.com/o200aus.htm
[8] http://www.pong-story.com/ody2001.htm
[9] http://www.pong-story.com/ody2100.htm

Pong

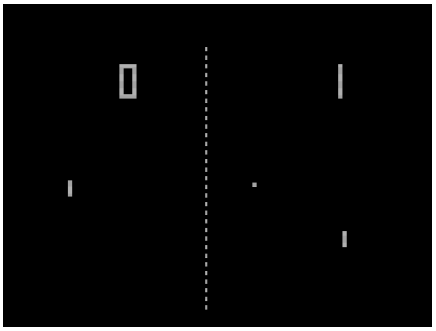
PONG	
 An upright cabinet of *Pong*.	
Developer(s)	Atari Inc.
Publisher(s)	Atari Inc.
Designer(s)	Allan Alcorn
Series	*Pong*
Platform(s)	Arcade
Release date(s)	1972
Genre(s)	Sports game
Cabinet	Upright
CPU	Discrete
Sound	Monaural
Display	Vertical orientation, black-and-white raster display, standard resolution

Pong (marketed as ***PONG***) is one of the earliest arcade video games, and is a tennis sports game featuring simple two-dimensional graphics. While other arcade video games such as *Computer Space* came before it, *Pong* was one of the first video games to reach mainstream popularity. The aim is to defeat your opponent in a simulated table tennis game by earning a higher score. The game was originally manufactured by Atari Incorporated (Atari), who released it in 1972. *Pong* was created by Allan Alcorn as a training exercise assigned to him by Atari co-founder Nolan Bushnell. Bushnell based the idea on an electronic ping-pong game included in the Magnavox Odyssey, which later resulted in a lawsuit against Atari. Surprised by the quality of Alcorn's work, Atari decided to manufacture the game.

Pong quickly became a success and is the first commercially successful video game, which led to the start of the video game industry. Soon after its release, several companies began producing games that copied *Pong*'s gameplay, and eventually released new types of games. As a result, Atari encouraged its staff to produce more innovative games. Several sequels were released that built upon the original's gameplay by adding new features. During the 1975 Christmas season, Atari released a home version of *Pong* exclusively through Sears retail stores. It was also a commercial success and led to numerous copies. The game has been remade on numerous home and portable platforms following its release. *Pong* has been referenced and parodied in multiple television shows and video

games, and has been a part of several video game and cultural exhibitions.

Gameplay



The two paddles return the ball back and forth. The score is kept by the numbers (0 and 1) at the top of the screen.

Pong is a two-dimensional sports game which simulates table tennis. The player controls an in-game paddle by moving it vertically across the left side of the screen, and can compete against either a computer controlled opponent or another player controlling a second paddle on the opposing side. Players use the paddles to hit a ball back and forth. The aim is for a player to earn more points than the opponent; points are earned when one fails to return the ball to the other.[1] [2] [3]

Development and history

Atari engineer Allan Alcorn designed and built *Pong* as a training exercise.

Pong was the first game developed by Atari Inc., founded in June 1972 by Nolan Bushnell and Ted Dabney.[4] [5] After producing *Computer Space*, Bushnell decided to form a company to produce more games by licensing ideas to other companies. Their first contract was with Bally Technologies for a driving game.[3] [6] Soon after the founding, Bushnell hired Allan Alcorn because of his experience with electrical engineering and computer science; Bushnell and Dabney also had previously worked with him at Ampex. Prior to working at Atari, Alcorn had no experience with video games.[7] To acclimate Alcorn to creating games, Bushnell gave him a project secretly meant to be a warm-up exercise.[7] [8] Bushnell told Alcorn that he had a contract with General Electric for a product, and asked Alcorn to create a simple game with one moving spot, two paddles, and digits for score keeping.[7] The project was inspired by a game included in the first video game console, the Magnavox Odyssey—in May 1972, Bushnell had visited the Magnavox Profit Caravan in Burlingame, California where he played the Magnavox Odyssey demonstration, specifically the table tennis game.[9] [10]

Alcorn first examined Bushnell's schematics for *Computer Space*, but found them to be illegible. He went on to create his own designs based on his knowledge of transistor–transistor logic and Bushnell's game. Feeling the basic game was too boring, Alcorn added features to give the game more appeal. He divided the paddle into eight segments to change the ball's angle of return. For example, the center segments return the ball a 90° angle in relation to the paddle, while the outer segments return the ball at smaller angles. He also made the ball accelerate the more it was returned back and forth between paddles; missing the ball reset the speed.[3] Another feature was that the in-game paddles could not reach the top of screen. This was caused by a simple circuit which had an inherent defect. Instead of dedicating time to fixing the defect, Alcorn decided it gave the game more difficulty and helped limit the time the game could be played; he imagined two skilled players being able to play forever otherwise.[7]

Three months into development, Bushnell told Alcorn he wanted the game to feature realistic sound effects and a roaring crowd.[7] [11] Dabney also wanted the game to "boo" and "hiss" when a player lost a round. Alcorn was running out of room on the circuit board and did not know how to create such sounds with digital circuits. After inspecting the sync generator, he discovered it could generate different tones and used those for the game's sound effects.[3] [7] To construct the prototype, Alcorn purchased a black and white television set from a local store, placed it into a 4 feet (1.2 m) wooden cabinet, and soldered the wires into boards to create the necessary circuitry. The prototype impressed Bushnell and Dabney so much that they felt it could be a profitable product and decided to test its marketability.[3]

Atari had established a pinball route consisting of local businesses to generate steady income.[5] In September 1972, Bushnell and Alcorn installed the *Pong* prototype at a local bar, Andy Capp's Tavern; they selected the bar because of their good working relation with the bar's manager, Bill Gaddis. They placed the prototype on one of the tables near the other entertainment machines: a jukebox, pinball machines, and *Computer Space*. The game was well received the first night and its popularity continued to grow over the next one and a half weeks. Bushnell then went on a business trip to Chicago to demonstrate *Pong* to executives at Bally and Midway Manufacturing;[12] he intended to use *Pong* to fulfill his contract with Bally, rather than the driving game.[3] [4] A few days later, the prototype began exhibiting complications and Gattis contacted Alcorn to fix it. Upon inspecting the machine, Alcorn discovered the mechanisms had jammed from an overflow of quarters.[12]

After hearing about the game's success, Bushnell decided there would be more profit for Atari to manufacture the game rather than license it, but the interest of Bally and Midway had already been piqued.[4] [12] Bushnell decided to inform each of the two groups that the other was not interested—Bushnell told the Bally executives that the Midway executives did not want it and vice versa—to preserve the relationships for future dealings. Upon hearing this, the two groups declined Bushnell's offer.[12] Bushnell had difficulty finding financial backing for *Pong*; banks viewed it as a variant of pinball, which at the time the general public associated with the Mafia. Atari eventually obtained a line of credit from Wells Fargo that it used to expand their facilities to house an assembly line. Management sought assembly workers at the local unemployment office, but was unable to keep up with demand. The first arcade cabinets produced were assembled very slowly, about ten machines a day, many of which failed quality testing. Atari eventually streamlined the process and began producing the game in greater quantities.[13] By 1973, they began shipping *Pong* to other countries with the aid of foreign partners.[14]

Home version

The success of *Pong* resulted in Bushnell pushing his employees to create new products.[4] [15] In 1974, Atari engineer Harold Lee proposed a home version of *Pong* that would connect to a television: *Home Pong*. The system began development under the codename *Darlene*, named after an attractive female employee at Atari. Alcorn worked with Lee to develop the designs and prototype, and based them on the same digital technology used in their arcade games. The two worked in shifts to save time and money; Lee worked on the design's logic during the day, while Alcorn debugged the designs in the evenings. After the designs were approved, fellow Atari engineer Bob Brown assisted Alcorn and Lee in building a prototype. The prototype consisted of a device attached to a wooden pedestal containing over a hundred wires, which would eventually be replaced with a single chip designed by Alcorn and Lee; the chip had yet to be tested and built before the prototype was constructed. The chip was finished in the later half of 1974, and was, at the time, the highest performing chip used in a consumer product.[15]

Bushnell and Gene Lipkin, Atari's vice-president of sales, approached toy and electronic retailers to sell *Home Pong*, but were rejected; retailers felt the product was too expensive and would not interest consumers. Atari contacted Sears' Sporting Goods department after noticing a Magnavox Odyssey advertisement in the sporting goods section of their catalog. They discussed the game with a representative, Tom Quinn, who expressed enthusiasm and offered Atari an exclusive deal. Believing they could find more favorable terms elsewhere, Atari's executives declined and continued to pursue toy retailers. In January 1975, Atari staff set up a *Home Pong* booth at a toy trade fair in New York City, but was unsuccessful in soliciting orders.[15]

Atari's *Home Pong* console, released through Sears in 1975, and the original Sears Catalog advertisement.

While at the show, they met Quinn again, and, a few days later, set up a meeting with him to obtain a sales order. In order to gain approval from the Sporting Goods department, Quinn suggested Atari demonstrate the game to executives in Chicago. Alcorn and Lipkin traveled to the Sears Tower and, despite a technical complication, obtained approval. Bushnell told Quinn he could produce 75,000 units in time for the Christmas season, however, Quinn requested double the amount. Though Bushnell knew Atari lacked the capacity to manufacture 150,000 units, he agreed.[15] Atari acquired a new factory through funding obtained by venture capitalist Don Valentine. Supervised by Jimm Tubb, the factory fulfilled the Sears order.[16] The first units manufactured were branded with Sears' "Tele-Games" name. Atari later released a version under their own brand in 1976.[17]


The Magnavox Odyssey, invented by Ralph H. Baer, inspired *Pong*'s development.

Lawsuit from Magnavox

The success of *Pong* attracted the attention of Ralph Baer, the inventor of the Magnavox Odyssey, and his employer, Sanders Associates. Sanders had an agreement with Magnavox to handle the Odyssey's sublicensing, which included dealing with infringement on their exclusive rights. However, Magnavox had not pursued legal action against Atari and numerous other companies which released *Pong* clones.[18] Sanders applied pressure for three years, and in 1975 Magnavox filed suit against Atari, Bally Midway, and Chicago Dynamics.[18] [19] Magnavox argued that Atari had infringed on Baer's patents and his concept of electronic ping-pong based on detailed records Sanders kept of the Odyssey's design process dating back to 1966. Other documents included depositions from witnesses and a signed guest book that demonstrated Bushnell had played the Odyssey's table tennis game prior to releasing *Pong*.[18] [20] In response to claims that he saw the Odyssey, Bushnell later stated that, "The fact is that I absolutely did see the Odyssey game and I didn't think it was very clever."[21]

After considering his options, Bushnell decided to settle with Magnavox out of court. Bushnell's lawyer felt they could win, however, he estimated legal costs of US$1.5 million, which would have exceeded Atari's funds. Magnavox offered Atari an agreement to become a licensee for US$700,000. Other companies producing "*Pong* clones"—Atari's competitors—would have to pay royalties. In addition, Magnavox would obtain the rights to Atari products developed over the next year.[18] [20] Magnavox continued to pursue legal action against the other companies, and proceedings began shortly after Atari's settlement in June 1976. The first case took place at the

United States District Court in Chicago, with Judge John Grady presiding.[18] [19] [20] To avoid Magnavox obtaining rights to their products, Atari decided to delay the release of their products for a year, and withheld information from Magnavox's attorneys during visits to their facilities.[20]

Impact and legacy

The *Pong* arcade games manufactured by Atari were a great success. The prototype was well received by Andy Capp's Tavern patrons, with people coming to the bar solely to play the game.[4] [12] Following its release, *Pong* consistently earned four times more revenue than other coin-operated machines, which resulted in an increase in the number of orders Atari received. This provided Atari with a steady source of income; the company sold the machines at three times the cost of production. By 1973, the company had filled 2,500 orders, and, at the end of 1974, sold more than 8,000 units.[22] The arcade cabinets have since become collector's items with the cocktail-table version being the rarest.[23] Atari eventually sold more than 35,000 units, however, many more imitations were produced by competitors.[24] [25] Soon after the game's successful testing at Andy Capp's Tavern, other companies began visiting the bar to inspect it. Similar games appeared on the market three months later, produced by companies like Ramtek and Nutting Associates.[26] Atari could do little against the competitors as they had not initially filed for patents on the solid state technology used in the game. When the company did file for patents, complications delayed the process. As a result, the market consisted primarily of "*Pong* clones"; author Steven Kent estimated that Atari had produced less than a third of the machines.[25] Bushnell referred to the competitors as "Jackals" because he felt they had an unfair advantage. His solution to competing against them was to produce more innovative games and concepts.[25] [26]

Home Pong was an instant success following its limited 1975 release through Sears; around 150,000 units were sold that holiday season.[27] [28] The game became Sears' most successful product at the time, which earned Atari a Sears Quality Excellence Award.[28] Similar to the arcade version, several companies released clones to capitalize on the home console's success, many of which continued to produce new consoles and video games. Magnavox re-released their Odyssey system with simplified hardware and new features, and would later release updated versions. Coleco entered the video game market with their Telstar console; it features three *Pong* variants and was also succeeded by newer models.[27] Nintendo released the Color TV Game 6 in 1977, which plays six variations of electronic tennis. The next year, it was followed by an updated version, the Color TV Game 15, which features fifteen variations. The systems were Nintendo's entry into the home video game market and the first to produce themselves—they had previously licensed the Magnavox Odyssey.[29] The dedicated *Pong* consoles and the numerous clones have since become varying levels of rare; Atari's *Pong* consoles are common, while APF Electronics' TV Fun consoles are moderately rare.[30] Prices among collectors, however, vary with rarity; the Sears Tele-Games versions are often cheaper than those with the Atari brand.[27]

Several publications consider *Pong* the game which launched the video game industry as a lucrative enterprise.[8] [17] [31] Video game author David Ellis sees the game as the cornerstone of the video game industry's success, and called the arcade game "one of the most historically significant" titles.[4] [23] Kent attributes the "arcade phenomenon" to *Pong* and Atari's games that followed it, and considers the release of the home version the successful beginning of home video game consoles.[26] [28] Bill Loguidice and Matt Barton of Gamasutra referred to the game's release as the start of a new entertainment medium, and commented that its simple, intuitive gameplay made it a success.[17] Many of the

Tele-Games *Pong IV*, Sears' version of *Pong* sequel (*Pong Doubles*), was one of the many consoles that flooded the market by 1977.

companies that produced their own versions of *Pong* eventually became well-known within the industry. Nintendo entered the video game market with clones of *Home Pong*. The revenue generated from them—each system sold over a million units—helped the company survive a difficult financial time, and spurred them to pursue video games further.[29] After seeing the success of *Pong*, Konami decided to break into the arcade game market and released its first title, *Maze*. Its moderate success spurred Konami to develop more titles.[32]

Sequels and remakes

Bushnell felt the best way to compete against imitators was to create better products, leading Atari to produce sequels in the years followings the original's release: *Pong Doubles*, *Super Pong*, *Quadrapong*, and *Pin-Pong*.[2] The sequels featured similar graphics, but included new gameplay elements; for example, *Pong Doubles* allows four players to compete in pairs, while *Quadrapong* has them compete against each other in a four way field.[33] [34] Bushnell also conceptualized a free-to-play version of *Pong* to entertain children in a Doctor's office. He initially titled it *Snoopy Pong* and fashioned the cabinet after Snoopy's doghouse with the character on top, but retitled it to *Puppy Pong* and altered Snoopy to a generic dog to avoid legal action. Bushnell later used the game in his chain of Chuck E. Cheese's restaurants.[2] [35] [36] [37] [38] In 1976, Atari released *Breakout*, a single-player variation of *Pong* where the object of the game is to remove bricks from a wall by hitting them with a ball.[39] Like *Pong*, *Breakout* was followed by numerous clones that copied the gameplay: *Arkanoid*, *Alleyway*, *Break 'Em All*.

Atari has also remade the game on numerous platforms. *Pong* has been included in several Atari compilations on platforms including the Sega Mega Drive, PlayStation Portable, Nintendo DS, and personal computer.[40] [41] [42] [43] [44] Through an agreement with Atari, Bally Gaming and Systems developed a slot machine version of the game.[45] The Atari developed *TD Overdrive* included *Pong* as an extra game to be played during the loading screen.[46] [47] In 1999, the game was remade for home computers and the PlayStation with 3D graphics and power-ups.[48] [49]

In popular culture

Pong has appeared in several facets of popular culture. The game is prominently featured in episodes of several television series: *That '70s Show*,[50] *King of the Hill*,[51] and *Saturday Night Live*.[52] In 2006, an American Express commercial featured Andy Roddick in a tennis match against the white, in-game paddle.[53] Other video games have also referenced and parodied *Pong*; for example *Neuromancer* for the Commodore 64 and *Banjo-Kazooie: Nuts and Bolts* for the Xbox 360.[54] [55] The concert event Video Games Live has performed audio from *Pong* as part of a special retro "Classic Arcade Medley".[56] Frank Black's song "Whatever Happened to Pong?" on the album *Teenager of the Year* heavily references the game's elements.[57]

Dutch design studio Buro Vormkrijgers created a *Pong*-themed clock as a fun project within their offices. After the studio decided to manufacture it for retail, Atari took legal action in February 2006. The two companies eventually reached an agreement in which Buro Vormkrijgers could produce a limited number under license.[58] In 1999, French artist Pierre Huyghe created an installation entitled "Atari Light", in which two people use handheld gaming devices to play *Pong* on an illuminated ceiling. The work was shown at the Venice Biennale in 2001, and the Museo de Arte Contemporáneo de Castilla y León in 2007.[59] [60] The game was included in the London Science Museum's 2006 Game On exhibition meant to showcase the various aspects of video game history, development, and culture.[61]

See also

- History of video games

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External links

- Pong-story.com (http://www.pong-story.com), the most comprehensive site about Pong and its origins.
- The Atari Museum (http://www.atarimuseum.com/) An in-depth look at Atari and its history
- Pong variants (http://www.mobygames.com/game-group/pong-variants) at MobyGames

Telstar (game console)

Manufacturer	Coleco
Type	Dedicated console
Generation	First generation
Retail availability	1976-1978
Successor	ColecoVision (1982-1984)

The **Telstar** is a series of video game consoles produced by Coleco from 1976 to 1978. Starting with Telstar *Pong* clone based on General Instrument's AY-3-8500 chip in 1976, there were 14 consoles released in the Telstar branded series.

Models

1. **Telstar** - (model 6040, 1976) Three *Pong* variants (hockey, handball, tennis), two paddle controllers fixed on console. This was the very first game to use the AY-3-8500 chip.[1]
2. **Telstar Classic** - (model 6045, 1976) Same as the Telstar, with deluxe wood case.
3. **Telstar Deluxe** - (1977) aka "Video World Of Sports", same as the Telstar but brown pedestal case with wood panel, made for Canadian market with French and English text.
4. **Telstar Ranger** - (model 6046, 1977) Four *Pong* variants (hockey, handball, tennis, jai alai) and two gun games (target, skeet), black and white plastic case, includes revolver-style light gun and separate paddle controllers. Uses the AY-3-8500 chip.
5. **Telstar Alpha** - (model 6030, 1977) Four *Pong* variants, black and white plastic case, fixed paddles. Uses the AY-3-8500 chip.
6. **Telstar Colormatic** - (model 6130, 1977) Same as the Telstar Alpha but with detached wired paddles as well as color graphics. Uses the AY-3-8500 game chip and the Texas Instruments SN76499N chip for color.
7. **Telstar Regent** - (model 6036, 1977) Same as the Telstar Colormatic but no color and black and white case.
8. **Telstar Sportsman** - (1978) Similar to Telstar Regent, but with an additional light gun and different setting switches.

Telstar Alpha

9. **Telstar Combat!** - (model 6065, 1977) Four variations on Kee Games' *Tank*, four fixed joysticks (two per player), uses a General Instruments AY-3-8700 Tank chip.
10. **Telstar Colortron** - (model 6135, 1978) Four *Pong* variants, in color, built in sound, fixed paddles, uses AY-3-8510 chip.
11. **Telstar Marksman** - (model 6136, 1978) Four *Pong* variants and two gun games in color, larger light gun with removable stock, fixed paddles, uses AY-3-8512 chip.
12. **Telstar Galaxy** - Separate joysticks and fixed paddles, uses AY-3-8600 game chip and AY-3-8615 color encoder.

13. **Telstar Gemini** - (1978) Four pinball games and two light-gun games in color, light gun, two flipper buttons on left and right sides of case, pinball launch button and field adjustment sliders on top, light gun, uses a MOS Technology MPS 7600-004 chip.
14. **Telstar Arcade** - Cartridge-based, triangular case includes light gun, steering wheel with gear shift, and paddles, one on each side. Each cartridge includes a customized MOS Technology MPS-7600 chip. The chip contained custom logic circuits driven by a basic processor which ran a very small program stored in ROM.

The large product lineup and the impending fading out of the *Pong* machines led Coleco to face near-bankruptcy in 1980.

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[1] http://colecomuseum.com/colecotelstar.php

External links

- Pong-Story: All Coleco Telstar systems, with photos (http://www.pong-story.com/coleco.htm)
- Telstar and other systems (http://www.classicgaming.com/gamingmuseum/museum.html)
- The Dot Eaters entry (http://www.thedoteaters.com/p3_stage4.php) on the history of Telstar and Coleco
- The COLECO Story by Ralph H. Baer (http://pongmuseum.com/history/baer-theCOLECOstory.php)

APF TV Fun

APF TV Fun	
Developer(s)	APF Electronics Inc.
Publisher(s)	APF Electronics Inc.
Platform(s)	Arcade
Genre(s)	Sports simulation
Cabinet	Standard
CPU	AY-3-8500 chipset from General Instruments[1]
Sound	Amplified mono (one channel)
Display	Vertical orientation, black-and-white raster display, standard resolution

The **APF TV Fun** was an early competitor of Pong manufactured by APF Electronics Inc. and built in Japan in 1976. It featured four built in games, a built in speaker, and two controller knobs, Toggle Switches (choices were "Professional" and "Amateur") for the following settings - Angle / Bat Size / Ball Speed. There were 2 buttons - Power and Start Game, and a dial to select between the four built-in games.[2] It could be powered by either the included AC adapter or by using six C size batteries[2] .The game was named by 11 year old Stuart Lipper, the son of the CFO and nephew of the President, he was paid $1 for his efforts.

The TV Fun package was the first excursion of APF into the video game market, APF was formerly a calculator and other small electronics developer. The TV Fun was one of the largest selling TV games of its time. It was sold at Sears under the name Hockey Jockari. TV Fun was followed up by the MP 1000 and then APF Imagination Machine a few years later. The TV Fun included just four titles, and had no way of adding more through a cartridge system. Those four titles were Tennis, Hockey, Single Handball, and Squash - all of which were variations on the typical pong formula.

The system itself was 16" x 7.5" x 3" and featured a faux-woodgrain finish, as did many of the early home video game consoles.

References

[1] Old Computers Museum "APF TV Fun" - http://www.old-computers.com/museum/computer.asp?c=1009&st=1

[2] Vid Game Net - "PONG APF FUN" http://www.vidgame.net/PONG/apf_fun.htm

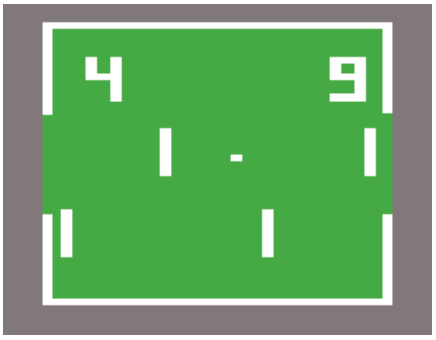
Color TV Game

The Color TV Game 6, released in 1977

Manufacturer	Nintendo
Type	Dedicated console
Generation	First generation
Retail availability	1977-1979[1]
Successor	Nintendo Entertainment System

Color TV Game (カラー テレビゲーム *Karā Terebi Gēmu*) is a series of home dedicated consoles created by Nintendo. There were five different consoles in the series developed and released only in Japan.

History



Screenshot of one of the games in *Color TV Game 15* and *Color TV Game 6*.

The series debuted in 1977 with the *Color TV Game 6* (カラーテレビゲーム6 *Karā Terebi Gēmu Roku*).[1] [2] It contained six variations of "Light Tennis" (or Pong). The players controlled their paddles with dials attached directly to the machine. Additionally, as an alternative to the standard version, a white-colored C Battery powered model of the Color TV Game 6 was introduced. With a limited run of only a few hundred units, these white colored units are largely considered to be the most prized by serious collectors.

Color TV-Game 15

In 1978, Nintendo released the *Color TV Game 15* (カラーテレビゲーム15 *Karā Terebi Gēmu Jū Go*). With the two controllers now on cables (making for much more comfortable play) and 15 slightly different versions of Light Tennis, the CTG 15 sold over a million units. Two models of the CTG 15 were released, the only difference between the two being a slight color tint change. The lighter orange version is considered significantly more difficult to find by collectors, while the dark orange version is somewhat more common. In the same year, Nintendo released the *Color TV Racing 112* (カラーテレビレーシング112 *Karā Terebi Gēmu Hyaku Jū Ni*), a bird's-eye-view racing game that implemented a steering wheel and gearshift. Alternatively, two smaller controllers could be used for multiplayer.

The "Color TV Game Block Breaker" (カラーテレビゲームブロック崩し *Karā Terebi Gēmu Burokku Kuzushi*) was released in 1979; the 1-player console ran a ported version of "Block Breaker" (ブロック崩し *Burokku Kuzushi*), one of Nintendo's arcade games based on Atari's *Breakout*. Like the Color TV Game 6, the in-game paddle was controlled by a dial attached to the system. The system's external design was one of Shigeru Miyamoto's first video-game projects after joining Nintendo in 1977.

The final console in the series was the *Computer TV Game* (コンピューターテレビゲーム *Konpyūtā Terebi Gēmu*), and it was released in 1980. Like other consoles in the Color TV Game series, it was distributed only in Japan. One of the games in this console was a port of Nintendo's first video arcade game, *Computer Othello*.

Related releases

Over two decades after their release, Nintendo would feature Color TV Games in their *WarioWare* series. *WarioWare, Inc.: Mega Microgame$!*, released for the Game Boy Advance in 2003, includes a microgame version of *Color TV Racing 112*, as part of 9-Volt's collection of old Nintendo games. *Color TV Game 6* also became a microgame. It was one of 9-Volt and 18-Volt's Nintendo games in *WarioWare: Smooth Moves*, released for the Wii in 2006.

References

[1] DeMaria, Rusel; Wilson, Johnny L. (2003), *High Score!: The Illustrated History of Electronic Games* (2 ed.), McGraw-Hill, pp. 363 (http://books.google.com/books?id=HJNvZLvpCEQC&pg=PT5&vq="color+tv+game"), 378 (http://books.google.com/books?id=HJNvZLvpCEQC&pg=PT20&vq="color+tv+game"), ISBN 978-0-07-223172-4

[2] Fleming, Dan (1996), *Powerplay*, Manchester University Press ND, p. 180 (http://books.google.com/books?id=U3u7AAAAIAAJ&pg=PA180&dq="color+tv+game"), ISBN 978-0-7190-4717-6

Further reading

- Sheff, David; Eddy, Andy (1999), *Game Over: How Nintendo Conquered the World*, GamePress, pp. 15, 27–28, 32 (http://books.google.com/books?id=0dK2AAAAIAAJ&q="Color+TV+Game"), ISBN 978-0-9669617-0-6

External links

- Color TV Game (http://www.nindb.net/system/color-tv-game.html) at NinDB (http://www.nindb.net)
- *Color TV Game 15 + Color TV Game 6* at gameads.gamepressure.com (http://gameads.gamepressure.com/tv_game_commercial.asp?ID=8140)

Video Pinball

Video Pinball	
	
Developer(s)	Atari Inc.
Publisher(s)	Atari Inc.
Designer(s)	Bob Smith (2600 version)
Platform(s)	Dedicated console, Arcade, Atari 2600
Release date(s)	• NA 1977
Genre(s)	Pinball
Mode(s)	Up to 2 players, alternating turns
Cabinet	Upright
Display	Horizontal orientation, Raster, medium resolution

Video Pinball is a dedicated video game console released 1977 as another Atari Inc. coin-op to standalone home console translation, by bringing the game *Breakout* to home players. Bumper controllers on the sides or a dial on the front were used to control the games depending on the game selected. There were three game types — Pinball, Basketball, and Breakout.

Gameplay

Video Pinball allowed 7 games (4 pinball variations, 1 basketball, 2 breakout variations), and used a micro-controller and a small amount of RAM rather than the "Pong on a chip" IC's used in the slew of pong machines Atari Inc. had been releasing. Pinball was played with the side bumpers, and Breakout and Basketball with the dial.

Ports

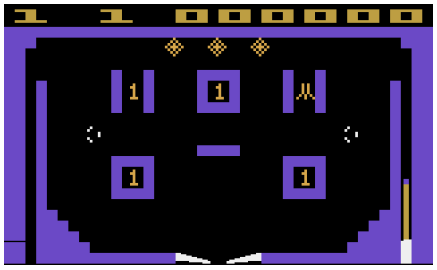
Video Pinball coin-op

Atari Video Pinball Coin-Op

Released in 1978, Mounted inside the cabinet is a 3-D playfield with bumpers, LEDs and fully decorated with a city nightline, neon stars and disco dancers. The control panel consists of a start button, a plunger to "launch" the ball, and flippers on the left and right sides. The control panel also has a spring that allows the player to push down on it for a nudge effect.

Atari 2600

Released for the Atari 2600 video game console in 1980, it featured actual simulations of a pinball machine ball shooter, flippers, bumpers and spinners. The game also implemented a simulation of a real ball's actual physics. The game also features a unique rollover bonus with an Atari Inc. logo on the playfield; hitting the logo four times results in an extra ball[1] . It was programmed by Bob Smith.



Atari 2600 version

Most of the game play involves learning how to perform specific functions, such as launching the ball or activating the flippers, with the Atari 2600 joystick. Moving the joystick controller down pulls the pinball machine plunger back while pressing the joystick button shoots the ball into the playfield. The left and right flippers are activated by moving the joystick controller left or right. The ball can be nudged (as in nudging a table gently in real life) by holding down the joystick button and moving the controller in a particular direction.

The Atari 2600 version of *Video Pinball* was made available on Microsoft's *Game Room* service for its Xbox 360 console and for Windows-based PCs in June 2010.

See also

- Raster Blaster
- Midnight Magic (Atari 2600)

External links

- AtariAge - Video Pinball page [2]
- AtariAge - Video Pinball instruction manual [3]
- *Video Pinball* [4] at MobyGames
- Article on Video Pinball at CriticalMess.net [5]

References

[1] http://www.atariage.com/manual_html_page.html?SoftwareLabelID=588

The Second Generation

History of video game consoles (second generation)

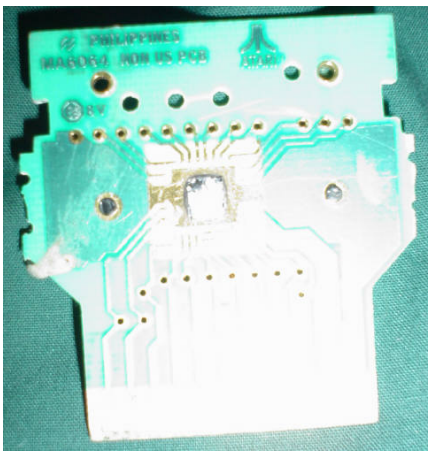
In the history of computer and video games, the **second generation** (sometimes referred to as the **early 8 bit era** or to a lesser extent, the **4 bit era**) began in 1976 with the release of the Fairchild Channel F and Radofin 1292 Advanced Programmable Video System.

The early portion of this generation saw the release of several consoles as various companies decided to enter the market, and an occurrence of a later portion whose releases were in direct reaction to the earlier consoles. The Atari 2600 was the dominant console for much of the second generation, with other consoles such as the Intellivision, Odyssey 2, and ColecoVision also enjoying market share.

The second generation came to an abrupt end in 1984 amid the video game crash of 1983.

Early 8-bit home consoles (1976-1983)

The earliest console, the Magnavox Odyssey, had used removable cartridges that were nothing but glorified jumpers to activate the games already wired in to the console. This method was soon replaced during the move to Pong consoles, where the logic for one or more games was hardcoded into microchips using discrete logic, and no additional games could ever be added. By the mid-1970s cartridges had returned with the move to CPU based consoles. With games now consisting of microprocessor based code, these games were burned onto ROM chips that were mounted inside plastic cartridge casings that could be plugged into slots on the console. When the cartridges were plugged in, the general-purpose microprocessors in the consoles read the cartridge memory and ran whatever program was stored there. Rather than being confined to a small selection of games included in the box, consumers could now amass libraries of game cartridges.



An Atari 2600 game cartridge circuit board

The Fairchild VES was the world's first CPU based video game console, introducing the cartridge-based game code storage format. It was released by Fairchild Semiconductor in August 1976. When Atari released their VCS the next year, Fairchild quickly re-named it to the Fairchild Channel F.

In 1977, Atari released its CPU based console called the Video Computer System (VCS), later called Atari 2600. Nine games were designed and released for the holiday season. It would quickly become by far the most popular of all the early consoles.

The Bally Astrocade was originally referred to as the Bally Home Library Computer, and was released in 1977, but available only through mail order. Delays in the production meant none of the units actually shipped until 1978, and by this time the machine had been renamed the Bally Professional Arcade. In this form it sold mostly at computer stores and had little retail exposure (unlike the Atari VCS). In 1979 Bally grew less interested in the arcade market and decided to sell off their Consumer Products Division, including development and production of the game console. In 1981 they re-released the unit with the BASIC cartridge included for free, this time known as the Bally

Computer System, and then changed the name again in 1982 to Astrocade. It sold under this name until the video game crash of 1983, and then disappeared around 1985.

In 1978, Magnavox released its CPU based console, the Odyssey 2, in the United States and Canada. Philips Electronics released this same game console as the Philips G7000 in many European countries. Although it never became as popular as Atari, it managed to sell several million units through 1983. Philips had also designed the more powerful Interton VC 4000 console family (e.g. 1292 Advanced Programmable Video System) before this.

In 1979, Activision was created by disgruntled former Atari programmers. It was the first third-party developer of video games. Many new developers would follow their lead in succeeding years.

The next major entry was Intellivision, introduced by Mattel in 1980. Though chronologically coming long before the "16-bit era", the Intellivision had a unique processor with instructions that were 10 bits wide (allowing more instruction variety and potential speed), and registers 16 bits wide. The system rocketed to popularity alongside the 2600.

Though not the first system to challenge Atari, it was the first to pose a serious threat to Atari's dominance. A series of Intellivision TV ads featuring George Plimpton mercilessly attacked the Atari VCS's lesser capabilities with side-by-side game comparisons. Nevertheless, Atari held exclusive rights to most of the popular arcade game conversions of the day, and used this key segment to support their older hardware in the market. This game advantage and the difference in price between the machines meant that each year Atari sold more units than Intellivision, lengthening its lead despite inferior graphics. This need for price parity has influenced every console war since.

1982 saw the introduction of four new consoles, the Emerson Arcadia 2001, the Vectrex, the ColecoVision, and the Atari 5200. The Vectrex was unique among home systems of the time in featuring vector graphics and its own self-contained display. The Arcadia and ColecoVision were even more powerful machines.

The popularity of early consoles was strongly influenced by their ports of arcade games. The Atari 2600 was the first with *Space Invaders*, and the Colecovision bundled in Nintendo's *Donkey Kong*.

Early cartridges were 2 KB ROMs for Atari 2600 and 4 KB for Intellivision. This upper limit grew steadily from 1978 to 1983, up to 16 KB for Atari 2600 and Intellivision, 32 KB for ColecoVision. *Bank switching*, a technique that allowed two different parts of the program to use the same memory addresses was required for the larger cartridges to work. In contrast, some Arcadia family members (e.g. Palladium VCG) supported up to 31 KB without any need for bank switching. In the game consoles, high RAM prices at the time limited the RAM (memory) capacity of the systems to a tiny amount, often less than 1 KB. Although the cartridge size limit grew steadily, the RAM limit was part of the console itself and all games had to work within its constraints.

By 1982 a glut of consoles, over-hyped game releases, and games from new third-party developers less well-prepared than Activision began to appear - overflowing the shelf capacity of toy stores. In part because of these oversupplies, the video game industry crashed, starting from Christmas 1983 and stretching through all of 1984.

Sales

As of 2004, the Atari 2600 has sold 30 million units.[1] As of 1990, the Intellivision had sold 3 million units.[2] [3] [4]

Comparison

Name	Fairchild Channel F	Atari 2600	Magnavox Odyssey²	Intellivision	Atari 5200
Console					
Launch prices	US$169.95	US$199	US$200 ¥49,800	US$299	US$270
Release date	• US August 1976	• US October 1977 • EU 1978 • JP October 1983	• US 1978 • EU December 1982 • JP 1982 • BRZ 1983	• US 1979 • EU 1982 • JP 1982	• US November 1982
Media	Cartridge	Cartridge and Cassette, available via special 3rd party attachment)	Cartridge	Cartridge	Cartridge
Top-selling games	N/A	*Pac-Man*, 7 million (as of September 1, 2006)[5] [6]	N/A	*Astrosmash* (1 million)[7]	N/A
Backward compatibility	N/A	N/A	None	Atari 2600 games through the System Changer module	Atari 2600 games through the 2600 cartridge adapter
Accessories (retail)	N/A	• Driving controller • Keypad • Game Brain • Starpath Supercharger • GameLine	• The Voice • Chess Module	• Keyboard component (cancelled) • Entertainment Computer System • Intellivoice	• Trak-Ball Controller • Atari 2600 adaptor
CPU	Fairchild F8 1.79 MHz (PAL 2.00 MHz)	MOS Technology 6507 1.19 MHz	Intel 8048 8-bit microcontroller 1.79 MHz	General Instrument CP1610 894.886 kHz	Custom MOS 6502C 1.79 MHz (*not* a 65c02)
Memory	64 bytes, 2 kB VRAM (2×128×64 bits)	(within a MOS Technology RIOT chip): 128 bytes (additional RAM may be included in the game cartridges)	CPU-internal RAM: 64 bytes Audio/video RAM: 128 bytes	1456 bytes main RAM	16 kB main RAM

Video	• 102 × 58 pixels visible • 8 colors, maximum of 4 per scanline	• 160 x 192 resolution • 2 sprites, 2 missiles and 1 ball per scanline. Sprites can be use multiple times through the HMOVE command. • 2 backgrounds colors and 2 sprite colors per scanline • 128 colors (NTSC) • 104 colors (PAL)	• 160×200 resolution (NTSC) • 16-color fixed palette; sprites use 8 colors • 4 8×8 single-color user-defined sprites • 12 8×8 single-color characters; 64 shapes built into ROM BIOS; • 4 quad characters; • 9×8 background grid; dots, lines, or blocks	• 159x96 pixels (159x192 display on a TV screen, scanlines being doubled) • 16 color palette, all of which can be on the screen at once • 8 sprites.	• 320×192 resolution, • 16 (out of 256) on-screen colors per scan line with 256 colors capable of being displayed at once.
Audio	Mono audio with: • 500 Hz, 1 kHz, and 1.5 kHz tones (can be modulated quickly to produce different tones)	Mono	Mono audio with: • 24-bit shift register, clockable at 2 frequencies • noise generator	Mono audio with: • three channel sound • one noise generator	Mono audio with: • 4-channel sound

Name	**Vectrex**	**Emerson Arcadia 2001**	**ColecoVision**	**Bally Astrocade**	**Sega SG-1000**
Console					
Launch prices	US$199	N/A	N/A	N/A	¥15,000(JP)
Release date	• US November 1982 • EU May 1983 • JP June 1983	• US 1982	• US August 1982 • EU May 1982	• US 1977	• JP July 15, 1983 • AUS 1983
Media	Cartridge	Cartridge	Cartridge and Cassette, available with Expansion #3	Cartridge and cassette/Floppy, available with ZGRASS unit	Cartridge and Cassette (SG-3000)
Top-selling games	N/A	N/A	*Donkey Kong* (pack-in)	N/A	N/A
Backward compatibility	N/A	N/A	Compatible with Atari 2600 Via Expansion #1	N/A	N/A
Accessories (retail)	N/A	N/A	• Expansion #1 • Expansion #2 • Expansion #3 • Roller Controller • Super Action Controller Set	• ZGRASS unit	N/A
CPU	Motorola 68A09 1.5 MHz	Signetics 2650 CPU 3.58 MHz	Zilog Z80A 3.58 MHz	Zilog Z80 1.789 MHz	NEC 780C (clone of Zilog Z80) 3.58 MHz for NTSC, 3.55 MHz for PAL

Memory	1 kB main RAM	512 bytes	8 kB main RAM 16 kB VRAM	4k (up to 64k with external modules in the expansion port)	16 kB Main RAM 16 kB VRAM
Video	Built in vector CRT	• 128x208 / 128x104 • 8 Colours	• 256x192 resolution • 32 sprites, maximum of 4 sprites per scanline • 16 colors	• Resolution: True 160x102 / Basic 160x88 / Expanded RAM 320x204 • Colors: True 8* / Basic 2	• 256x192 resolution • 32 sprites, maximum of 4 sprites per scanline • 16 colors
Audio	Mono (built in speaker)	Mono audio with: • Single Channel "Beeper" • Single Channel "Noise"	Mono audio with: • 3 tone generators • 1 noise generator	Mono audio with: • 3 voices • noise/vibrato effect	Mono Audion with • 4-channel sound • 3 sound generators, 4 octaves each, • 1 white noise generator

Early handheld game consoles

The first handheld game console with interchangeable cartridges was the Microvision designed by Smith Engineering, and distributed and sold by Milton-Bradley in 1979. Crippled by a small, fragile LCD display and a very narrow selection of games, it was discontinued two years later.

The Epoch Game Pocket Computer was released in Japan in 1984. The Game Pocket Computer featured an LCD screen with 75 X 64 resolution, and could produce graphics at about the same level as early Atari 2600 games. The system sold poorly, and as a result only 5 games were made for it.

Nintendo's Game & Watch series of dedicated game systems proved more successful. It helped to establish handheld gaming as popular and lasted until 1991. Many Game & Watch games would later be re-released on Nintendo's subsequent handheld systems.

Handheld console gallery

Milton Bradley Microvision (Released in 1979)

Video game franchises established during second generation

- *Asteroids*
- *Breakout*
- *Defender*
- *Donkey Kong*
- *Frogger*
- *Mario Bros.*
- *Mr. Do!*
- *Pac-Man*
- *Pitfall!*
- *Q*bert*
- *Space Invaders*
- *Spy Hunter*
- *Tempest*
- *Galaxian*
- *Galaga*
- *Mappy*

See also

- Home computer
- History of computing hardware (1960s–present)
- Retrogaming

References

[1] "Atari VCS (Atari 2600)" (http://images.businessweek.com/ss/06/10/game_consoles/source/3.htm). *A Brief History of Game Console Warfare*. BusinessWeek. . Retrieved 2007-12-04.

[2] "Mattel Intellivision - 1980-1984" (http://classicgaming.gamespy.com/View.php?view=ConsoleMuseum.Detail&id=17&game=9). *ClassicGaming*. IGN. . Retrieved 2008-05-16.

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[6] Kent, Steven (2001). *The Ultimate History of Video Games*. Three Rivers Press. ISBN 0-7615-3643-4.

[7] "Mattel Intellivision — 1980–1984" (http://classicgaming.gamespy.com/View.php?view=ConsoleMuseum.Detail&id=17&game=9). *ClassicGaming*. IGN. . Retrieved 2008-05-16.

External links

- The Dot Eaters: Pixel Boxes (http://www.thedoteaters.com/p3_stage1.php)

Fairchild Channel F

Manufacturer	Fairchild Semiconductor
Type	Video game console
Generation	Second generation
Retail availability	August, 1976
Media	Cartridge
CPU	Fairchild F8
Controller input	Joystick/Paddle Keypad (Canceled)

The **Fairchild Channel F** is a game console released by Fairchild Semiconductor in August 1976 at the retail price of $169.95. It has the distinction of being the first programmable ROM cartridge-based video game console. It was launched as the **Video Entertainment System**, or **VES**, but when Atari released their VCS the next year, Fairchild renamed its machine.

The console

The Channel F electronics were designed by Jerry Lawson using the Fairchild F8 CPU, the first public outing of this processor. he worked with Nick Talesfore who was responsible for the Industrial Design of the hand controllers, console and video game cartridges as the manager of industrial design; and, Ron Smith who was responsible for the mechanical engineering of the video cartridges and the 8 degrees of freedom hand controllers. All worked for Exetron a a division of Fairchild Camera & Instrument Corporation headed by Wilf Corigan. Notably, Robert Noyce worked on the F8 design team before he left Fairchild to start his own company, Intel. The F8 is very complex compared to the typical integrated circuits of the day, and had more inputs and outputs than other contemporary chips. Because chip packaging was not available with enough pins, the F8 is instead fabricated as a pair of chips that had to be used together to form a complete CPU.

The graphics are quite basic by modern standards. The Channel F was only able to use one plane of graphics and one of four background colors per line, only three plot colors to choose from (red, green and blue) that turned into white if the background was set to black. A resolution of 128 × 64 with approximately 102 × 58 pixels visible and help from only 64 bytes of system RAM, half the amount of the Atari 2600.[1] [2] The F8 processor at the heart of the console was able to produce enough AI to allow for player vs. computer matches, a first in console history. All previous machines required a human opponent.

The palette of the Channel F

In the original unit, sound is played through an internal speaker, rather than the TV set. However, the System II passes sound to the television through the RF switch.

The controllers are a joystick without a base; the main body is a large hand grip with a triangular "cap" on top, the top being the portion that actually moved for eight-way directional control. It can be used as both a joystick and paddle (twist), and not only pushed down to operate as a fire button but also pulled up. The model 1 unit contains a small compartment for storing the controllers when moving it. The System II featured detachable controllers. Zircon later offered a special control which featured an action button on the front of the joystick. It was marketed by Zircon as "Channel F Jet-Stick" in a letter sent out to registered owners before Christmas 1982.[3] They also released it as an Atari-compatible controller called "Video Command" it was also first released without the extra fire button, before that only the downwards plunge motion was connected and acted as the fire button, the pull-up and twist actions weren't used.

Games

There are twenty-six cartridges, termed 'Videocarts', that were officially released during the ownership of Fairchild and Zircon, the first 21 of which were released by Fairchild. Several of these cartridges are capable of playing more than one game and were typically priced at $19.95. The Videocarts are large and yellow, and usually feature colorful label artwork reminiscent of the artist Peter Max. The console contains two built-in games, Tennis and Hockey, which were both advanced Pong clones. The reflecting bar could be changed to diagonals by twisting the controller, and could move forward and backward.

A sales brochure from 1978 lists 'Keyboard Videocarts' for sale. The three shown were K-1 Casino Poker, K-2 Space Odyssey, and K-3 Pro-Football. These are to use the Keyboard accessory which is a 16 button keypad. All further brochures, released after Zircon took over Fairchild, never listed this accessory nor anything called a Keyboard Videocart.

There is one additional cartridge released numbered Videocart-51 and simply titled 'Demo 1'. This Videocart is shown in a single sales brochure released shortly after Zircon acquired the company. It was never listed for sale after this single brochure which was used for winter of 1979.

Ken Uston reviewed 32 games in his book *Ken Uston's Guide to Buying and Beating the Home Video Games* in 1982, and rated some of the Channel F's titles highly; of these, *Alien Invasion* and *Video Whizball* were considered by Uston to be "the finest adult cartridges currently available for the Fairchild Channel F System."[4] The games on the whole, however, rated last on his survey of over 200 games for the Atari, Intellivision, Astrocade and Odyssey consoles, and contemporary games were rated "Average" with future Channel F games rated "below average".[5] Uston rated almost one half of the Channel F games as "high in interest" and called that "an impressive proportion" and further noted that "Some of the Channel F cartridges are timeless; no matter what technological developments occur, they will continue to be of interest." His overall conclusion was that the games "serve a limited, but useful, purpose" and that the "strength of the Channel F offering is in its excellent educational line for children."[6]

List of games

- Integrated with console: Hockey, Tennis
- Videocart-1: Tic Tac Toe, Shooting Gallery, Doodle, Quadradoodle
- Videocart-2: Desert Fox, Shooting Gallery
- Videocart-3: Video Blackjack
- Videocart-4: Spitfire
- Videocart-5: Space War
- Videocart-6: Math Quiz (Addition & Subtraction)
- Videocart-7: Math Quiz (Multiplication & Division)
- Videocart-8: Mind Reader, Nim (also referred to as Magic Numbers)
- Videocart-9: Drag Strip
- Videocart-10: Maze, Cat and Mouse
- Videocart-11: Backgammon, Acey-Duecy
- Videocart-12: Baseball
- Videocart 13: Robot War/Torpedo Alley
- Videocart-14: Sonar Search
- Videocart-15: Memory Match
- Videocart 16: Dodge-It
- Videocart-17: Pinball Challenge
- Videocart-18: Hangman
- Videocart-19: Checkers
- Videocart-20: Video Whizball
- Videocart-21: Bowling
- Videocart-22: Slot Machine
- Videocart-23: Galactic Space Wars
- Videocart-24: Pro-Football
- Videocart-25: Casino Poker
- Videocart-26: Alien Invasion

Carts listed (as mentioned above) but never released:

- Keyboard Videocart-1: Casino Poker
- Keyboard Videocart-2: Space Odyssey
- Keyboard Videocart-3: Pro-Football

Official carts that also exist:

- Democart
- Democart 2

German SABA also released a few compatible carts different from the original carts, translation in Videocart 1 Tic-Tac-Toe to German words, Videocart 3 released with different abbreviations (German), Videocart 18 changed graphics and German word list and the SABA 20 that's a Chess game released only by SABA.

Market impact

The biggest effect of the Channel F in the market was to spur Atari into releasing and improving their next-generation console which was then in development. Then codenamed "Stella," the machine was also going to use cartridges, and after seeing the Channel F they realized they needed to release it before the market was flooded with cartridge based-machines. With cash flow dwindling as sales of their existing Pong-based systems dried up, they were forced to sell to Warner Communications to gain the capital they needed. When the Atari VCS gaming

system (whose name was coined as a takeoff of the VES) was released a year later, it had considerably better graphics and sound.

The Channel F System II

Fairchild decided to compete with the VCS, and began a console re-design as the **Channel F System II**. The major changes were in design, with the controllers removable from the base unit instead of being wired directly into it, the storage compartment was moved to the rear of the unit, and the sound was now mixed into the TV signal so the unit no longer needed a speaker. This version also featured a simpler and more modern-looking case design. However, by this time the market was in the midst of the first video game crash, and Fairchild eventually threw in the towel and left the market.

The Channel F System II

Some time in 1979, Zircon International bought the rights to the Channel F and released the **Channel F System II**. Only six new games were released after the debut of the second system before its death, several of which were developed at Fairchild before they sold it off.

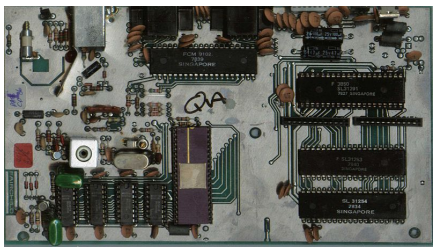
A number of licensed versions were released in Europe, including the **Luxor Video Entertainment System** in Sweden, **Adman Grandstand** in the UK, and the **Saba Videoplay**, **Nordmende Teleplay** and **ITT Tele-Match Processor**, from Germany and also **Dumont Videoplay** and **Barco Challenger** from the Barco/Dumont company in Italy and Belgium.

Homebrew

Like many other classic consoles, the Channel F lives on through homebrew. For example, a 2009 version of Pac-Man was developed and distributed for the Channel F.[7]

Technical specifications [Original Channel F]

- CPU chip: Fairchild F8 operating at 1.79 MHz (PAL gen. 1: 2.00 MHz, PAL gen.2: 1.77 MHz)
- RAM: 64 bytes, 2 kB VRAM (2×128×64 bits)
- Resolution: 128 × 64 pixels, approximately 102 × 58 pixels visible depending on TV
- Colors: eight colors (either black/white or four color max. per line)
- Audio: 500 Hz, 1 kHz, and 1.5 kHz tones (can be modulated quickly to produce different tones)
- Input: two custom game controllers, hardwired to the console (original release) or removable (Channel F System II)



PCB Scan of the Grandstand Video Entertainment Computer (UK Channel F II variant).

- Output: RF modulated composite video signal, cord hardwired to console

See also

- TV POWWW (interactive TV game show that used Channel F)

References

[1] http://classicdev.org/images/thumb/3/31/FVE100_schematic_sheet_1of3.gif/1280px-FVE100_schematic_sheet_1of3.gif
[2] http://classicdev.org/images/thumb/5/55/FVE100_schematic_sheet_2of3.png/1280px-FVE100_schematic_sheet_2of3.png
[3] http://fndcollectables.com/CHANNEL_F_INFO/U_S_/Adds___Offers/LETTERS/x82fr1f.jpg
[4] Uston, Ken. *Ken Uston's Guide to Buying and Beating the Home Video Games* (Signet, 1982) p.605
[5] Uston, Ken. *Ken Uston's Guide to Buying and Beating the Home Video Games* (Signet, 1982) p.20.
[6] Uston, Ken. *Ken Uston's Guide to Buying and Beating the Home Video Games* (Signet, 1982) p.603 and p.23.
[7] http://www.consolecity.com/games/action-game_info/game_id-29406.html

External links

- The Dot Eaters article (http://www.thedoteaters.com/p3_stage1.php) with a history of the Channel F and games
- Interview with designer Jerry Lawson (http://www.vintagecomputing.com/index.php/archives/545)

RCA Studio II

The **RCA Studio II** is a videogame console made by RCA that debuted in January 1977. The graphics of Studio II games were black and white and resembled those of earlier Pong consoles and their clones. The Studio II also did not have joysticks or similar game controllers but instead used two ten button keypads that were built into the console itself. This made two player games difficult because the players would be forced to hold the console and sit extremely close. The console was capable of making simple beep sounds with slight variations in tone and length.

One distinct feature of the Studio II was its five built-in games. Also unique to the Studio II was its use of a switchbox that relayed both the modulated RF signal of the console's video to the television set while powering the console with DC power. This type of hookup would not be seen again (or thereafter) until the Atari 5200 used a similar video signal and power connection method.

The Studio II was not a successful product; it was already obsolete by the time it hit the market when compared to the previously released Fairchild Channel F, and had its "final nail in the coffin" when the superior (to both) Atari 2600 console was released only 10 months later. It was discontinued in 1979.[1]

The name "Studio II" is a reference to RCAs then famous recording studios. The RCA Studio II was named as to represent a second studio in which artists could create productions for RCA. [2] There is not any forerunner console to the Studio II.

System specs

- RCA 1802 microprocessor, 1.78 MHz
- 2 KB ROM (includes the five built-in games)
- 512 bytes RAM
- RCA CDP 1861 "Pixie" video chip, 64x32, monochrome graphics [3]

Studio II built-in games

- Addition
- Bowling
- Doodle
- Freeway
- Patterns [3]

Studio II cartridge game titles

- Baseball
- Bingo (extremely rare, possibly only a prototype)
- Biorhythm
- Blackjack
- Fun with Numbers
- Gunfighter / Moonship Battle
- Spacewar
- Speedway / Tag
- Tennis / Squash
- TV Schoolhouse I
- TV Schoolhouse II [4]

External links

- History of Home Video Games - RCA Studio II [5]
- The Dot Eaters article [1], featuring the RCA Studio II

Atari 2600

Atari 2600 four-switch "wood veneer" version, dating from 1980-1982

Manufacturer	Atari, Inc.
Type	Video game console
Generation	Second generation
Retail availability	• NA October 14, 1977 • EU 1978 • JP October, 1983 (Atari 2800)
Discontinued	January 1, 1992
Units sold	30 million (as of 2004)[1]
Media	ROM cartridge, Tape
CPU	MOS 6507 @ 1.19 MHz
Memory	128 bytes RAM, 4 KB ROM
Controller input	Joystick Paddles Driving Controller Trak-Ball Keypad
Online services	GameLine
Best-selling game	*Pac-Man*, 7 million (as of September 1, 2006)[2] [3]
Predecessor	Atari Pong
Successor	Atari 5200

The **Atari 2600** is a video game console released in October 1977 by Atari, Inc. It is credited with popularizing the use of microprocessor-based hardware and cartridges containing game code, instead of having non-microprocessor dedicated hardware with all games built in. The first game console to use this format was the Fairchild Channel F; however, the Atari 2600 is credited with popularizing the plug-in concept among the game-playing public.

The console was originally sold as the **Atari VCS**, for **Video Computer System**. Following the release of the Atari 5200, in 1982, the VCS was renamed "Atari 2600", after the unit's Atari part number, CX2600. The 2600 was typically bundled with two joystick controllers, a conjoined pair of paddle controllers, and a cartridge game—initially *Combat*[4] and later *Pac-Man*.[5]

The Atari 2600 was wildly successful. During much of the 1980s, "Atari" was a synonym for this model in mainstream media and, by extension, for video games in general.[6]

In 2009, the 2600 was named the second greatest video game console of all time by IGN.[7]

History

Atari Inc. had purchased an engineering think tank in 1973 called Cyan Engineering to research next-generation video game systems, and had been working on a prototype known as "Stella" (named after one of the engineers' bicycles) for some time. Unlike prior generations of machines that used custom logic to play a small number of games, Stella's core was a complete CPU, the famous MOS Technology 6502 in a cost-reduced version, known as the 6507. It was combined with a RAM-and-I/O chip, the MOS Technology 6532, and a display and sound chip of their own design known as the **TIA**, for ***T**elevision **I**nterface **A**daptor*. Beyond those three, the first two versions of the machine contain just one more chip, a standard CMOS logic buffer IC, bringing the total chip count to the very low and cost-effective number of four. Some later versions of the console eliminated the buffer chip.

Programs for small computers were generally stored on cassette tape, disk or paper tape. By the early 1970s, Hewlett Packard manufactured desktop computers costing thousands of dollars such as the HP 9830, which packaged Read Only Memory (ROM) into removable cartridges to add special programming features, and these were being considered for use in games. At first, the design was not going to be cartridge-based, but after seeing a "fake" cartridge system on another machine, they realized they could place the games on cartridges essentially for the price of the connector and packaging.

In August 1976, Fairchild Semiconductor released their own CPU-based system, the Video Entertainment System. Stella was still not ready for production, but it was clear that it needed to be before there were a number of "me too" products filling up the market—which had happened after they released Pong. Atari Inc. simply did not have the cash flow to complete the system quickly, given that sales of their own Pong systems were cooling. Nolan Bushnell eventually turned to Warner Communications, and sold the company to them in 1976 for US$28 million on the promise that Stella would be produced as soon as possible.

Key to the eventual success of the machine was the hiring of Jay Miner, a chip designer who managed to squeeze an entire breadboard of equipment making up the TIA into a single chip. Once that was completed and debugged, the system was ready for shipping. By the time it was released in 1977, the development had cost about US$100 million.

Launch and success

The unit was originally priced at US$199, and shipped with two joysticks and a *Combat* cartridge (eight additional games were available at launch and sold separately).[8] In a move to compete directly with the Channel F, Atari Inc. named the machine the Video Computer System (or VCS for short), as the Channel F was at that point known as the **VES**, for *Video Entertainment System*. The VCS was also rebadged as the **Sears Video Arcade** and sold through Sears, Roebuck and Company stores. This model was manufactured by Dimerco Electronics.

When Fairchild learned of Atari Inc.'s naming, they quickly changed the name of their system to become the Channel F. However, both systems were now in the midst of a vicious round of price-cutting: *Pong* clones that had been made obsolete by these newer and more powerful machines were sold off to discounters for ever-lower prices. Soon many of the clone companies were out of business, and both Fairchild and Atari Inc. were selling to a public that was completely burnt out on Pong. In 1977, Atari Inc. sold only 250,000 VCSs.

For the first year of production, the VCS was manufactured in Sunnyvale, California. The consoles manufactured there had thick internal RF shielding, and thick plastic molding around the sides and bottom. These added weight to the console, and because all six switches were on the front, these consoles were nicknamed "Heavy Sixers". After this first year, production moved to Hong Kong, and the consoles manufactured there had thinner plastic molding. In 1978, only 550,000 units from a production run of 800,000 were sold, requiring further financial support from

Warner to cover losses. This led directly to the disagreements that caused Atari Inc. founder Nolan Bushnell to leave the company in 1978.[9]

Once the public realized it was possible to play video games other than *Pong*, and programmers learned how to push its hardware's capabilities, the VCS gained popularity. By this point, Fairchild had given up, thinking video games were a passing fad, thereby handing the entire quickly growing market to Atari Inc. By 1979, the VCS was the best-selling Christmas gift (and console), mainly because of its exclusive content, and 1 million units were sold that year.

Atari Inc. then licensed the smash arcade hit *Space Invaders* by Taito, which greatly increased the unit's popularity when it was released in January 1980, doubling sales again to over 2 million units. The VCS and its cartridges were the main factor behind Atari Inc. grossing more than $2 billion in 1980. Sales then doubled again for the next two years, with almost 8 million units selling in 1982.

In 1980, the VCS was given a minor revision in which the left and right difficulty switches were moved to the back of the console, leaving four switches on the front. Other than this, these four-switch consoles looked nearly identical to the earlier six-switch models. In 1982, another version of the four-switch console was released without woodgrain. They were nicknamed "Darth Vader" consoles due to their all-black appearance. These were also the first consoles to be officially called "Atari 2600", as the Atari 5200 was released the same year.

During this period, Atari Inc. expanded the 2600 family with two other compatible consoles. They designed the Atari 2700, a wireless version of the console that was never released because of a design flaw.[10] The company also built a sleeker version of the machine dubbed the Atari 2800 to sell directly to the Japanese market in early 1983, but it suffered from competition with the newly released Nintendo Famicom.

In a survey mentioned by Jeff Rovin it is reported that more stores reported breakdowns of the Atari 2600 system than any other, and that Atari repair centers seemed to have the most trouble with consoles manufactured in 1980. In one case it is stated that a system was repaired five times before static electricity from a carpet was discovered as having caused the problem. The controllers were also a source of breakage because of the way they could be gripped by a player holding it with their fist, allowing players to get carried away and over control, which was less likely with other systems released at the time, such as the Odyssey 2, which had controllers that were nearly half its size.[11]

Sears Tele-Games 2600s

Atari Inc. also continued their OEM relationship with Sears under the latter's Tele-Games brand label, which started in 1975 with the original Pong. Sears released several versions of the 2600 as the Sears Video Arcade series from 1977 to 1983. These include the Rev. A "Heavy Sixer" model in 1977, the Rev. B "4 switch" model in 1980, and the US version of the Atari 2800 branded as the Sears Video Arcade II in 1983.[12]

Early Atari 2600 that was branded "Tele-Games" and sold by Sears

Sears also released their own versions of Atari Inc.'s games under the Tele-Games brand — often with different titles[13] — which included the Tele-Games branded variations of text and picture labels. Three games were also produced by Atari Inc. for Sears as exclusive releases under the Tele-Games brand: *Steeplechase*, *Stellar Track*, and *Submarine Commander*.[13]

Sears' Tele-Games brand was unrelated to the company Telegames, which also produced cartridges for the Atari 2600 — mostly re-issues of M-Network games.[14]

Decline

During this period, Atari Inc. continued to grow until it had one of the largest R&D divisions in Silicon Valley. However, it spent much of its R&D budget on projects that seemed rather out of place at a video game (or even home computer) company; many of these projects never saw the light of day. Meanwhile, several attempts to bring out newer consoles failed for one reason or another, although Atari Inc.'s home computer systems, the Atari 8-bit family, sold reasonably, if not spectacularly. Warner was more than happy anyway, as it seemed to have no end to the sales of the 2600, and Atari Inc. was responsible for over half of the company's income.

The programmers of many of Atari Inc.'s biggest hits grew disgruntled with the company for not crediting game developers and many left the company and formed their own independent software companies. The most prominent and longest-lasting of these third-party developers was Activision, founded in 1980, whose titles quickly became more popular than those of Atari Inc. itself. Atari Inc. attempted to block third-party development for the 2600 in court but failed, and soon other publishers, such as Imagic and Coleco, entered the market. Atari Inc. suffered from an image problem when a company named Mystique produced a number of pornographic games for the 2600. The most notorious of these, *Custer's Revenge*, caused a large number of protests from women's and Native American groups[15] because it depicts General George Armstrong Custer raping a bound Native American woman.[16] Atari Inc. sued Mystique in court over the release of the game.[17]

Atari Inc. continued to scoop up licenses during the shelf life of the 2600, the most prominent of which included *Pac-Man* and *E.T.* Public disappointment with these two titles and the market saturation of poor third-party titles are cited as big reasons for the video game crash of 1983. Suddenly, Atari Inc.'s growth meant it was losing massive amounts of money during the crash, at one point about $10,000 a day. Warner quickly grew tired of supporting Atari Inc., and started looking for buyers in 1984. Although not formally discontinued, the 2600 was de-emphasized for two years after Warner's 1984 sale of Atari Inc.'s Consumer Division to Commodore Business Machines founder Jack Tramiel, who wanted to concentrate on home computers. He froze all development of console games, including a 2600 *Garfield* game and an Atari 5200 port of *Super Pac-Man*.

Atari 2600 Jr.

The Atari 2600 in its 1984 cost-reduced version, also known as the "2600 Jr."

In 1985, a new version of the 2600 was released (although it was planned for release two years earlier). The new redesigned version of the 2600, unofficially referred to as the 2600 Jr., featured a smaller cost-reduced form factor with a modernized Atari 7800-like appearance. The redesigned 2600 was advertised as a budget gaming system (under $50) that had the ability to run a large collection of classic games. With its introduction came a resurgence in software development both from Atari Corp. and from a few third parties (notably, Activision, Absolute Entertainment, Froggo, Epyx, and Exus). The Atari 2600 continued to sell in the USA and Europe until 1991, and in Asia until the early 1990s. Its final Atari-licensed release was KLAX in 1990. Over its lifetime, an estimated 40 million units were shipped, and its video game library reportedly numbers more than 900 titles with commercial games released for this system all the way until 1991. In Brazil, the console became extremely popular in the mid-1980s. The Atari 2600 was officially retired by Atari Corp. on January 1, 1992, making it the longest-lived home video game console (14 years, 2 months) in US game history.

The system was promoted on a United Kingdom TV ad in 1989 in the run-up to Christmas, in which it claimed *The fun is back!*, although the games were very much dated even compared to the Sega Mega Drive, Nintendo NES and Sega Master System which were the main interest at the time. The advertising campaign also used its price of under £50 as a selling point. However, despite this the games system still failed in competition to the more modern

systems. The advert was also a re-dubbed version of the early original campaign in the United States.

Design

Hardware

The CPU was the MOS Technology 6507, a cut-down version of the 6502, running at 1.19 MHz in the 2600. The 6507 included fewer memory address pins—13 instead of 16—and no external interrupts to fit into a smaller 28-pin package. Smaller packaging was, and still is, an important factor in overall system cost, and since memory was very expensive at the time, the 6507's small 8 kB of maximum external memory space was not going to be used up anyway. In fact, memory was so expensive they could not imagine using up even 4 kB, and when they got a deal on 24-pin connectors for the cartridge socket, they were only too happy to thereby limit the games to 4K.[18] Later games got around this limitation with bank switching.

The console had only 128 bytes of RAM for runtime data that included the call stack and the state of the game world. There was no frame buffer, as the necessary RAM would have been too expensive. Instead the video device had two bitmapped sprites, two one-pixel "missile" sprites, a one-pixel "ball," and a 40-pixel "playfield" that was drawn by writing a bit pattern for each line into a register just before the television scanned that line. As each line was scanned, a game had to identify the non-sprite objects that overlapped the next line, assemble the appropriate bit patterns to draw for those objects, and write the pattern into the register. In a telling reveal of its Pong heritage, by default, the right side of the screen was a mirrored duplicate of the left; to control it separately, the software had to modify the patterns as the scan line was drawn. After the controller scanned the last active line, a more leisurely vertical blanking interval began, during which the game could process input and update the positions and states of objects in the world. Any mistake in timing produced visual artifacts, a problem programmers called *racing the beam*.[19]

Standard joystick

The video hardware gave the 2600 a reputation as one of the most complex machines in the world to program, but those programmers who understood it realized that such direct control over the video picture was also a source of flexibility. One advantage the 2600 had over more powerful competitors such as the ColecoVision was that the 2600 had no protection against altering settings in mid-line. For example, although each sprite nominally had only one color, it was possible to color the rows differently by changing the sprite's color as it was drawn. If the two hardware sprites were not enough for a game, a developer could share one sprite among several objects (as with the ghosts in *Pac-Man*) or draw software sprites, which was only a little more difficult than drawing a fixed playfield. The *Pitfall!* screenshot below demonstrates some of these tricks: the player is a multi-color sprite, one sprite is multiplexed for the logs and the scorpion, and the swinging vine is drawn by shifting the position of the "ball" on each scan line. Despite the hardware limitations, many Atari 2600 games have a lot of action on the screen, creating an engaging experience.

Additionally, the 2600 supported several types of input devices (joysticks, paddles, keyboards, etc.) and third-party peripherals, and many of these peripherals were interchangeable with the *MSX* and several other Japanese systems. In some cases, it is possible to use the Atari joysticks with the Sega Master System and Mega Drive/Genesis, though functionality may be limited. Conversely, Master System and Genesis controllers work quite well on the 2600.

Color and graphics

The Atari 2600 used different color palettes depending on the television signal format used.[20] With the NTSC format, a 128-color palette was available, while in PAL, only 104 colors were available. Additionally, the SECAM palette consisted of only 8 colors.

Notable games

During the console's lifetime, Atari Inc and Atari Corp. published many titles. These games include *Adventure* (often credited as starting the action-adventure game genre[21] —its creator, Warren Robinett, also introduced the first widely known Easter egg to the gaming world),[22] *Breakout*,[23] and *Yars' Revenge*.[24] The console's popularity attracted many third-party developers, which led to popular titles such as Activision's *Pitfall!*[25] and Imagic's *Atlantis*. However, two Atari published titles, *E.T. the Extra-Terrestrial*[25] and *Pac-Man*,[26] are frequently blamed for contributing to the video game crash of 1983.

Pitfall!, one of the most popular third party games for the Atari 2600.

The ten biggest sellers

The 10 biggest selling games for the Atari 2600 were:[27]

1. *Pac-Man*
2. *Pitfall!*
3. *Missile Command*
4. *Demon Attack*
5. *E.T. the Extra-Terrestrial*
6. *Atlantis*
7. *Adventure*
8. *River Raid*
9. *Kaboom!*
10. *Space Invaders*

Legacy

Atari 2000

The **Atari 2000** (model number CX-2000) is a prototype version of the Atari 2600 intended to be released as a cheaper alternative for children in 1982. Although identical in specification to the original 2600, the 2000 included built-in controllers and a different case design. The 2000 was originally intended to be black, but it was later recolored blue to appeal more to children. While Atari never officially stated the reason for not releasing the 2000, experts have cited the poor quality and durability of its built-in joysticks and the greater in-house popularity of the competing 2600jr design as the most likely reasons.[28]

Atari 3200

Atari started work on a replacement to the 2600, called the **Atari 3200**, with codenames including Super Stella, Sylvia, and PAM (a note attached reads "Super Stella: Multipurpose"). The system was to have compatibility with Atari 2600 cartridges, and was based on a 10-bit processor. It was still unfinished when preliminary game programmers discovered that it was difficult to program. The project was cancelled, and Atari went with the second "System X" also titled PAM, that would later become the Atari 5200. Atari also cloned the Atari 3200 into the Sears Super Arcade II, but this was never released.[29]

Clones and reissues

The console and its old and new games are very popular with collectors because of its significant impact on video game and consumer electronics history and also due to its nostalgic value for many people, along with a number of games that are still considered highly playable. In addition, modern Atari 2600 clones remain on the market. One example is the Atari Classics 10-in-1 TV Game, manufactured by Jakks Pacific, which simulates the 2600 console, and includes converted versions of 10 games into a single Atari-brand-look-a-like joystick with composite video outputs for connecting directly to modern televisions or VCRs. Another is the TV Boy, which includes 127 games in an enlarged joypad.

The Atari Flashback 2 console, released in 2005, contains 40 games (with four more programs unlockable by a cheat code). The console implements the original 2600 architecture and can be modified to play original 2600 cartridges by adding a cartridge port, and is compatible with original 2600 controllers.

Additionally, Benjamin Heckendorn has created several different versions of a portable 2600, created by cutting apart full-sized vintage units, adding screens and putting them into new enclosures.

In music

Many games for the Atari 2600 have detailed and easily identifiable music, and its distinctive sound makes it ideal for use in modern lo-fi and industrial music. In 2002, Dallas musician and visual artist Paul Slocum developed a cartridge called Synthcart for the Atari 2600, which allows the user to turn an Atari 2600 into a two-voice synthesizer and drum machine. Adapters have also been developed by amateurs enabling the Atari 2600's use with MIDI devices. A number of bands, such as 8 Bit Weapon, MIKE BISON, Bud Melvin, TEMPHUiBIS, Black Moth Super Rainbow and The Squigs, as well as Slocum's own band Tree Wave, use Synthcart to make modern music on the Atari 2600. Some effects units like the MXR Blue Box are often cited for their ability to produce an Atari-like sound. Phonte from the hip-hop group Little Brother, along with fellow lyricist Eccentric, formed a mock-group named Unheralded Symmetrics, and recorded a tribute to the system, entitled "Atari 2600".

Emulation

Atari 2600 emulation is available for most major operating systems and is now very accurate. Despite the relative simplicity of the 2600 system, it is not an easy system to emulate. While it does not require a lot of computational power to emulate the 2600, it is hard to accurately do so. For example, because of the lack of a frame buffer, 2600 emulators must not only emulate the console, but the television as well. Due to the longevity of the system, many 2600 games used undocumented features, and even exploited bugs in the hardware to squeeze the most out of the system, doing things even the original designers would deem impossible (a notable example is the starfield of the game *Cosmic Ark*). It took some time for the emulator programmers to mature their software to properly emulate the undocumented features, bugs and quirks of the system.

The MESS emulator supports recording and playing back of Atari 2600 emulation sessions. The Home Action Replay Page[30] (aka HARP) allows Atari 2600 users to archive their favorite play sessions of the Atari 2600 system and its games.

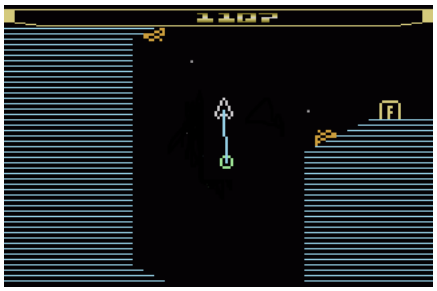
Some well known Atari 2600 emulators today are:

- Stella - An open source, multiplatform emulator (Windows, Mac OS X, Linux, Dreamcast, Nintendo DS, Wii, GP2X).
- z26 – Another open source, multiplatform customizable emulator (Windows, MS-DOS, Linux)
- PC Atari Emulator – Easy to use, very fast emulator (Windows, MS-DOS). Handles the Cosmic Ark starfield effect correctly.
- MESS – the multi system emulator that supports all old Atari console systems
- The Pocket VCS – PPC – Easy to use, very fast and emulator (Windows Mobile).
- GP2X-2600 – An emulator for the GP2X handheld console

Homebrews

After 30 years since the launch of the Atari 2600, new homebrew games for the system are still made and sold by hobbyists with several new titles available each year. Most of the development on the platform is still done in 6502 assembly language but a BASIC-like language compiler named batari Basic (or "bB") and visual environment called Visual batari Basic are also available.

Games created for the Atari can be executed using either an emulator or copied directly to a blank cartridge making use of either a PROM or EPROM chip. This allows the construction of homebrew cartridges that will run on an original Atari 2600.



Thomas Jentzsch's *Thrust*, a homebrew game for the Atari 2600

Programmers

This is a partial list of Atari 2600 programmers:

- David Crane
- Tod Frye
- Rob Fulop
- Larry Kaplan was one of the top programmers on the Atari 2600.[31]
- Alan Miller
- Warren Robinett
- Carol Shaw
- Howard Scott Warshaw
- Bob Whitehead
- Tom Reuterdahl

See also

- List of Atari 2600 games
- Coleco Gemini
- TV Games
- TV Boy

Notes

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VC 4000

Manufacturer	Interton
Type	Video game console
Generation	Second generation
Release date	1978
Introductory price	€153
Discontinued	1983
Media	Cartridges
CPU	Signetics 2650A, Signetics 2636 video controller
Input	2 controllers with 12 buttons, 2 fire buttons and an analog joystick
Related articles	1292 Advanced Programmable Video System

The **VC 4000** is an early 8-bit cartridge-based game console released in Germany in 1978 by Interton. The console is quite obscure outside Germany, but many software compatible systems can be found in many European countries (see 1292 Advanced Programmable Video System). It's unclear if Interton really made the VC 4000 from scratch or if they bought the rights and the design to produce it, as many other brands produced similar systems the following years.

The VC-4000 is powered by a Signetics 2650A CPU (same as the Arcadia 2001) and a Signetics 2636 Video Controller. The two controllers are composed of a 12-key keypad, 2 fire buttons and an analog joystick. On the control panel of the system, one can find an on/off switch and three buttons: RESET, SELECT and START.

Technical specifications

- CPU: Signetics 2650A
- Video controller: Signetics 2636

External links

- Old-computers.com [1]
- Console Database [2]
- WinArcadia/AmiArcadia emulator [3]
- Interton VC 4000 Gaming Guide [4]
- EA2001 Central [5]

Magnavox Odyssey²

Type	Video game console
Generation	Second generation
Retail availability	1978 1982
Units sold	2 Million[1] .
Media	ROM cartridge
CPU	Intel 8048

The **Magnavox Odyssey²**, known in Europe as the **Philips Videopac G7000**, in Brazil as the **Philips Odyssey**, in the United States as the **Magnavox Odyssey²** and the **Philips Odyssey²**, and also by many other names, is a video game console released in 1978.

In the early 1970s, Magnavox was an innovator in the home video game industry. They succeeded in bringing the first home video game system to market, the Odyssey, which was quickly followed by a number of later models, each with a few technological improvements. In 1978, Magnavox, now a subsidiary of North American Philips, released the **Odyssey²**, its new second-generation video game console.

In 2009, the video game website IGN named the Odyssey² the 21st greatest video game console, out of its list of 25.[2]

Design

The original Odyssey had a number of removable circuit cards that switched between the built-in games, of which there were ten in Europe and Asia, and twelve in America. The Odyssey² followed in the steps of the Fairchild Channel F and Atari 2600 by being designed to play programmable ROM cartridges. With this improvement, each game could be a completely unique experience, with its own background graphics, foreground graphics, gameplay, scoring, and music. The potential was enormous, as an unlimited number of games could be individually purchased; a game player could purchase a library of video games tailored to his or her own interest. Unlike any other system at that time, the Odyssey² included a full alphanumeric membrane keyboard, which was to be used for educational games, selecting options, or programming (Magnavox released a cartridge called *Computer Intro!* with the intent of teaching simple computer programming).

The Odyssey² used the standard joystick design of the 1970s and early 1980s: the original console had a moderately-sized silver controller, held in one hand, with a square housing for its eight-direction stick that was manipulated with the other hand. Later releases had a similar black controller, with an 8-pointed star-shaped housing for its eight-direction joystick. In the upper corner of the joystick was a single 'Action' button, silver on the original controllers and red on the black controllers. The games, graphics and packaging were designed by Ron Bradford and

Steve Lehner.[3]

One other difference in these controllers is that the earliest releases of the silver joystick were removable. They could be plugged and unplugged from the back of the unit, while all later silver and all black controllers were hardwired into the rear of the unit itself.

One of the strongest points of the system was its excellent speech synthesis unit, which was released as an add-on for speech, music, and sound effects enhancement. The area that the Odyssey² may be best remembered for was its pioneering fusion of board and video games: *The Master Strategy Series*. The first game released was *Quest for the Rings!*, with gameplay somewhat similar to *Dungeons & Dragons*, and a storyline reminiscent of J. R. R. Tolkien's *The Lord of the Rings*, later two other games were released in this series, *Conquest of the World*, and *The Great Wall Street Fortune Hunt*, each with its own gameboard.

Its graphics, and few color choices compared to its biggest competitors at the time, the Atari 2600, Intellivision and the Bally Astrocade, were its "weakest point", however the game characters would often have "added personality" programmed into them[4] . Of these systems it was listed by Jeff Rovin as being the third in total of sales, and one of the seven major video game suppliers.

Market life

United States

The Odyssey² sold moderately well in the US. Even without third-party developers, by 1983 over one million Odyssey² units were sold in the US alone. The lack of third-party support kept the number of new games very limited, but the success of the Philips Videopac G7000 overseas led to two other companies producing games for it: Parker Brothers released *Popeye*, *Frogger*, *Q* Bert* and *Super Cobra*, while Imagic released versions of their hit games *Demon Attack* and *Atlantis*. Finally, in 1983 the two Imagic games were brought to the US; these became strong sellers.

To sell would-be customers on its technical abilities as a computer-based console, the Odyssey² was marketed with superlative phrases such as "The Ultimate Computer Video Game System", "Sync-Sound Action", "True-Reality Synthesization", "On-Screen Digital Readouts" and "a serious educational tool" on the packaging for the console and its game cartridges. All games produced by Magnavox/Philips ended with an exclamation point, such as *K.C. Munchkin!* and *Killer Bees!*[5]

Europe

In Europe, the Odyssey² did very well on the market. In Europe, the console was most widely known as the **Philips Videopac G7000**, or just the **Videopac**, although branded variants were released in some areas of Europe under the names **Radiola Jet 25**, **Schneider 7000**, and **Siera G7000**. Philips, as Magnavox's European parent company, used their own name rather than Magnavox's for European marketing. A rare model, the **Philips Videopac G7200**, was only released in Europe; it had a built-in black-and-white monitor. Videopac game cartridges are mostly compatible with American Odyssey² units, although some games have color differences and a few are completely incompatible. A number of additional games were released in Europe that never came out in the US.

European models had no power button, and black action buttons

Brazil

In Brazil, the console was released as the **Philips Odyssey**; the Magnavox Odyssey was released in Brazil by a company named "Planil Comércio", not affiliated to Philips or Magnavox. Since just a few units were sold, the Brazilian branch of Philips released in 1983 Odyssey² without its number. Odyssey became much more popular in Brazil than it ever was in the US; tournaments were even held for popular games like *K.C.'s Krazy Chase!* (*Come-Come* in Brazil). Titles of games were translated into Portuguese, sometimes creating a new story, like *Pick-axe Pete*, that became *Didi na Mina Encantada* (Didi in the Charmed Mine) referring to the Renato Aragão's comedy character, and was one of the most famous Odyssey games in Brazil.

Japan

The Odyssey² was released in Japan in December 1982 by Kōton Trading Toitarii Enterprise (コートン・トレーディング・トイタリー・エンタープライズ, a division of DINGU company) under the name オデッセイ２ (*odessei2*). "Japanese" versions of the Odyssey² and its games consisted of the American boxes with katakana stickers on them and cheaply printed black-and-white Japanese manuals. The initial price for the console was ¥49,800, which is approximately 500 US dollars. It was apparently not very successful; Japanese Odyssey² items are now very difficult to find.

Technical specifications

- CPU
  - Intel 8048 8-bit microcontroller running at 1.79 MHz
- Memory:
  - CPU-internal RAM: 64 bytes
  - Audio/video RAM: 128 bytes
  - BIOS ROM: 1024 bytes
- Video:
  - Intel 8244 custom IC
  - 160×200 resolution (NTSC)
  - 16-color fixed palette; sprites may only use 8 of these colors
  - 4 8×8 single-color user-defined sprites; each sprite's color may be set independently
  - 12 8×8 single-color characters; must be one of the 64 shapes built into the ROM BIOS; can be freely positioned like sprites, but cannot overlap each other; each character's color may be set independently
  - 4 quad characters; groups of four characters displayed in a row
  - 9×8 background grid; dots, lines, or solid blocks
- Audio:
  - Intel 8244 custom IC
  - mono
  - 24-bit shift register, clockable at 2 frequencies
  - noise generator
  - NOTE: There is only one 8244 chip in the system, which performs both audio and video functions.
- Input:
  - Two 8-way, one-button, digital joysticks. In the first production runs of the Magnavox Odyssey and the Philips 7000, these were permanently attached to the console; in later models, they were removable and replaceable.
  - QWERTY-layout membrane keyboard
- Output:
  - RF Audio/Video connector

  - Péritel/SCART connector (France only)
- Media:
  - ROM cartridges, typically 2 KB, 4 KB, or 8 KB in size.
- Expansion modules:
  - The Voice - provides speech synthesis & enhanced sound effects
  - Chess Module - The Odyssey2 didn't have enough memory and computing power for a decent implementation of chess on its own, so the C7010 chess module contained a secondary CPU with its own extra memory to run the chess program.

Emulation

An open source console emulator for the Odyssey² called *O2EM* is available. It includes Philips Videopac G7400 emulation among other features. The emulator works on Linux, Microsoft Windows, DOS and other platforms. *O2EM*, (originally not open source) was created in 1997 by computer programmer Daniel Boris and further enhanced by Andre Rodrigues de La Rocha.

The open source multi-platform multi-system emulator MESS has good Odyssey² support, and is the only emulator to emulate The Voice expansion module without using sound samples.

See also

- List of Videopac games
- Magnavox Odyssey
- Philips Videopac G7400

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External links

- Ed Averett (http://www.dadgum.com/halcyon/BOOK/AVERETT.HTM) - Programmer of 24 game titles for the Odyssey².
- O2EM Odyssey² & Videopac+ Emulator (http://o2em.sourceforge.net/)
- Videopac.org (http://www.videopac.org/) - Home of the Philips G7000*
- Dan Boris's Odyssey 2 Tech Page (http://www.atarihq.com/danb/o2.shtml) - technical documents on the Odyssey²'s hardware by the author of O2EM
- The Odyssey2 Homepage! (http://www.the-nextlevel.com/odyssey2/) - Odyssey² fan site. Information on collectibility and individual games
- Odyssey2.org (http://www.odyssey2.org/) - Home of the Magnavox Odyssey²
- The Dot Eaters article (http://www.thedoteaters.com/p3_stage2.php) on the history of the Odyssey²

- Ozyr's Odyssey2 Archive (http://www.ozyr.com/o2/) - Instructions for U.S. Odyssey2, European & Brazilian games. Also includes scans of the Odyssey Adventure magazine.

Intellivision

Manufacturer	Mattel
Type	Video game console
Generation	Second generation
Retail availability	1979 (US test market)[1] [2] [3] 1980 (North America)[1] [2] [3] 1982 (Europe, Japan)
Discontinued	1991[1] [2] [3] [4]
Units sold	3 million[1] [2] [3]
Media	ROM cartridge
CPU	GI CP1610
Online services	PlayCable
Best-selling game	*Astrosmash* (1 million)[1]

The **Intellivision** is a video game console released by Mattel in 1979. Development of the console began in 1978, less than a year after the introduction of its main competitor, the Atari 2600. The word *intellivision* is a portmanteau of "intelligent television". Over 3 million Intellivision units were sold and a total of 125 games were released for the console.[1] [2] [3]

History and development

The Intellivision was developed by Mattel Electronics, a subsidiary of Mattel formed expressly for the development of electronic games. The console was test marketed in Fresno, California, in 1979 with a total of four games available, and was released nationwide in 1980 with a price tag of US$299 and a pack-in game: *Las Vegas Poker & Blackjack*. Though not the first system to challenge Atari, it was the first to pose a serious threat to Atari's dominance. A series of ads featuring George Plimpton was produced that mercilessly attacked the Atari 2600's lesser capabilities with side-by-side game comparisons.

One of the slogans of the television advertisements stated that Intellivision was "the closest thing to the real thing"; one example in an advertisement compared golf games. The other console's games had a blip sound and cruder graphics, while the Intellivision featured a realistic swing sound and striking of the ball, and graphics that suggested a more 3D look. There was also an advertisement comparing the Atari 2600 to it, featuring the slogan "I didn't know".

Like Atari, Mattel marketed their console to a number of retailers as a rebadged unit. These models include the Radio Shack TandyVision, the GTE-Sylvania Intellivision, and the Sears Super Video Arcade. The Sears model was a specific coup for Mattel, as Sears was already selling a rebadged Atari 2600 unit, and in doing so made a big contribution to Atari's success.

In its first year, Mattel sold 175,000 Intellivision consoles, and the library grew to 35 games. At this time, all Intellivision games were developed by an outside firm, APh Technological Consulting. The company recognized that what had been seen as a secondary product line might be a big business. Realizing that potential profits are much greater with first party software, Mattel formed its own in-house software development group.

The original five members of that Intellivision team were manager Gabriel Baum, Don Daglow, Rick Levine, Mike Minkoff and John Sohl. Levine and Minkoff, a long-time Mattel Toys veteran, both came over from the hand-held Mattel games engineering team. To keep these programmers from being hired away by rival Atari, their identity and work location was kept a closely guarded secret. In public, the programmers were referred to collectively as the Blue Sky Rangers.

By 1982, sales were soaring. Over two million Intellivision consoles had been sold by the end of the year, earning Mattel a $100,000,000 profit. Third-party Atari developers Activision, and Imagic began releasing games for the Intellivision, as did hardware rivals Atari and Coleco. Mattel created *M Network* branded games for Atari and Coleco's systems. The most popular titles sold over a million units each. The Intellivision was also introduced in Japan by Bandai.

The original 5-person Mattel game development team had grown to 110 people under now-Vice President Baum, while Daglow led Intellivision development and top engineer Minkoff directed all work on all other platforms.

Keyboard Component

Intellivision's packaging and promotional materials, as well as television commercials, promised that with the addition of a soon-to-be-available accessory called the "Keyboard Component", originally portrayed in TV ads as a larger box with an opening in the top that the Intellivision fit into. This would turn the Intellivision into a fully-functional home computer system.

The unit would bring the system's available RAM up to a full 64K, a large amount for the time, and would have provided both a built-in cassette drive for data storage and a connection for an optional 40-column thermal printer. The cassette drive would be able to provide both data storage and an audio track simultaneously, allowing for interactive audio recording and playback under computer control, and a secondary 6502 microprocessor inside the Keyboard Component would be programmed to handle all of these extra capabilities independently of the Intellivision's CP1610 CPU. The unit would even provide an extra cartridge slot, allowing the original Intellivision to remain permanently docked with the Keyboard Component while still being able to play standard game cartridges.

Unfortunately, while the Keyboard Component was an ambitious piece of engineering for its time, it suffered from reliability problems and proved to be expensive to produce. Originally slated to be available in 1981, the Keyboard Component was repeatedly delayed as the engineers tried to find ways to overcome the reliability issues and reduce manufacturing costs.

The Keyboard Component's repeated delays became so notorious around Mattel headquarters that comedian Jay Leno, when performing at Mattel's 1981 Christmas party, got his biggest titter of the evening with the line: "You know what the three big lies are, don't you? 'The check is in the mail,' 'I'll still respect you in the morning,' and 'The Keyboard will be out in spring.'"[5]

Complaints from consumers who had chosen to buy the Intellivision specifically on the promise of a "Coming Soon!" personal-computer upgrade that seemed as if it would never materialize eventually caught the attention of the Federal Trade Commission (FTC), who started investigating Mattel Electronics for fraud and false advertising. Mattel said that the Keyboard Component was a real product still being test-marketed and even released a small

number of Keyboard Components to a handful of retail stores, along with a handful of software titles in order to support this claim. The FTC eventually ordered Mattel to pay a $10,000/day fine until the promised computer upgrade was in full retail distribution. To protect themselves from the ongoing fines, the Keyboard Component was officially canceled in the fall of 1982 and the Entertainment Computer System (ECS) module offered up in its place.

While approximately four thousand Keyboard Components were manufactured before the module was canceled and recalled, it is not clear how many of them actually found their way into the hands of Intellivision customers. Today, very few of them still exist; when the Keyboard Component was officially canceled, part of Mattel's settlement with the FTC involved offering to buy back all of the existing Keyboard Components from dissatisfied customers. Any customer who opted to keep theirs was required to sign a waiver indicating their understanding that no more software would be written for the system and which absolved Intellivision of any future responsibility for technical support.[6] Several of the units were later used by Mattel Electronics engineers when it was discovered that, with a few minor modifications, a Keyboard Component could be used as an Intellivision software-development system in place of the original hand-built development boards.

The Keyboard Component debacle was ranked as #11 on GameSpy's 25 Dumbest Moments in Gaming.[7]

Entertainment Computer System (ECS)

In mid-1981, Mattel's upper management was becoming concerned that the Keyboard Component division would never be able to produce a sellable product. As a result, Mattel Electronics set up a competing internal engineering team whose stated mission was to produce an inexpensive add-on called the BASIC Development System, or BDS, to be sold as an educational device to introduce kids to the concepts of computer programming.

The rival BDS engineering group, who had to keep the project's real purpose a secret among themselves, fearing that if David Chandler, the head of the Keyboard Component team, found out about it he would use his influence to get the project killed, eventually came up with a much less expensive alternative. Originally dubbed the **Lucky**, from LUCKI: Low User-Cost Keyboard Interface, it lacked many of the sophisticated features envisioned for the original Keyboard Component. Gone, for example, was the full 64K of RAM and the secondary 6502 CPU; instead, the ECS offered a mere 2K RAM expansion, a built-in BASIC that was marginally functional, plus a much-simplified cassette and thermal-printer interface.

Ultimately, this fulfilled the original promises of turning the Intellivision into a computer, making it possible to write programs and store them to tape, and interfacing with a printer well enough to allow Mattel to claim that they had delivered the promised computer upgrade and stop the FTC's mounting fines. It even offered, via an additional AY-3-8910 sound chip inside the ECS module and an optional 49-key Music Synthesizer keyboard, the possibility of turning the Intellivision into a multi-voice synthesizer which could be used to play or learn music.

In the fall of 1982, the LUCKI, now renamed the Entertainment Computer System (ECS), was presented at the annual sales meeting, officially ending the ill-fated Keyboard Component project. A new advertising campaign was aired in time for the 1982 Christmas season, and the ECS itself was shown to the public at the January 1983 Consumer Electronic Show (CES) in Las Vegas. A few months later, the ECS hit the market, and the FTC agreed to drop the $10K/day fines.

Unfortunately, by the time the ECS made its retail debut, an internal shake-up at the top levels of Mattel Electronics' management had caused the company's focus to shift away from hardware add-ons in favor of software, and the ECS received very little further marketing push. Further hardware developments, including a planned **Program Expander** that would have added another 16K of RAM and a more intricate, fully-featured Extended-BASIC to the system, were halted, and in the end less than a dozen software titles were released for the ECS.

Intellivoice

In 1982, Mattel introduced a new peripheral for the Intellivision: The Intellivoice, a voice synthesis device which produces speech when used with certain games. The Intellivoice was original in two respects: not only was this capability unique to the Intellivision system at the time (although Magnavox soon rolled out a similar device for the Odyssey2), but the speech-supporting games written for Intellivoice actually made the speech an integral part of the gameplay.

Unfortunately, the amount of speech that could be compressed into a 4K or 8K ROM cartridge was limited, and the system did not sell as well as Mattel had hoped; while the initial orders were as high as 300,000 units for the Intellivoice module and its initial game-cartridge offerings, interest in future titles dropped rapidly until the fourth and last Intellivoice title, *Tron: Solar Sailer*, sold a mere 90,000 units. A fifth game, a children's title called *Magic Carousel*, was shelved, and in August 1983 the Intellivoice system was quietly phased out.

The four titles available for the Intellivoice system, in order of their release, were:

- *Space Spartans*
- *Bomb Squad*
- *B-17 Bomber*
- *Tron: Solar Sailer*

A fifth title, *Intellivision World Series Major League Baseball*, developed as part of the Entertainment Computer System series, also supports the Intellivoice if both the ECS and Intellivoice are connected concurrently. Unlike the Intellivoice-specific games, however, *World Series Major League Baseball* is also playable without the Intellivoice module (but not without the ECS.)

Intellivision II

In addition to the ECS module, 1983 also saw the introduction of a redesigned model, called the Intellivision II (featuring detachable controllers and sleeker case), the System Changer (which played Atari 2600 games on the Intellivision II), and a music keyboard add-on for the ECS.

Intellivision II featuring the game *BurgerTime* and the voice synthesis module.

Like the ECS, Intellivision II was designed first and foremost to be inexpensive to manufacture. Among other things, the raised bubble keypad of the original hand controller was replaced by a flat membrane keyboard surface. However, because many Intellivision games had been designed for users to play by feeling the buttons without looking down, some of these games were far less playable on Intellivision II.

Instead of an internal power supply like the original system had, the Intellivision II would use an external AC adapter. Its main drawback, however, was that it was a non-standard power supply — running on 16.2V — meant that if the AC adapter was lost or damaged, the system could be rendered useless, as replacement power supplies for that particular voltage requirement were not readily available. It is unknown whether Intellivision II AC adapters were sold separately.

Mattel also changed the Intellivision II's internal ROM program (called the EXEC) in an attempt to lock out unlicensed 3rd party titles. To make room for the lock-out code while retaining compatibility with existing titles, some portions of the EXEC code were moved in a way that changed their timing. While most games were unaffected, a couple of the more popular titles, *Shark! Shark!*, and *Space Spartans*, had certain sound effects that the Intellivision II reproduced differently than intended, although the games remained playable. *Electric Company Word Fun* did not run at all and INTV's later release *Super Pro Football* has minor display glitches at the start, both due to the modified EXEC.[8] Mattel's attempt to lock out competitors' software titles was only temporarily successful, as the 3rd-party game manufacturers quickly figured out how to get around it.

Competition and market crash

See also: Video game crash of 1983

Amid the flurry of new hardware, there was trouble for the Intellivision. New game systems (ColecoVision, Emerson Arcadia 2001, Atari 5200, and Vectrex, all in 1982) were further subdividing the market, and the video game crash began to put pressure on the entire industry. The Intellivision team rushed to finish a major new round of games, including *BurgerTime* and the ultra-secret 3D glasses game *Hover Force*. Although *Burgertime* was a popular game on the Intellivision and was programmed by Blue Sky Ranger Ray Kaestner in record time, the five-month manufacturing cycle meant that the game did not appear until the late spring of 1983, after the video game crash had severely damaged game sales.

In the spring of 1983, Mattel went from aggressively hiring game programmers to laying them off within a two-week period. By August, there were massive layoffs, and the price of the Intellivision II (which launched at $150 earlier that year) was lowered to $69. Mattel Electronics posted a $300 million loss. Early in 1984, the division was closed — the first high-profile victim of the crash.

Intellivision game sales continued when a liquidator purchased all rights to the Intellivision and its software from Mattel, as well as all remaining inventory. After much of the existing software inventory had been sold, former Mattel Marketing executive Terry Valeski bought all rights to Intellivision and started a new venture. The new company, INTV Corp., continued to sell old stock via retail and mail order. When the old stock of Intellivision II consoles ran out, they introduced a new console dubbed INTV III. This unit was actually a cosmetic rebadge of the original Intellivision console (this unit was later renamed the Super Pro System.) In addition to manufacturing new consoles, INTV Corp. also continued to develop new games, releasing a few new titles each year. Eventually, the system was discontinued in 1991.

Intellivision games became readily available again when Keith Robinson, an early Intellivision programmer responsible for the game *TRON: Solar Sailer* [9] purchased the software rights and founded a new company, Intellivision Productions. As a result, games originally designed for the Intellivision are available on PCs and modern-day consoles including the PlayStation 2, Xbox and Nintendo GameCube in the *Intellivision Lives!* package, though all are now out of print at retail (though the Xbox version is available for purchase as a downloadable game through Xbox Live Game Marketplace's Xbox Originals service for the Xbox 360). A newer version of the *Intellivision Lives!* game is in development for the Nintendo DS. A small number of licensed Intellivision games are available through the GameTap subscription gaming service. Also, several LCD handheld and direct-to-TV games have been released in recent years.

VH1 Classic and MTV Networks released Intellivision games to Ipad and Iphone. Six classics, such as Thin Ice and Astromash were introduced to be played with the touch functions of both systems, for $0.99 per game.

Reviews and game guides

Ken Uston published *Ken Uston's Guide to Buying and Beating the Home Video Games* in 1982 as a guide to potential buyers of console systems/cartridges, as well as a brief strategy guide to numerous cartridge games then in existence. He described Intellivision as "the most mechanically reliable of the systems… The controller (used during "many hours of experimentation") worked with perfect consistency. The unit never had overheating problems, nor were loose wires or other connections encountered." However, Uston rated the controls and control system as "below average" and the worst of the consoles he tested (including Atari 2600, Magnavox Odyssey², Astrovision and Fairchild Channel F).[9]

Jeff Rovin lists *Intellivision* as one of the seven major suppliers of videogames in 1982, and mentions it as "the unchallenged king of graphics", however stating that the controllers can be "difficult to operate", the fact that if a controller breaks the entire unit must be shipped off for repairs (since they did not detach at first), and that the overlays "are sometimes so stubborn as to tempt one's patience".[10]

Innovations

- Intellivision can be considered the first 16-bit game console, as the registers in the microprocessor, where the mathematical logic is processed, are 16 bits wide.
- The Intellivision was also the first system to feature downloadable games. Although, without a storage device the games vanished once the machine was turned off. In 1981, General Instrument teamed up with Mattel to roll out the PlayCable, a device that allowed the downloading of Intellivision games via cable TV.
- Intellivision was the first game console to provide real-time human and robot voices in the middle of gameplay, courtesy of the IntelliVoice module. The voice chip used, the SP0256 Orator, was developed jointly by Mattel and General Instrument.[11]
- Intellivision was the first console to feature a controller with a directional pad that allowed 16 directions. The disc-shaped pad allowed players to control action without lifting the thumb and was considered by many Intellivision users to be a useful innovation. However, the ergonomics of the "action" buttons on the side of the controller were poor, and the disc-pad was perceived by potential buyers as unfamiliar. Along with cost, this was one of the factors in making the Intellivision less popular than the Atari 2600. However, it is interesting to note that the method of controlling movement on the Intellivision, with the thumb, is emulated in many subsequent video game controllers. The joystick-style controller, as seen on the VCS, has not been widely emulated on later consoles. A third-party joystick attachment was available by around 1984, that was installed by opening the controller and fitting the paddle over the disc. A flange around the hollow plastic conical joystick held it in securely when the controller's upper cover was replaced; and a much easier joystick control was the result. The Joystick was about three inches in height; it could not be gripped by the entire hand.
- The Intellivision was also the first game console or home computer to offer a musical synthesizer keyboard. The Music Synthesizer keyboard was designed as a secondary add-on for the ECS, and was intended to lead to a series of music-oriented software titles for both educational and entertainment purposes, but only one title, *Melody Blaster*, was ever released.
- Intellivision was also the first console to have a complete built-in character font. While Odyssey 2 had a limited character font (uppercase alphabet, numerals, and some other characters), Intellivision's system font had complete upper- and lowercase alphabets, numerals, and almost all of the punctuation and symbols found on standard computer keyboards.
- Intellivision was also the first console to have a dial-up modem add-on module (known as PlayCable).

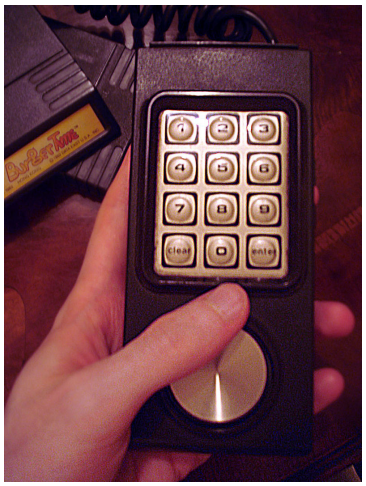
Technical specifications

- General Instrument CP1610 16-bit microprocessor CPU running at 894.886 kHz (i.e., slightly less than 1 MHz)
- 1456 bytes of RAM:
  - 240 × 8-bit Scratchpad Memory
  - 352 × 16-bit (704 bytes) System Memory
  - 512 × 8-bit Graphics RAM
- 7168 bytes of ROM:
  - 4096 × 10-bit (5120 bytes) Executive ROM
  - 2048 × 8-bit Graphics ROM
- 159 pixels wide by 96 pixels high (159x192 display on a TV screen, scanlines being doubled)
- 16 color palette, all of which can be on the screen at once
- 8 sprites. Hardware supports the following features per-sprite:
  - Size selection: 8×8 or 8×16
  - Stretching: Horizontal (1× or 2×) and vertical (1×, 2×, 4× or 8×)
  - Mirroring: Horizontal and vertical
  - Collision detection: Sprite to sprite, sprite to background, and sprite to screen border
  - Priority: Selects whether sprite appears in front of or behind background.
- three channel sound, with one noise generator (audio chip: General Instrument AY-3-8910)

Game controller

The Intellivision controller featured:

- 12-button numeric keypad (0-9, Clear, and Enter)
- Four side-located action buttons (where the top two are actually electronically the same, giving three distinct buttons)
- A directional disk, capable of detecting 16 directions of movement
- Laminated overlays that would slide into place as an extra layer on the keypad to show game-specific key functions



The original Intellivision controller.

The Intellivision console could detect the user pressing either the directional disk or a number on the keypad, but not both at the same time on the same controller. Some action games, such as Tron Deadly Discs and Night Stalker, used the disk to move and the numeric keypad to fire weapons, meaning players had to stop running momentarily in order to fire. However, since these games would accept input from either controller, players could avoid this disadvantage by holding one controller in each hand, with one hand operating one controller's directional disk, and with the other hand operating the numeric keypad on the other controller. This allowed continuous movement while firing.

Fans of the game console recall that an overuse injury was possible when playing for extended periods of time due to the pressure needed to use the keypad and especially the side buttons. This was a phenomenon similar to BlackBerry Thumb today. The problem was worsened significantly when the cost-reduced Intellivision II changed from solid rubber side buttons to plastic ones with a hollow center, leaving a rectangular imprint on players' thumbs and causing pain after even short periods of play. The change was apparently made to fractionally reduce the materials cost of the units, and was never play-tested for usability due to the rush to bring the system to market in the early days of the North American video game crash of 1983.

Despite the problems many consumers had with the controller, its design was briefly very influential; between the Intellivision's launch and the crash of 1983, three of the five new consoles released featured numeric keypads, like

the Intellivision's; four of the five had fire buttons on the sides like the Intellivision's; two used analog joysticks to best the Intellivision's 16-way movement, and a third (the Colecovision) had a short joystick whose top is cosmetically similar to the Intellivision's directional disc. However, most of these innovations disappeared after the crash of 1983, and were not seen again until the mid 90s.

The controller was ranked the fourth worst video game controller by IGN editor Craig Harris.[12]

See also

- List of Intellivision games
- TV POWWW (interactive TV game show that used Intellivision)

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External links

- Intellivision retrogaming company homepage (http://www.intellivisionlives.com/), run by Keith Robinson and The Blue Sky Rangers (the original Intellivision game programmers)
- Gamasutra - A History of Gaming Platforms: Mattel Intellivision (http://www.gamasutra.com/view/feature/3653/a_history_of_gaming_platforms_.php), by Bill Loguidice and Matt Barton
- Intellivision (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Intellivision/) at the Open Directory Project
- The history of the Intellivision (http://www.thedoteaters.com/p3_stage3.php/), at The Dot Eaters

Atari 5200

Manufacturer	Atari Inc.
Type	Video game console
Generation	Second generation
Retail availability	November 1982 (United States/Canada)
Discontinued	May 1984
Media	ROM cartridge
CPU	MOS 6502C @ 1.79 MHz
Controller input	Joystick Trak-Ball
Predecessor	Atari 2600
Successor	Atari 7800

The **Atari 5200 SuperSystem**, or simply the **Atari 5200**, is a video game console that was introduced in 1982 by Atari Inc. as a higher end complimentary console for the popular Atari 2600. [1] The 5200 was created to compete with the Intellivision, but wound up more directly competing with the ColecoVision shortly after its release.

Atari 5200 system with controller, game cartridges and packaging

The 5200 was based on Atari Inc.'s existing 400/800 computers and the internal hardware was almost identical, although software was not directly compatible between the two systems. The 5200's controllers feature an analog joystick and a numeric keypad along with start, pause and reset buttons. The 360-degree non-centering joystick was touted as offering more control than the four-position joystick controller offered with the Atari 2600.

In August of 2009, video game website IGN placed the 5200 23rd out of the 25 greatest video game consoles of all time.[2]

Hardware

Much of the technology in the Atari 8-bit family of home computer systems were originally developed as a second-generation games console intended to replace the 2600. However, as the system was reaching completion, the personal computer revolution was starting with the release of machines like the Commodore PET, TRS-80 and Apple II. These machines were similar in technological terms to the 2600, but sold for much higher prices with associated higher profit margins. Atari's management decided to enter this market, and the new technology was repackaged into the Atari 400 and 800, hitting the market in 1979.

In the early 1980s a second wave of games consoles came to market, notably the Intellivision and numerous other announcements and releases. Being behind the technological curve was not entirely surprising; the chipset used in the 400 and 800 was designed because they were aware the 2600 would be obsolete by the 1980 time frame. What was surprising was the sudden entry into the market of new competition, whose machines quickly cut off the sales of the 2600. Atari decided to re-enter the games market with a design that closely matched their original 1978 specifications. In its prototype stage, the Atari 5200 was originally called the "Atari Video System X - Advanced Video Computer System", and was codenamed "Pam" after a female employee at Atari Inc. It is also rumored that PAM actually stood for "Personal Arcade Machine", as the majority of games for the system ended up being arcade conversions. Actual working *Atari Video System X* machines, whose hardware is 100% identical to the Atari 5200 do exist, but they are extremely rare.[3]

The initial 1982 release of the system featured four controller ports, where nearly all other systems of the day had only two ports. The 5200 also featured a revolutionary new controller with an analog joystick, numeric keypad, two fire buttons on both sides of the controller and game function keys for Start, Pause, and Reset. The 5200 also featured the innovation of the first automatic TV switchbox, allowing it to automatically switch from regular TV viewing to the game system signal when the system was activated. Previous RF adapters required the user to slide a switch on the adapter by hand. This unique RF box was also where the power supply connected in a unique dual power/television signal setup similar to the RCA Studio II's. A single cable coming out of the 5200 plugged into the switch box and was used for both electricity and the television signal.

The 1983 revision of the Atari 5200 has two controller ports instead of four, and a change back to the more conventional separate power supply and standard non-autoswitching RF switch. It also has changes in the cartridge port address lines to allow for the Atari 2600 adapter released that year. While the adapter was only made to work on the two-port version, modifications can be made to the four-port to make it line-compatible. In fact, towards the end of the four-port model's production run, there were a limited number of consoles produced which included these modifications. These consoles can be identified by an asterisk in their serial number.

Controllers

The controller prototypes used in the electrical development lab used a yoke and gimbal mechanism that came from an RC airplane controller kit. This simple design gave very nice smooth linear control and was highly reliable. The production controllers were quite different and a great disappointment to the electrical and software development teams. The design of the analog joystick, which used a weak rubber boot rather than springs to provide centering, proved to be ungainly and unreliable. They ultimately alienated consumers and quickly became the Achilles' heel of the system because of their combination of an overly complex mechanical design with a very low-cost internal flex circuit system. Another major flaw of the controllers was that the design did not translate into a linear acceleration from the center through the arc of the stick travel. The controllers did, however, include a pause button. Various third party replacement joysticks were also released, including those made by Wico.

Atari Inc. released the Pro-Line Trak-Ball controller for the system, which was used primarily for gaming titles such as Centipede or Defender. A paddle controller[4] and an updated self-centering version of the original controller[5] were also in development, but never made it to market.

The primary controller was ranked the 10th worst video game controller by IGN editor Craig Harris.[6]

Internal differences between the 5200 and the 400/800

Although the Atari 5200's internal design was extensively based on that of the 400/800 home computers, the differences were sufficient that games designed for one would not run directly on the other.

One of the most obvious differences was the 5200's lack of a keyboard. However, there were several others:

- The 400/800's 10 KB operating system was replaced with a simpler 2 KB BIOS, of which 1 KB is the built-in character set.[7]
- A number of important registers, such as those of the GTIA and POKEY chips appear at different memory locations.[7]
- The purpose of some registers changed slightly on the 5200.[7]
- The 5200's analog joysticks required different input handling to the traditional digital joystick input on the 400/800. (However, the 5200 reassigned/rewired two of the 400/800's existing analog paddle registers for each bi-directional analog joystick input).[7]

Atari Corp.'s later XE Games System revisited the idea of a console based on the 400/800 hardware. However, as this was essentially just a 65XE computer with a detachable keyboard, it was able to run most of the home computer titles directly.

Market failure

The Atari 5200 is said to have suffered from its software incompatibility with the Atari 2600. However, an adapter was released in 1983, along with a revision allowing it to play all Atari 2600 games. Since "backwards-compatibility" was not a pressing concern with gamers who were attracted to the 5200's promise of better resolution graphics and improved sound, it is unlikely this played a huge role in the 5200's perceived failure in the market.

What many consider to be of larger concern to gamers at the time was the pack-in game, "Super-Breakout". Unfortunately, this was not a title that could draw mass appeal in the same way Donkey Kong did for the Colecovision. Where "Donkey Kong" showed off the graphics and sound capabilities of the Colecovision, "Super-Breakout" had the opposite effect, and is very likely the largest culprit to the 5200's under performance in the market.

Another problem was the lack of attention that Atari Inc. gave to the console; most of its resources went to the already over-saturated Atari 2600. It faced an uphill battle competing with the ColecoVision's head-start and a faltering video game market.

At one point during the 5200's lifespan, Atari Inc. planned on developing a smaller cost-reduced version of the Atari 5200, which would have gotten rid of the controller storage bin. Code-named the "Atari 5100" (a.k.a. "Atari 5200 Jr."), only a few fully working prototype Atari 5100s were made before the project was canceled.[8]

On May 21, 1984, during a press conference at which the Atari 7800 was introduced, company executives revealed that the 5200 had been discontinued.[9] Total sales of the 5200 were reportedly in excess of 1 million units.[10]

Technical specifications

- CPU: Custom MOS 6502C @ 1.79 MHz (*not* a 65c02).
- Support Hardware: 2 custom VLSI chips
- Maximum Screen Resolution: 320×192 resolution, 16 (out of 256) on-screen colors per scan line. Palette can be changed at every scan line using ANTIC display list interrupts, allowing all 256 colors to be displayed at once.
- Graphics: ANTIC and GTIA
- Sound: 4-channel sound via the POKEY chip which also handles keyboard scanning, serial I/O, high resolution interrupt capable timers (single cycle accurate), and random number generation.
- RAM: 16 KB[7]
- ROM:
  - 2 KB on-board BIOS for system startup and interrupt routing.
  - 32 KB ROM window for standard game cartridges, expandable using bank switching techniques.
- Physical Size: 13" × 15" × 4.25"

Launch titles

- Super Breakout
- Galaxian
- Space Invaders
- Asteroids (Prototype)

See also

- History of Atari
- List of Atari 5200 games
- Atari 8-bit family

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External links

- AtariAge – Comprehensive Atari 5200 database and information (http://www.atariage.com/software_search.html?SystemID=5200)

Vectrex

Manufacturer	Smith Engineering
Type	Video game console
Generation	Second generation
Retail availability	• NA November 1982 • EU May 1983 • JP June 1983
Media	ROM cartridge
CPU	Motorola MC68A09 @ 1.5 MHz
Controller input	Two

The **Vectrex** is a vector display-based video game console that was developed by Western Technologies/Smith Engineering. It was licensed and distributed first by General Consumer Electric (GCE), and then by Milton Bradley Company after their purchase of GCE. It was released in November 1982 at a retail price of $199 ($430 compensated for inflation[1]); as Milton Bradley took over international marketing the price dropped to $150 and then $100 shortly before the video game crash of 1983.[2] The Vectrex exited the market in early 1984.

Unlike other non-portable video game consoles, which connected to televisions and rendered raster graphics, the Vectrex has an integrated vector monitor which displays vector graphics. The monochrome Vectrex uses plastic screen overlays to generate color and various static graphics and decorations. At the time, many of the most popular arcade games used vector displays, and GCE was looking to set themselves apart from the pack by selling high-quality versions of games such as *Space Wars* and *Armor Attack*.

Vectrex comes with a built in game, the *Asteroids*-like *Minestorm*, which some claim was reason enough to buy a Vectrex system[3] . Two peripherals were also available for the Vectrex, a light pen and a 3D imager.

The Vectrex was also released in Japan under the name Bandai Vectrex Kousokusen.

While it is a mainstay of disc-based console systems today, the Vectrex was part of the first generation of console systems to feature a boot screen, which also included the Atari 5200 and Colecovision.[4]

System features and innovations

The Vectrex was the first system to offer a 3D peripheral (the Vectrex 3D Imager), predating the Sega Master System's SegaScope 3D by about four years.[5] Also, early units have a very audible "buzzing" from the built-in speaker that reacts to the graphics generated on screen. This is due to a lack of shielding between the built-in CRT and the speaker wiring and was eventually resolved in later production models. This idiosyncrasy has become a familiar characteristic of the machine.

Several companies offered or included Vectrex software in their products or promotions. The liquor company Mr. Boston gave out a limited number of customized cartridges of Clean Sweep. The box had a Mr. Boston sticker on it. The overlay was basically the regular Clean Sweep overlay with the Mr. Boston name, logo, and copyright info running up either side. The game itself had custom text, and the player controlled a top hat rather than a vacuum.

Some of the Vectrex's games feature unusual qualities or innovations, and new games are still being produced today by homebrew video game programmers.

The game built into the Vectrex, *Minestorm*, would crash at level 13. However, on some machines the game would continue much farther, with levels containing very unusual characteristics. The game would come to an ultimate end at its highest level, in which more mines were laid than would hatch. Consumers who complained to the company about the crash at the 13th level received a replacement cartridge in the mail. Entitled *MineStorm II*, it was the fixed version of the Vectrex's built in game. However, not many wrote to the company about it due to no advertisement of any sort, making *MineStorm II* one of the rarest cartridges for the Vectrex system.

Many critics (of the few who have commented on the system at all) believe that the system had a lot going for it, but merely was at the wrong place at the wrong time, due to it being released just prior to the North American Video Game Crash of 1983. These critics praise the system's durability (holding up surprisingly well, even to the present day), astounding library of games (considering how few games were actually released for the system), and a controller that was very well designed for its time.[6]

Technical specifications

Circuit Board

- CPU : Motorola 68A09 @ 1.5 MHz
- RAM: 1 KB (two 4-bit 2114 chips)
- ROM: 8 KB (one 8-bit 2363 chip)

Sound

- Sound: General Instrument AY-3-8912
- 3" electrodynamic paper cone speaker

Display

The cathode ray tube is a Samsung model 240RB40 monochrome unit measuring 9 × 11 inches, displaying a picture of 240 mm diagonal; it is an off-the-shelf picture tube manufactured for small black/white television sets. A vector CRT display such as the one in the Vectrex does not require a special tube, and differs from standard raster-based television sets only in the control circuits. Rather than use sawtooth waves to direct the internal electron beam in a raster pattern, digital-to-analog converters drive the horizontal and vertical deflection electromagnets. Those deflection electromagnets are wound on a standard yoke used in television sets, and the high-voltage transformer and is also an off-the-shelf TV component. Such use of existing television technology was already established by arcade games such as *Asteroids*.

3D Imager

The 3-D imager spins a disk which is half black and half colored bands that radiate from the center (usually red, green and blue) between the viewer's eyes and the Vectrex screen. The Vectrex is synchronized to the rotation of the disk (or vice versa) and draws vectors corresponding to a particular color and/or a particular eye. Therefore only one eye will see the vectrex screen and its associated images (or color) at any one time while the other will see nothing.

A single object that does not lie on the plane of the monitor (*i.e.*, in front of or into the monitor) is drawn at least twice to provide information for each eye. The distance between the duplicate images and whether the right eye image or the left eye image is drawn first will determine where the object will appear to "be" in 3-D space. The 3-D illusion is also enhanced by adjusting the brightness of the object (dimming objects in the background). Spinning the disk at a high enough speed will fool the viewer's eyes/brain into thinking that the multiple images it is seeing are two different views of the same object. This creates the impression of 3-D and color. The same 3-D effect is in fact possible with raster or film-projection images, and the shutter glasses used in some 3-D theaters and virtual reality theme park rides work on the same principle.

See also

- List of commercial failures in video gaming
- List of Vectrex games

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External links

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- Vectrex Portal (http://www.vectrex.com)
- Vectrex Museum (http://www.vectrexmuseum.com) - dedicated to the most ambitious and unusual Home Arcade System
- Spike's Big Vectrex Page (http://vectrex.atarihq.com) Vectrex portal, recent games/projects/news, information archive
- Vectrex infosite (http://www.vectrex.nl) News, manuals, reviews, screenshots, faqs, scanned manuals, scanned boxes and more.

Arcadia 2001

Manufacturer	Emerson Radio Corp
Type	Video game console
Generation	Second generation
Retail availability	1982[1]
Media	ROM cartridge
CPU	Signetics 2650 @ 3.58 MHz

The **Arcadia 2001** is a second-generation 8-bit console released by Emerson Radio Corp. The game library was composed of 51 unique games and about 10 variations. The graphic quality is similar to that of the Intellivision and the Odyssey².

The Arcadia was not named after the company of the same name. Arcadia Corporation, manufacturer of the 2600 supercharger, was sued by Emerson for trademark infringement. Arcadia Corporation then changed its name to Starpath.[2] Emerson licensed the Arcadia 2001 worldwide, and over 30 Arcadia clones exist.

Description

The Arcadia is much smaller than its contemporary competitors and is powered by a standard 12-volt power supply so it can be used in a boat or a vehicle. This portability feature, however, requires a portable television, which was extremely rare in the early 1980s. It also has two outputs (or inputs) headphone jacks on the back of the unit, on the far left and far right sides.

The system came with two Intellivision-style control pads, but with a lighter touch on the side 'fire' buttons. The control pads have screw holes in their centers, so that one could transform them into a joystick, as with the later Sega Master System's controller. Most games came with mylar overlays which could be applied to the controllers. The console itself had five buttons: power, start, reset, option, and select.

There are at least three different types of cartridge case styles and artwork, with variations on each. Emerson-family carts come in two different lengths of black plastic cases; the short style is similar to Atari 2600 carts in overall size. This family uses a unique "sketch" type of picture label. MPT-03 family cart cases (see below) resemble Super NES carts in size and shape, except that they are molded in brown plastic. Their labels look much more modern and stylized, with only a minimal picture on each. There is also a family of what seems pirate carts, that look nothing like the others in shape, size or label artwork. The different labeled versions, however, all used the same cartridges.

Market Failure

The Emerson version of the console was essentially considered dead on arrival in the USA. The system came out at nearly the same time as the Atari 5200 and the ColecoVision were released. In addition, Atari's use of exclusive rights to many games made it virtually impossible for Emerson to get popular games to the console.

Emerson actually created many popular arcade titles including *Pac-Man*, *Galaxian* and *Defender* for the Arcadia and had them manufactured. However, Atari started to sue its competitor companies for releasing games to which it had exclusive-rights agreements and Emerson was left with thousands of manufactured games that could no longer be sold.

Variants

The Arcadia 2001 was licensed to many different companies and sold under different names. However, not all consoles are compatible due to differences in cart slots and cases.

Name	Manufacturer	Country	Compatibility family
Advision Home Arcade	Advision		Emerson console
Arcadia	Bandai		Emerson console
Arcadia 2001	Emerson		Emerson console
Cosmos	Tele-Computer		Emerson console
Dynavision	Morning-Sun Commerce		MPT-03 console
Ekusera	P.I.C.		MPT-03 console
Hanimex MPT-03	Hanimex		MPT-03 console
HMG-2650	Hanimex		Emerson console
Home Arcade Centre	Hanimex		Emerson console
Intelligent Game MPT-03	Intelligent Game		MPT-03 console
Intercord XL 2000 System	Intercord		Emerson console
Intervision 2001	Intervision		Ormatu console
ITMC MPT-03	ITMC		MPT-03 console
Leisure-Vision	Leisure-Dynamics		Emerson console
Leonardo	GiG Electronics		Emerson console
Ormatu 2001	Ormatu Electronics BV		Ormatu console
Palladium Video Computer Game	Neckermann		Palladium console
Polybrain Video Computer Game	Polybrain		Palladium console
Poppy MPT-03 Tele Computer Spiel	Poppy		MPT-03 console
Prestige Video Computer Game MPT-03	Prestige		MPT-03 console
Robdajet MPT-03			MPT-03 console
Rowtron 2000	Rowtron		MPT-03 console
Schmid TVG-2000	Schmid		Emerson console
Sheen Home Video Centre 2001	Sheen		Ormatu console
Soundic MPT-03	Soundic		MPT-03 console
Tele Brain	Mr. Altus		Palladium console
Tele-Fever	Tchibo		Emerson console

Tempest MPT-03	Tempest		MPT-03 console
Tobby MPT-03	Tobby	Tobby	MPT-03 console
Trakton Computer Video Game	Trakton		Palladium console
Tryom Video Game Center	Tryom		MPT-03 console
Tunix Home Arcade	Monaco Leisure		Emerson console
UVI Compu-Game	Orbit Electronics		Orbit console
Video Master	Grandstand		Orbit console

Technical specifications

- Main Processor: Signetics 2650 CPU running @ 3.58 MHz
  - Some variants run a Signetics 2650A
- RAM: 512 bytes
- ROM: None
- Video Display: 128 × 208 / 128 × 104, 8 Colours
- Video Display Controller: Signetics 2637 UVI
- Sound: Single Channel "Beeper" + Single Channel "Noise"
- Hardware Sprites: 4 independent, single color
- Controllers: 2 × 2 way
- Keypads: 2 × 12 button (more buttons on some variants)

Games

Many of the games for the **Arcadia 2001** are ports of lesser-known arcade games such as *Route 16* and *Jungler*.

- 3-D Bowling - a Bowling game released for the Arcadia by Emerson Radio Corp. in 1982.
- 3-D Raceway - 3D Raceway
- 3-D Soccer - a Soccer game released by Emerson Radio Corp. for the Arcadia in 1982.
- Alien Invaders - is a Shoot-'Em-Up game released by Emerson Radio Corp. for the Arcadia in 1982.
- Astro Invader
- American Football - is a Football game released by Emerson Radio Corp. for the Arcadia in 1982.
- Baseball
- Brain Quiz
- Breakaway
- Capture
- Cat Trax
- Crazy Gobbler
- Crazy Climber (unreleased)
- Escape
- Funky Fish
- Galaxian
- Grand Prix 3-D
- Grand Slam Tennis
- Hobo
- Home Squadron
- Jump Bug
- Jungler
- Kidou Senshi Gundamu (only in Japan)
- Math Logic
- Missile War
- Ocean Battle
- Pleiades
- RD2 Tank
- Red Clash
- Robot Killer (clone of Berzerk)
- Route 16
- Soccer
- Space Attack
- Space Chess
- Space Mission
- Space Raiders
- Space Squadron
- Space Vultures
- Spiders
- Star Chess
- Super Bug
- Super Gobbler
- Tanks A Lot

- The End
- Turtles/Turpin

Emulation

- WinArcadia and AmiArcadia emulators [3].
- The Emerson Arcadia 2001 Emulator [3] The first (DOS) emulator.
- MESS: Multiple Emulator Super System. [4]

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External links

- Emerson Arcadia 2001 Central (http://amigan.yatho.com).
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- www.old-computers.com (http://www.old-computers.com/museum/computer.asp?st=2&c=835) Emerson Arcadia 2001 museum entry.
- www.old-computers.com (http://www.old-computers.com/magazine/view.asp?r=2&a=8) Article about Arcadia 2001 and "clones".
- MESS wiki (http://mess.redump.net/mess:drivers:arcadia:arcadia) Arcadia 2001 documentation and games snapshots

ColecoVision

Manufacturer	Coleco
Type	Video game console
Generation	Second generation
Retail availability	• US August 1982 • EU 1982
Discontinued	1984[1]
Media	ROM cartridge
CPU	Zilog Z80
Controller input	Joystick/Numeric Keypad Roller Controller Driving Controller Super Action Controller
Best-selling game	*Donkey Kong* (pack-in)
Predecessor	Telstar Arcade (1978)

The **ColecoVision** is Coleco Industries' second generation home video game console which was released in August 1982. The ColecoVision offered arcade-quality graphics and gaming style, and the means to expand the system's basic hardware. Released with a catalog of twelve launch titles, with an additional ten games announced for 1982, approximately 145 titles in total were published as ROM cartridges for the system between 1982 and 1984.[2] River West Brands currently owns the ColecoVision brand name.[3]

In 2009, IGN named the ColecoVision their 12th best video game console out of 25.[4]

History

Coleco licensed Nintendo's *Donkey Kong* as the official pack-in cartridge for all ColecoVision consoles, and this version of the game was well received as a near-perfect arcade port, helping to boost the console's popularity. By Christmas of 1982, Coleco had sold more than 500,000 units,[5] [6] in part on the strength of its bundled game.[7] The ColecoVision's main competitor was the arguably more advanced but less commercially successful Atari 5200.[8] [9] [10]

The ColecoVision was distributed by CBS Electronics outside of the United States, and was branded the **CBS ColecoVision**.

Sales quickly passed one million in early 1983,[11] before the video game crash of 1983. By the beginning of 1984, quarterly sales of the ColecoVision had dramatically decreased.[12]

Over the next 18 months, the Coleco company ramped down its video game division, ultimately withdrawing from the video game market by the end of the summer of 1985.[13] [14] The ColecoVision was officially discontinued by October 1985.[15] Total sales of the ColecoVision are uncertain but were ultimately in excess of 2 million units, as sales had reached that number by the spring of 1984,[16] while the console continued to sell modestly up until its discontinuation the following year.[17]

In 1986, Bit Corporation produced a ColecoVision clone called the Dina, which was sold in the United States by Telegames as the Telegames Personal Arcade.[18]

Hardware

The main console unit consists of a 14x8x2 inch rectangular plastic case that houses the motherboard, with a cartridge slot on the right side and connectors for the external power supply and RF jack at the rear. The controllers connect into plugs in a recessed area on the top of the unit.

The design of the controllers is similar to that of Mattel's Intellivision—the controller is rectangular and consists of a numeric keypad and a set of side buttons. In place of the circular control disc below the keypad, the Coleco controller has a short, 1.5-inch joystick. The keypad is designed to accept a thin plastic overlay that maps the keys for a particular game. Each ColecoVision console shipped with two controllers.

All first-party cartridges and most third-party software titles feature a twelve-second pause before presenting the game select screen. This delay results from an intentional loop in the console's BIOS to enable on-screen display of the ColecoVision brand. Companies like Parker Brothers, Activision, and Micro Fun bypassed this loop, which necessitated embedding portions of the BIOS outside the delay loop, further reducing storage available to actual game programming.

Technical specifications

- CPU: Zilog Z80A @ 3.58 MHz
- Video processor: Texas Instruments TMS9928A
  - 256x192 resolution
  - 32 sprites
  - 16 colors
- Sound: Texas Instruments SN76489A
  - 3 tone generators
  - 1 noise generator
- VRAM: 16 KB
- RAM: 1 KB
- Storage: Cartridge: 8/16/24/32 KB

Expansion modules

From its introduction, Coleco had touted a hardware add-on called the **Expansion Module #1** which made the ColecoVision compatible with the industry-leading Atari 2600. Functionally, this gave the ColecoVision the largest software library of any console of its day. The expansion module prompted legal action from Atari, but Atari was unable to stop sales of the module because the 2600 could be reproduced with standard parts. Coleco was also able to design and market the Gemini game system which was an exact clone of the 2600, but with combined joystick/paddle controllers.

Expansion Module #2

Expansion Module #2 is a driving controller expansion that consists of a steering wheel, gas pedal and the pack-in game *Turbo*. The driving controller is also compatible with the games *Destructor* and *Dukes Of Hazzard*.

Super Action Controller

Expansion Module #3, the final hardware expansion module, was released in the summer of 1983. Module #3 converts the ColecoVision into a full-fledged computer known as the Coleco Adam, complete with keyboard and digital data pack (DDP) cassette drives. Module #3 was originally conceived to be the ColecoVision **Super Game Module** using *game wafers* as the storage medium. Although Coleco presented a mock-up of the SGM at the 1983 New York Toy Show, that product was never manufactured. There were also rumors that Expansion Module #3 was to have incorporated an RCA CED player to store larger amounts of data.

Coleco prototyped a fourth expansion module intended to provide compatibility with Mattel's Intellivision, but this was never released.

Two controller expansions were also available. First was the **Roller Controller**, a trackball packaged with a port of the arcade game *Slither*, a *Centipede* clone and meant to be used with some dedicated games like Victory or to enhance the gameplay of previously published cartridges which benefitted from its trackball system (like Wargames). The second was the **Super Action Controller Set**, resembling a pair of boxing gloves each with joystick and numeric keypad on top and a series of buttons along the grip. It came with the game *Super Action Baseball* and saw later release of the *Rocky*-inspired *Super Action Boxing* and a port of *Front Line*.

Similarities to other platforms

The ColecoVision contains the same CPU and graphics chip as the MSX and Sega SG-1000/SC-3000, but MSX contains a different sound chip AY-3-8910. ColecoVision has the same CPU and a sound chip with Sega Master System, also similar but worse graphics chip. For this reason it is not hard to port games between these systems.

Games

Coleco's software approach was to license arcade games that Atari had not. Realizing that Atari had firm support from Namco (the creators of *Pac-Man* and many other hits), Coleco entered into contracts with companies such as Sega, Konami, and Universal. Given that the ColecoVision could produce near arcade-quality ports, industry magazines like *Electronic Games* were unanimous in their enthusiasm over the console.

Some of the more popular games include *Donkey Kong* (the pack-in), *Donkey Kong Junior*, *Carnival*, *Lady Bug*, *Mouse Trap*, and *Zaxxon*. Coleco also popularized lesser known arcade games, such as *Venture*, *Cosmic Avenger*, and *Mr. Do!*. In some cases, the console versions were arguably superior to the arcade versions, as seen in *Space Panic*. Later Coleco continued adapting newer successful arcade games like Subroc, Time Pilot and Frenzy, the company also made inferior ports of many of these games for the Atari 2600 and Intellivision, in an effort to broaden its market.

Compared to arcade ports, the ColecoVision did not offer many games original to the console, though a few notable releases are *Smurf: Rescue in Gargamel's Castle*, *War Room*, *Illusions*, and *Fortune Builder*, an early milestone in the style of *SimCity*.

Coleco was infamous for its vaporware offerings. An example of such was to be an adaptation of *Tunnels and Trolls*. It is not known whether the game's printed screen shots were from an actual prototype or were merely pre-development illustrations. The ColecoVision's box itself bears several other examples, among them *Chess Challenger*, *Side Trak*, *Rip Cord*, *Horse Racing*, and *Mr. Turtle*.

Legacy

In 1996, programmer Kevin Horton released the first homebrew game for the ColecoVision, a Tetris clone entitled *Kevtris*.[19] [20]

In 1997, Telegames released *Personal Arcade Vol. 1*, a collection of ColecoVision games for Microsoft Windows,[21] and a 1998 follow-up, *Colecovision Hits Volume One*.[22]

In popular culture

The value of the ColecoVision as an 1980s pop culture icon was discussed on VH1's *I Love The 80's Strikes Back*.[23] Several television series have aired episodes that reference or parody the console: *South Park*,[24] *Family Guy*[25] and *Everybody Hates Chris*.[26]

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External links

- ColecoVision (http://www.dmoz.org/Games/Video_Games/Console_Platforms/ColecoVision/) at the Open Directory Project

Bally Astrocade

Manufacturer	Bally
Type	Video game console
Generation	Second generation
Release date	1977
Media	ROM cartridge
CPU	Zilog Z80 clocked at 1.789 MHz
Memory	RAM: 4k-64k (with external modules) RAM, 8k ROM
Display	160x102 (8 colours), 160x88 (2 colours), 320x204

The **Astrocade** is an early video game console and simple computer system designed by a team at Midway, the videogame division of Bally. It was marketed only for a limited time before Bally decided to exit the market. The rights were later picked up by a third-party company, who re-released it and sold it until around 1983. The Astrocade is particularly notable for its very powerful graphics capabilities, and for the difficulty in accessing those capabilities.

History

Originally referred to as the **Bally Home Library Computer**, it was released in 1977 but available only through mail order. Delays in the production meant none of the units actually shipped until 1978, and by this time the machine had been renamed the **Bally Professional Arcade**. In this form it sold mostly at computer stores and had little retail exposure (unlike the Atari VCS). In 1979 Bally grew less interested in the arcade market and decided to sell off their Consumer Products Division, including development and production of the game console.

At about the same time a 3rd party group had been unsuccessfully attempting to bring their own console design to market as the **Astrovision**[1] . A corporate buyer from Montgomery Ward who was in charge of the Bally system put the two groups in contact, and a deal was eventually arranged. In 1981 they re-released the unit with the BASIC cartridge included for free, this time known as the **Bally Computer System**, and then changed the name again in 1982 to **Astrocade**. It sold under this name until the video game crash of 1983, and then disappeared around 1985.

Midway had long been planning to release an expansion system for the unit, known as the **ZGRASS-100**. The system was being developed by a group of computer artists at the University of Illinois known as the *Circle Graphics Habitat*, along with programmers at Nutting. Midway felt that such a system, in an external box, would make the Astrocade more interesting to the market. However it was still not ready for release when Bally sold off the division. A small handful may have been produced as the **ZGRASS-32** after the machine was re-released by Astrovision.

The system, combined into a single box, would eventually be released as the Datamax UV-1. Aimed at the home computer market while being designed, the machine was now re-targeted as a system for outputting high-quality graphics to video tape. These were offered for sale some time between 1980 and 1982, but it is unknown how many were built.

Description

In the late 1970s Midway contracted Dave Nutting Associates to design a video display chip that could be used in all of their videogame systems, from standup arcade games, to a home computer system. The system Nutting delivered remains perhaps the most powerful graphics system of the 8-bit generation, and was used in most of Midway's classic arcade games of the era, including **Gorf** and **Wizard of Wor**.

The basic systems were powered by a Zilog Z80 driving the display chip with a RAM buffer in between the two. The display chip had two modes, a low-resolution mode at 160 x 102, and a high-resolution mode at 320 x 204, both with 2-bits per pixel for four colors. This sort of color/resolution was normally beyond the capabilities of RAM of the era, which could not read out the data fast enough to keep up with the TV display. The chip used a clever trick to work around this problem, technically "holding the RAS high", allowing them to read one "line" at a time at very high speed into a buffer inside the display chip. The line could then be read out to the screen at a more leisurely rate, while also interfering less with the CPU, which was also trying to use the same memory.

Sadly, on the Astrocade the pins needed to use this "trick" were not connected. Thus the Astrocade system was left with just the lower resolution 160 x 102 mode. In this mode the system used up 160 x 102 x 2bits = 4080 bytes of memory to hold the screen. Since the machine had only 4k of RAM, this left very little room left over for the program's use, which was used for things like holding the score, or game options. The rest of the program would have to be placed in ROM.

The Astrocade used color registers, or *color indirection* as it was often referred to then, so the four colors could be picked from a palette of 256 colors. Color animation was possible by changing the values of the registers, and using a horizontal blank interrupt you could change them from line to line. An additional set of four color registers could be "swapped in" at any point along the line, allowing you to create two "halves" of the screen, split vertically. Originally intended to allow you to easily create a "score area" on the side of the screen, clever programmers used this feature to emulate 8 color modes.

Unlike the VCS, the Astrocade did not include hardware sprite support. It did, however, include a blitter-like system and software to drive it. Memory above 0x4000 was dedicated to the display, and memory below that to the ROM. If a program wrote to the ROM space (normally impossible, it's "read only" after all) the video chip would take the data, apply a function to it, and then copy the result into the corresponding location in the RAM. Which function to use was stored in a register in the display chip, and included common instructions like XOR and bit-shift. This allowed the Astrocade to support any number of "sprites" independent of hardware, with the downside that it was up to the software to re-draw them when they moved.

The Astrocade was one of the early cartridge-based systems, using cartridges known as *Videocades* that were designed to be as close in size and shape as possible to a cassette tape. The unit also included two games built into the ROM, Gunfight and Checkmate, along with the simple but useful Calculator and a "doodle" program called Scribbling.

The Astrocade featured a relatively complex input device incorporating several types of control mechanisms: the controller was shaped as a pistol-style grip with trigger switch on the front; a small 4-switch/8-way joystick was placed on top of the grip, and the shaft of the joystick connected to a potentiometer, meaning that the stick could be rotated to double as a paddle controller. By most reports the controllers were excellent, but had the downside of breaking frequently.

On the front of the unit was a 24-key "hex-pad" keyboard used for selecting games and options. Most cartridges included two games, and when they were inserted the machine would reset and display a menu starting with the programs on the cartridge and then listing the four built-in programs. On the back were a number of ports, including connectors for power, the controllers, and an expansion port. One oddity was that the top rear of the unit was empty, and could be opened to store up to 15 cartridges. The system's ability to be upgraded from a Videogame console to Personal computer along with its library of nearly 30 games in 1982 are some reasons that made it more versatile than its main competitors, and was listed by Jeff Rovin as one of the seven major video game suppliers[2] .

BASIC

The Astrocade also included a BASIC programming language cartridge, based on Lee Chen Wang's Palo Alto Tiny BASIC. Supporting BASIC on the system was very difficult, because the display alone used up almost all the available RAM. The solution to this problem was very complex, yet very clever.

BASIC programs were stored in the video RAM by interleaving every bit of the program along with the display itself; BASIC used all the even-numbered bits, and the display got the odd-numbered bits. The interpreter would read out two bytes, drop all the odd-numbered bits, and assemble the results into a single byte of code. This was rendered invisible by setting two of the colors to be the same as the other two, such that colors 01 and 11 would be the same (white), so the presence, or lack, of a bit for BASIC had no effect on the screen. Additional memory was scavenged by using fewer lines vertically, only 88 instead of the full 102. The end result of all this was to manage to squeeze out 1760 bytes of RAM for BASIC programs. The downside was that most of the graphics system's power was unavailable.

BASIC was programmed, laboriously, through this keyboard by assigning each of the keys a single command, number and several alpha characters. These were selected through a set of 4 colored shift keys. This way you simply typed "WORD"(gold) shift then the "+" key and got GOTO.

ZGRASS

The ZGRASS unit sat under the Astrocade and turned it into a "real" computer, including a full keyboard, a math co-processor (FPU), 32k of RAM, and a new 32k ROM containing the GRASS programming language (sometimes referred to as **GRAFIX** on this machine). The unit also added I/O ports for a cassette and floppy disk, allowing it to be used with CP/M.

Specifications

Circuit Board and Cartridges

- CPU: Z80, 1.789 MHz
- RAM: 4k (up to 64k with external modules in the expansion port)
- ROM: 8k
- Cart ROM: 8k
- Expansion: 64K total
- Ports: 4 controller, 1 expansion, 1 light pen
- Sound: 3 voices + noise/vibrato effects (played through the TV)

Video

- Resolution: True 160x102 / Basic 160x88 / Expanded RAM 320x204
- Colors: True 8* / Basic 2
  - The bitmap structure of the Bally actually only allows for 4 color settings. However, through the use of 2 color palettes and a left/right boundary control byte you could have the left section of screen (this could be the play field) use 1 set of colors while the right side (this could show information such as lives and score) used an entirely different set of colors, thus 8 total colors were possible.
- Graphic type: Bitmap, 2 plane bitpacked

List of games

- 280 Zzzap / Dodgem
- Amazing Maze / Tic Tac Toe
- Artillery Duel
- Astro Battle
- Bally Pin
- Basic (not a game but included for completeness)
- Baseball
- Basketball
- Bingo Math / Speed Math
- Bioryhtm
- Blackjack / Poker / Acey-Deucy
- Blast Droids
- Bowling
- Checkers / Backgammon
- Clowns / Brickyard
- Coloring Book
- Conan The Barbarian
- Cosmic Raiders
- Dog Patch
- Drag Race / Desert Fox
- Football
- Galactic Invasion
- Galaxian
- Grand Prix / Demolition Derby
- Gunfighter
- ICBM Attack
- Incredible Wizard
- Letter Match / Spell 'N Score / Crosswords
- Machine Language Manager (not a game but included for completeness)
- Mazeman
- Median
- Missile Attack
- Ms. CandyMan
- Muncher
- Music Maker
- Panzer Attack / Red Baron

- Pirates Chase
- Sea Devil
- Seawolf / Missile
- Soccer
- Solar Conqueror
- Space Fortress
- Space Invaders
- Star Battle
- Tornado Baseball / Tennis / Hockey / Handball
- Treasure Cove
- Wizard of Wor

See also

- Atari 2600
- Colecovision
- Fairchild Channel F
- Intellivision

References

[1] http://www.islandnet.com/~kpolsson/vidgame/vid1982.htm Chronology of Video Game Systems by Ken Polsson
[2] The Complete Guide to Conquering Video Games, by Jeff Rovin, Collier Books, 1982

External links

- Bally Alley (http://www.ballyalley.com/)
- Bally Astrocade text FAQ (http://www.ballyalley.com/faqs/bally-astrocade_faq.txt)
- The Bally Astrocade entry in Classic Gaming Museum at GameSpy.com (http://gamingmuseum.classicgaming.gamespy.com/bally.html)
- Bally/Astrocade html FAQ (http://www.glankonian.com/~lance/Ballyfaq.html)
- Astrocade history at The Dot Eaters (http://www.thedoteaters.com/p3_stage2.php)

SG-1000

SG-1000	
	
Manufacturer	Sega
Type	Video game console
Generation	Second generation
Retail availability	● July 15, 1983 1983 1983 ● July, 1984(SG-1000 II)
Media	ROM Cartridge, Cassette tape
CPU	NEC 780C (clone of Zilog Z80) clocked at 3.579545 MHz for NTSC, 3.546893 MHz for PAL
Memory	2kB RAM, 16kB VRAM
Display	256×192 resolution, 16 colours, 32 on-screen sprites
Successor	Sega Mark III/Sega Master System

The **SG-1000** (エスジー・セン *Esujī Sen*), which stands for **Sega Game 1000**, was a cartridge-based video game console manufactured by Sega. This system marked Sega's first entry into the home video game hardware business, and while the system was not popular[1] , it provided the basis for the more successful Sega Master System[2] .

History

Monaco GP SG-1000 game cartridge

The SG-1000 was first released to the Japanese market on July 15, 1983. Coincidentally, this is exactly the same day that Nintendo's Family Computer was released in Japan. The console reached minor success in that market and sold moderately well within Asia until 1985. The system was launched in New Zealand as released by Grandstand Leisure Limited, Australia by John Sands and in other countries, such as France, Italy, Spain, and South Africa. The console in its original form was never launched in North America.

Game manufacturer Tsukuda Original produced the Othello Multivision (オセロマルチビジョン), an SG-1000 clone with its own set of Othello Multivision-branded games. Because the SG-1000's hardware was very similar to Coleco's Colecovision console, Telegames was able to produce a clone named the Telegames Personal Arcade in North America, which can play both SG-1000 and Colecovision games. The Telegames Personal Arcade was based on Bit Corp's Dina 2-in-1 ColecoVision clone.

A caveat is the SG-1000's surprisingly wide availability on Taiwan's secondary market. This console is highly significant in Taiwan as one of its first and best-remembered consoles, where it was manufactured and sold (very briskly) under license as "阿羅士" ['Lou Shi']. This was striking in that in the same time period from 1983 to 1986,

Famicom games were widely pirated as standalone and multi-carts (replete with rudimentary switch banks to select the active ROM), as well as no less than three different pirated versions of the Atari 2600 with boastful monikers characteristic of the times ("冒險家" ['Adventurer'], "賓果" ['Delight'], "强棒創造者" ['Steadfast Creator']).

Taiwan, among a few other countries, also received a "Mark IV" version of the console (most likely a modified Master System II) and the Mark naming convention was further extended to the Mega Drive/Genesis ('Mark V').

SG-1000 II

Sega SG-1000 II

In July 1984, Sega released an updated version of the console called the SG-1000 II. It is functionally identical to the SG-1000, but has a re-styled shell and the connector for the optional plug-in SK-1100 keyboard has been moved from the rear to the front. It was initially priced at ¥15,000. A computer version of this console, with a built-in keyboard, was called the SC-3000, which would go on to outsell the SG-1000.

The SG-1000 runs all SC-3000 games and applications, with the exception of Music and Basic Cartridges. The machine could be used just like the SC-3000, provided one had the keyboard attachment ready. The console also had an optional game card reader add-on called the *Card Catcher* that allowed for the use of Sega game card software.

The *Card Catcher* would become built into the Sega Mark III, as well as the first version of the Master System.

Sega SC-3000

SC-3000

SC-3000H

The **SC-3000** was the computer equivalent of the SG-1000.

The SC-3000 sold for ¥29,800 in 1983 and was marketed as a computer for beginners. Since games were compatible with both the SC-3000 and SG-1000, and since the SC-3000 was also able to run computer applications, it outsold the SG-1000.

Users were able to create their own programs and games on the machine in BASIC, as well as machine code. A speech synthesis unit, light pen, and several other third party accessories were also available.

The **SC-3000H**, which originally sold for ¥33,800, was an upgraded version of the SC-3000 with more RAM and an upgraded keyboard (the original keyboard was of the low-end membrane type).

The SC-3000 had an add-on called the **SF-7000**. The SF-7000 added 64KB of RAM and 8KB ROM, a 3-inch floppy disk drive, a Centronics parallel port, and an RS232 serial port.

Sega Mark III

The Sega Mark III Logo

Sega Mark III

The Sega Mark III (model number SG-1000M3), a yet newer version in Japan with improved video hardware and an increased amount of RAM, would be redesigned to become the Sega Master System.

Specifications

- CPU: NEC 780C (clone of Zilog Z80)
  - 3.579545 MHz for NTSC, 3.546893 MHz for PAL
- Main RAM: 16 kbit (2 kB)
- Video RAM: 128 kbit (16 kB)
- Video processor: Texas Instruments TMS9928A
  - 256×192 resolution
  - 32 sprites
  - 16 colors
- Sound: Texas Instruments SN76489
  - 4-channel mono sound
  - 3 sound generators, 4 octaves each, 1 white noise generator
- Ports:
  - 1 cartridge
  - 1 DIN composite video/audio (SC-3000 only)
  - 1 RF out
  - 1-2 joystick (1 port for SG-1000, 2 for SG-1000 II and SC-3000)
  - 1 expansion parallel bus (used for SK-1100 keyboard and FM Sound Unit; (SK-1100)SG-1000 and SG-1000 II and Sega MarkIII / (FM Sound Unit)Sega MarkIII only)
  - 1 cassette (SC-3000 and SK-1100 keyboard)
  - 1 printer (SC-3000 and SK-1100 keyboard)

Emulation

The Gametap subscription gaming service includes an emulator of the SG-1000 console. As of June 15, 2007, eleven SG-1000 titles were available for play. The open source emulators MESS, blueMSX, and MEKA are able to emulate the SG-1000 console, among other consoles. Sega Master System emulators are usually able to play SG-1000 games, as the real Sega Master System also had that capability.

List of SG-1000/SC-3000 series games

Sega SG-1000/SC-3000 series Cartridge Game List

Code Number	Software Title	ROM Size	Genre	Developer	Copyright	Publisher(Sale)	Release(JPN)	Release(AUS)	Comment
G-1001	*Borderline*	16KB	Shooter	Compile	SEGA	SEGA	July 15, 1983	Unknown	
G-1002	*Safari Hunting*	16KB	Action	Compile	SEGA	SEGA	July 15, 1983	Unknown	
G-1003	*N-Sub*	16KB	Shooter	Compile	SEGA	SEGA	July 15, 1983	Unknown	
G-1004	*Mahjong*	16KB	Variety	SEGA	SEGA	SEGA	July 15, 1983	Unknown	
G-1005	*Champion Golf*	32KB	Sports	SEGA	Logitec	SEGA	July 15, 1983	1983	
G-1006	*Serizawa hachidan 's Tsumeshogi*	16KB	Puzzle/Variety	Coreland	SEGA	SEGA	July 15, 1983	Not released	Tsumeshogi Puzzle Game. It was put on the market only in Japan.
G-1007	*Congo Bongo*	32KB	Action	Ikegami Tsushinki	SEGA	SEGA	July 15, 1983	Unknown	
G-1008	*YAMATO*	16KB	Shooter	SEGA	SEGA	SEGA	July 15, 1983	Unknown	
G-1009	*Champion Tennis*	8KB	Sports	SEGA	SEGA	SEGA	July 15, 1983	Unknown	Serve, receive and smash the ball. Attack your rival's weak point. Use all corners of the court to your advantage and get a glorious victory over your opponent! This is a highly intellectual and competitive sports game which requires sharp nerves and concentration.
G-1010	*Star Jacker*	32KB	Shooter	SEGA	SEGA	SEGA	July 15, 1983	Unknown	
G-1011	*Champion Baseball*	16KB	Sports	Alpha Denshi	SEGA	SEGA	July 15, 1983	1983	

G-1012	*Sindbad Mystery*	16KB	Shooter	SEGA	SEGA	SEGA	July 15, 1983	Unknown	SINDBAD, an adventurous boy, comes to TREASURE ISLAND. He wants to successfully find the treasure through the clues in the TREASURE MAP by opening the ? panels. To challenge him, MONSTERS are here and there, loitering in the maze-like routes on the island. Muster up your courage, roll the STONE forward and destroy the MONSTERS. After successfully finding the TREASURE, let's go on to the next adventure on another, more wonderous TREASURE ISLAND!
G-1014	*Golgo 13*	32KB	Shooter	SEGA	SEGA	SEGA	1984	Unknown	
G-1015	*Orguss*	32KB	Shooter	SEGA	Big West Advertising, MBS	SEGA, Big West Advertising, MBS	1984	Unknown	
G-1017	*Monaco GP*	32KB	Racing	SEGA	SEGA	SEGA	1983	Unknown	
G-1018	*SEGA Flipper*	16KB	Action	SEGA	SEGA	SEGA	1983	Unknown	
G-1019	*Pop Flamer*	16KB	Action	SEGA	Jaleco	SEGA	1983	Unknown	
G-1020	*Pacar*	16KB	Action	SEGA	SEGA	SEGA	1983	Unknown	Pac-Man like game.

G-1022	*Sega Galaga*	16KB	Shooter	SEGA	Namco	SEGA	1983	Unknown	
G-1023	*Space Slalom*	8KB	Action	SEGA	Oruka->Sega	SEGA	1983	Unknown	
G-1026	*Zippy Race*	32KB	Racing	SEGA	Irem	SEGA	1983	Unknown	
G-1027	*Pachinko*	16KB	Variety	SEGA	SEGA	SEGA	1983	Unknown	
G-1028	*Exerion*	16KB	Shooter	SEGA	Jaleco	SEGA	1983	Unknown	
G-1029	*Pachinko 2*	16KB	Variety	SEGA	SEGA	SEGA	1984	Unknown	
G-1030	*Home Mahjong*	48KB	Variety	SEGA	SEGA	SEGA	1984	Unknown	
G-1030B	*Home Mahjong(Limited Edition)*	48KB	Variety	SEGA	SEGA	SEGA	1984	Unknown	
G-1031	*Lode Runner*	32KB	Action/Puzzle	Compile	Broderbund	SEGA	1984	Unknown	
G-1032	*Safari Race*	32KB	Racing	SEGA	SEGA	SEGA	1984	Unknown	
G-1033	*Champion Boxing*	32KB	Sports	SEGA	SEGA	SEGA	1984	Unknown	
G-1034	*Champion Soccer*	16KB	Sports	SEGA	SEGA	SEGA	1984	Unknown	
G-1035	*Hustle Chumy*	16KB	Action	Compile	Compile	SEGA	1984	Unknown	
G-1036	*Flicky*	32KB	Action	SEGA	SEGA	SEGA	1984	Unknown	
G-1037	*Girl's Garden*	32KB	Action	SEGA	SEGA	SEGA	1984	Unknown	
G-1038	*Zaxxon*	32KB	Shooter	Ikegami Tsushinki	SEGA	SEGA	1985	Unknown	
G-1039	*Champion Pro Wrestlling*	32KB	Sports	SEGA	SEGA	SEGA	1985	Unknown	
G-1040	*GP World*	32KB	Racing	SEGA	SEGA	SEGA	1985	Unknown	
G-1041	*Konami's Sinnyu Shain Toru-Kun*	32KB	Action	Konami	Konami	SEGA	1985	Unknown	
G-1042	*Konami's Hyper Sports*	32KB	Sports	Konami	Konami	SEGA	1985	Unknown	
G-1043	*Star Force*	32KB	Shooter	SEGA	Tehkan	SEGA	1985	Unknown	
G-1044	*Othello*	32KB+RAM2KB	Variety	SEGA	Tsukuda Original	SEGA	1985	Unknown	
G-1045	*Space Invaders*	32KB	Shooter	SEGA	Taito	SEGA	1985	Unknown	
G-1046	*The Castle*	32KB+RAM8KB	Action/Puzzle	SEGA	ASCII	SEGA	1986	Not released	
G-1315	*Loretta No Shouzou*	1Mbit	Adventure	SEGA	SEGA	SEGA	Feb 18, 1987	Not released	*Loretta No Shouzou*(= Loretta's portrait) It is Sherlock Holmes's original story. Only Japanese corresponds.

Sega SG-1000/SC-3000 series MYCARD Game List

Code Number	Software Title	ROM Size	Genre	Developer	Copyright	Publisher(Sale)	Release
C-5	*Champion Golf*	32KB	Sports	SEGA	Logitec	SEGA	1985
C-17	*Monaco GP*	32KB	Racing	SEGA	SEGA	SEGA	1985
C-26	*Zippy Race*	32KB	Racing	SEGA	Irem	SEGA	1985
C-33	*Champion Boxing*	32KB	Sports	SEGA	SEGA	SEGA	1985
C-43	*Star Force*	32KB	Shooter	SEGA	Tehkan	SEGA	1985
C-46-1	*Dragon-Wang* (with CardCatcher Limited Edition*)	32KB	Action	SEGA	SEGA	SEGA	1985
C-46	*Dragon-Wang*	32KB	Action	SEGA	SEGA	SEGA	1985
C-47-1	*Zoom 909* (with CardCatcher Limited Edition*)	32KB	Shooter	SEGA	SEGA	SEGA	1985
C-47	*Zoom 909*	32KB	Shooter	SEGA	SEGA	SEGA	1985
C-48	*Choplifter*	32KB	Action	Compile	Broderbund	SEGA	1985
C-49	*Pitfall 2*	32KB	Action	SEGA	Activision	SEGA	1985
C-50	*Doki Doki Penguin Land*	32KB	Action/Puzzle	Coreland	SEGA	SEGA	1985
C-51	*Drol*	32KB	Action	SEGA	Broderbund	SEGA	1985
C-52	*Chack'n Pop*	32KB	Action	SEGA	Taito	SEGA	1985
C-53	*Bank Panic*	32KB	Action	SEGA	Sanritsu Denki	SEGA	1985
C-54	*Rock n' Bolt*	32KB	Action	SEGA	Activision	SEGA	1985
C-55	*Elevator Action*	32KB	Action	SEGA	Taito	SEGA	1985
C-56	*Sokoban*	32KB	Puzzle	SEGA	Thinking Rabbit	SEGA	1985
C-57	*Championship Lode Runner*	32KB	Action/Puzzle	Compile	Broderbund	SEGA	1985
C-58	*H.E.R.O.*	32KB	Action	SEGA	Activision	SEGA	1985
C-59	*Champion Ice Hockey*	32KB	Sports	SEGA	SEGA	SEGA	1985
C-60	*Hang-On II*	32KB	Racing	SEGA	SEGA	SEGA	1985
C-61	*Bomb Jack*	32KB	Action/Puzzle	SEGA	Tehkan	SEGA	1985
C-62	*Champion Ski* (Cancelled)	32KB	Sports	SEGA			
C-63	*Gulkave*	32KB	Shooter	Compile	Compile	SEGA	1986
C-64	*C-SO!*	32KB	Action	Compile	Pony	SEGA	1985
C-65	*Ninja Princess*	32KB	Shooter	SEGA	SEGA	SEGA	1986
C-66	*Super Tank*	32KB	Shooter	SEGA	SEGA	SEGA	1986
C-67	*Champion Kendo*	32KB	Sports	SEGA	SEGA	SEGA	1986
C-69	*Wonder Boy*	32KB	Action	Escape	SEGA	SEGA	1986
C-71	*Champion Billiards*	32KB	Sports	Compile	SEGA	SEGA	1986
C-72	*The Black Onyx*	32KB	RPG	SEGA	BPS	SEGA	1987

(It is inserted into Cartridge Slot, and a 'Card Catcher' is the thing of the adapter to use card software. A 'Card Catcher' attached version existed in the first limited edition of *Dragon-Wang* and *ZOOM-909*. Because there is no card slot in the SG-1000/SC-3000 series, it is a necessary adapter (card slot SEGA Mark III/ Master System). But, it

is possible that it is used.)

Othello Multivision Cartridge List

Code Number	Software Title	ROM Size	Genre	Developer	Copyright	Publisher(Sale)	Release
OM-G001	*Q*bert*	8KB	Action	Konami	Gottlieb	Tsukuda Original	1984
OM-G002	*Guzzlur*	8KB	Action	Tsukuda Original	Tehkan	Tsukuda Original	1984
OM-G003	*Space Mountain*	8KB	Shooter	Tsukuda Original	Tsukuda Original	Tsukuda Original	1984
OM-G004	*3 Nin Mahjong*	16KB	Variety	Tsukuda Original	Tsukuda Original	Tsukuda Original	1984
OM-G005	*Challenge Derby*	16KB	Action	Tsukuda Original	Tsukuda Original	Tsukuda Original	1984
OM-G006	*Ayako.Okamoto's Match Play Golf*	32KB	Sports	Tsukuda Original	Tsukuda Original	Tsukuda Original	1984
OM-G007	*Space Armor*	16KB	Shooter	Tsukuda Original	Tsukuda Original	Tsukuda Original	1985
OM-G008	*007 James Bond*	16KB	Action	Tsukuda Original	Tsukuda Original	Tsukuda Original	1985
OM-G009	*Challenge Soccer* (Cancelled)		Sports	Tsukuda Original			
OM-G010	*Great Escape2* (Cancelled)		Shooter	Tsukuda Original			

The Othello Multivision is a licensed clone of the SG-1000, manufactured by Tsukuda Original and fully compatible with the SG-1000. The console comes with a copy of the game Othello built into the unit, and eight additional titles were released by Tsukuda Original.

Sega CAI Software(for SC-3000 series or SG-1000 series + SK-1100)

Code Number	Software Title	Media	Contents commentary	Developer	Sale	Release
E-101	*Music for SC* (or SK) (Triple Accord, 5 Octaves)	Cartridge			SEGA	1983
E-102	*Graphic*	Cartridge	Graphic Editor		SEGA	1983
E-103	*Chugaku Hisshu Ei Tango* (Junior High School 1st)	Tape	English Words		SEGA	1983
E-104	*Chugaku Hisshu Ei Sakubun* (Junior High School 1st)	Tape	English Compositionfor		SEGA	1983
E-105	*Chugaku Hisshu Ei Bunpou* (Junior High School 1st)	Tape	English Grammer		SEGA	1983
E-106	*Tanoshii Sansuu* (Elementary School 4th, vol.1)	Tape	Mathematics		SEGA	1983
E-107	*Kagaku Genso Kigou Master*	Tape	Chemical Symbols		SEGA	198x
E-108	*Nihonshi Nenpyou*	Tape	Chronological Table of Japanese History		SEGA	198x
E-109	*Sekaishi Nenpyou*	Tape	Chronological Table of World History		SEGA	198x
E-110	*Chugaku Hisshu Ei Tango* (Junior High School 2nd)	Tape	English Words		SEGA	198x
E-111	*Chugaku Hisshu Ei Sakubun* (Junior High School 2nd)	Tape	English Compositionfor		SEGA	198x
E-112	*Chugaku Hisshu Ei Bunpou* (Junior High School 2nd)	Tape	English Grammar		SEGA	198x
E-113	*Tanoshii Sansuu* (Elementary School 4th, vol.2)	Tape	Mathematics		SEGA	198x

E-114	*Tanosii Sansuu* (Elementary School 5th, vol.2)	Tape	Mathematics		SEGA	198x
E-115	*Tanoshii Sansuu* (Elementary School 6th, vol.2)	Tape	Mathematics		SEGA	198x
E-116	*Tanoshii Sansuu* (Elementary School 5th, vol.1)	Tape	Mathematics		SEGA	198x
E-117	*Tanoshii Sansuu* (Elementary School 6th, vol.1)	Tape	Mathematics		SEGA	198x
E-119	*Uranai Angel Cutie*	Cartridge ROM32KB	Fortune-telling		SEGA	198x
E-???	*Butsuri (Undo to Chikara Hen)*	Tape	Physics		SEGA	198x
E-???	*Butsuri (Energy Hen)*	Tape	Physics		SEGA	198x

BASIC cartridge

Code Number	Software Title	Corresponding model	Sale	Release
B-10	*BASIC Level II A*	SC-3000 series	SEGA	1983
B-11	*BASIC Level II A*	SK-1100(SG-1000series+SK-1100)	SEGA	1983
B-21	*BASIC Level II B*	SK-1100(SG-1000series+SK-1100)	SEGA	1983
B-30	*BASIC Level III A*	SC-3000 series	SEGA	1983
B-40	*BASIC Level III B*	SC-3000 series	SEGA	1983
B-41	*BASIC SK-III*	SK-1100(SG-1000series+SK-1100)	SEGA	1983
B-50	*Home BASIC*	both (SC-3000 or SK-1100)	SEGA	1984
B-51	*Home BASIC Level II B*	both (SC-3000 or SK-1100)	SEGA	1984

Other

Code Number	Software Title	ROM Size	Genre	Developer	Copyright	Sale	Release
GB-800	*TV Oekaki*			SEGA	SEGA	SEGA	1986

The drawing/painting program *TV Oekaki* (Eng. trans.: "TV Doodler" or "TV Scribbler") uses a drawing tablet that connects directly to the cartridge.

References

[1] "Playing the SG-1000, Sega's First Game Machine" (http://www.wired.com/gamelife/2009/10/sega-sg-1000/). Wired Magazine's online site. October 2009. . Retrieved 2009-10-05.

[2] "Playing the SG-1000, Sega's First Game Machine" (http://www.wired.com/gamelife/2009/10/sega-sg-1000/). Wired Magazine's online site. October 2009. . Retrieved 2009-10-05.

External links

- SEGA.com (http://www.sega.com)
- SEGA.jp Sega Hardware encyclopedia (Japanese) (http://sega.jp/archive/segahard/)
- Page on SC-3000 and SF-7000 (http://membres.lycos.fr/mavati/sf7000/)
- SC-3000 Survivors (http://www.sc-3000.com/)

The Third Generation

History of video game consoles (third generation)

In the history of computer and video games, the **third generation** began in 1983 with the Japanese release of the Family Computer (later known as the Nintendo Entertainment System in the rest of the world). Although the previous generation of consoles had also used 8-bit processors, it was at the end of this generation that home consoles were first labeled by their "bits". This also came into fashion as 16-bit systems like the Mega Drive/Genesis were marketed to differentiate between the generations of consoles. In the United States, this generation in gaming was primarily dominated by the NES/Famicom.

Overview

The Family Computer (commonly abbreviated the Famicom) became very popular in Japan during this era and ended up crowding out the other consoles in this generation. The Famicom's American counterpart, the Nintendo Entertainment System, dominated the gaming market in Japan and North America, thanks in part to its restrictive licensing agreements with developers. Although the NES dominated the market in Japan and North America, the Sega Master System made large inroads in Brazil, Oceania and Europe and the NES was never able to break its grip. The Atari 7800 also had a fairly successful life, and the Sharp X68000 began its niche run in Japan in 1987.

In the later part of the third generation (argued by some as part of the 4th generation), Nintendo also introduced the Game Boy, which almost single-handedly solidified, and then proceeded to dominate, the previously scattered handheld market for 15 years. While the Game Boy product line has been incrementally updated every few years, until the Game Boy Micro and Nintendo DS, and partially the Game Boy Color, all Game Boy products were backwards compatible with the original released in 1989.

The third generation saw many of the first console role-playing video games (RPGs). Editing and censorship of video games was often used in localizing Japanese games to North America. During this era, many of the most famous video game franchises of all time were founded. Some notable examples include *Super Mario Bros.*, *Final Fantasy*, *The Legend of Zelda*, *Dragon Quest*, *Metroid*, *Mega Man*, *Metal Gear*, *Castlevania*, *Phantasy Star*, and *Bomberman*.

The third generation also saw the dawn of the children's educational console market. Although consoles such as the VideoSmarts and ComputerSmarts systems were stripped down to very primitive input systems designed for children, their use of ROM cartridges would establish this as the standard for later such consoles. Due to their reduced capacities, these systems typically were not labeled by their "bits" and were not marketed in competition with traditional video game consoles.

This generation is often mislabeled as the "First Generation" as it saw the beginnings of the video game industry as we know it today (although the grouping of generations is largely arbitrary).

Nintendo versus Sega

The Nintendo Entertainment System (NES) / Family Computer (Famicom) sold by far the most units of any third generation console in North America and Japan. This was due to its earlier release, its strong lineup of 1st party titles(such as *Super Mario Bros. 1* and *3*, *The Legend of Zelda*, and *Metroid*), and Nintendo's strict licensing rules that required NES titles to be exclusive to the console for two years after release. This put a damper on third party support for the other, less popular consoles. However, Sega's Master System was more popular in Europe, Brazil,

Australia, and New Zealand, markets that were first reached by Sega. Many more games for the Master System were released in Europe and Brazil than in North America, and the console had a very long shelf-life in Brazil and New Zealand. In Europe competition was tough since NES failed to build the monopoly that it had in the US and in Japan. The industry started to grow in places west of the Soviet Union, including Lithuania via new programmers trained in that area. By the end of the generation there was no clear winner in Europe. The Master System was finally discontinued in the late 1990s, while Nintendo of Japan continued to repair Famicom systems until October 31, 2007.[1] [2] [3]

Comparison

Name	NES/Famicom	Casio PV-1000	Epoch Cassette Vision	Supergame VG 3000	Sega Master System	Atari 7800
Console						
Launch prices	¥14,800 US$199.99 CA$240	¥14,800	¥13,500	Unknown	¥24,200 US$199.99	US$140.00
Release date	• JP July 15, 1983 • US October 18, 1985 • AME February 1 1986 • EU September 1 1986 • WW January 1 1987	• JP October 1983	• JP June 1981	Brazil - June 1985	• JP October 20 1985 • AME June 1 1986 • WW September 1 1987	• AME June 1 1986 • WW September 1 1987
Media	Cartridge and floppy disk (Japan only)	Cartridge	Cartridge	Cartridge	Cartridge and data card	Cartridge
Top-selling games	*Super Mario Bros.* (pack-in), 40.23 million (as of 1999)[4] *Super Mario Bros. 3*, 18 million (as of May 21, 2003)[5]	Unknown	N/A	N/A	Hang-On and Safari Hunt (Pack-In)	Pole Position II (pack-in)
Backward compatibility	None	None	None	None	Sega SG-1000 (Japanese system only)	Atari 2600

Accessories (retail)	• Famicom Disk System • NES Advantage • NES Satellite • NES Zapper • Mattel Power Glove • NES Power Pad • NES R.O.B. More...	N/A	• N/A	• N/A	• Light Phaser • Sega 3-D Glasses • Sega Control Stick • Sega Handle Controller • Sega Paddle Control[6] • Sega Pro Action Replay • Sega Remote Control System • Sega Rapid-Fire Unit • Sega SG Commander • Sega Sports Pad	• XG-1
CPU	Ricoh 2A03 (based on MOS Technology 6502 1.79 MHz (1.66 MHz PAL)	D780C-1 (Z80A) 3.579 MHz	PD7801G 4 MHz	6507 1.19 MHz	NEC 780C (Zilog Z80 clone) 3.57 MHz (3.54 MHz PAL)	Custom, 6502C (based on MOS Technology 6502) 1.79 MHz
Memory	2 KB main RAM 2 KB video RAM 256 bytes sprite RAM 28 bytes palette RAM	2 KB + 1 KB (character generator)	128 Bytes	128 bytes	8 KB main RAM 16 KB video RAM	4 KB main RAM
Video	64 sprites (8 per scanline) 256x240 resolution 25 simultaneous colors 53 color palette	8 colors 256x192 resolution	16 colors 54x62 resolution	128 colors (16 colors with 8 intensity levels each)	64 sprites (8 per scanline) 256x240 resolution 32 simultaneous colors 64 color palette	Unlimited sprites 320x200 resolution 25 simultaneous colors 256 color palette
Audio	Mono audio with: • Two square waves • One triangle wave • One noise generator • One DPCM channel • One FM synthesizer (*Famicom Disk system, Japan only*)	Unknown	Mono audio with: • One tone generator • One noise generator • One 1-Bit PCM	Mono	Mono audio with: • Three square waves • One noise generator • 9-channel, 2-operator FM synthesizer (Japan only)	Mono audio with: • Two square waves

Worldwide sales standings

Console	Units sold
Nintendo Entertainment System	60 million (as of August 4, 2007)[7]
Sega Master System	13 million (as of September 6, 2005)[8] [9]

See also

- Home computer
- Chiptune

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Nintendo Entertainment System

Left: Nintendo Entertainment System with controller
Right: Nintendo Family Computer (Famicom)

Manufacturer	Nintendo
Type	Video game console
Generation	Third generation (8-bit era)
Retail availability	• JP July 15, 1983 • NA October 18, 1985 • EU September 1, 1986[a] • EU / AUS 1987[a]
Discontinued	• US 1995 • JP September 2003
Units sold	61.91 million[1]
Media	ROM cartridge ("Game Pak")[b]
CPU	Ricoh 2A03 8-bit processor (MOS Technology 6502 core)
Controller input	2 controller ports[c] 1 expansion slot
Best-selling game	*Super Mario Bros.* (pack-in), 40.23 million (as of 1999)[2] *Super Mario Bros. 3*, 18 million (as of July 27, 2008)[3]
Predecessor	Color TV Game
Successor	Super Nintendo Entertainment System

The **Nintendo Entertainment System** (also called **NES** or **Nintendo**) is an 8-bit video game console that was released by Nintendo in North America, Europe and Australia in 1985. In most of Asia, including Japan (where it was first launched in 1983), China, Vietnam, Singapore, Middle East and Hong Kong, it was released as the **Family Computer** (ファミリーコンピュータ *Famirī Konpyūta*), commonly abbreviated as the **Famicom** (ファミコン *Famikon*, listen, or **FC** for short). In South Korea, it was known as the **Hyundai Comboy** (현대 컴보이) and was distributed by Hyundai Electronics. In Russia, an unlicensed clone was manufactured called **Dendy** (Де́нди). Similarly in India, clones were popular by the names of Little Master and Wiz Kid,[4] in Poland there also was a clone produced, called **Pegasus**. It was succeeded by the Super Nintendo Entertainment System.

As the best-selling gaming console of its time,[5] e[›] the NES helped revitalize the US video game industry following the video game crash of 1983,[6] and set the standard for subsequent consoles in everything from game design[f][›] to controller layout. In addition, with the NES, Nintendo introduced a now-standard business model of licensing third-party developers, authorizing them to produce and distribute software for Nintendo's platform.[7]

In 2009, the Nintendo Entertainment System was named the single greatest video game console in history by IGN, out of a field of 25.[8] 2010 marked the system's 25th anniversary, which was officially celebrated by Nintendo of America's magazine Nintendo Power in issue #260 (November 2010) with a special 26-page tribute section. Other video game publications also featured articles looking back at 25 years of the NES, and its impact in the video game console market.

History

Following a series of arcade game successes in the early 1980s, Nintendo made plans to produce a cartridge-based console. Masayuki Uemura designed the system, which was released in Japan on July 15, 1983 for ¥14,800 alongside three ports of Nintendo's successful arcade games *Donkey Kong*, *Donkey Kong Jr.* and *Popeye*. The Family Computer (or Famicom) was slow to gather momentum; a bad chip set caused the initial release of the system to crash. Following a product recall and a reissue with a new motherboard, the Famicom's popularity soared, becoming the best-selling game console in Japan by the end of 1984.[9]

Encouraged by these successes, Nintendo soon turned its attention to the North American market. Nintendo entered into negotiations with Atari to release the Famicom under Atari's name as the name *Nintendo Advanced Video Gaming System*; however, this deal eventually fell apart when Atari executives discovered that Nintendo had released a port of *Donkey Kong* on the ColecoVision, one of Atari's competitors.[10] g[›] Subsequent plans to market a Famicom console in North America featuring a keyboard, cassette data recorder, wireless joystick controller and a special BASIC cartridge under the name "Nintendo Advanced Video System" likewise never materialized.[11]

In June 1985, Nintendo unveiled its American version of the Famicom at the Consumer Electronics Show (CES). It rolled out its first systems to limited American markets starting in New York City on October 18, 1985, following up with a full-fledged North American release of the console in February of the following year.[12] Nintendo simultaneously released seventeen launch titles for the New York City test:[13] *10-Yard Fight*, *Baseball*, *Clu Clu Land*, *Donkey Kong Jr. Math*, *Duck Hunt*, *Excitebike*, *Golf*, *Gyromite*, *Hogan's Alley*, *Ice Climber*, *Kung Fu*, *Mach Rider*, *Pinball*, *Stack-Up*, *Tennis*, *Wild Gunman* and *Wrecking Crew*.[14] h[›] Some varieties of these launch games contained Famicom chips with an adapter inside the cartridge so they would play on North American consoles.[15]

In Europe and Australia, the system was released to two separate marketing regions. One region consisted of most of mainland Europe (excluding Italy), and distribution there was handled by a number of different companies, with Nintendo responsible for most cartridge releases. Most of this region saw a 1986 release. Mattel handled distribution for the other region, consisting of the United Kingdom, Italy, Australia and New Zealand, starting the following year. Not until the 1990s did Nintendo's newly created European branch direct distribution throughout Europe.[16] Despite the system's lackluster performance outside of Japan and North America, by 1990 the NES had outsold all previously released consoles worldwide.[17] The Nintendo Entertainment System was not available in the Soviet Union.[18]

As the 1990s dawned, however, renewed competition from technologically superior systems such as the 16-bit Sega Mega Drive/Genesis marked the end of the NES's dominance. Eclipsed by Nintendo's own Super Nintendo Entertainment System (SNES), the NES's user base gradually waned. However, even as developers ceased production for the NES, a number of high-profile video game franchises and series that started on the NES were transitioned to newer consoles and remain popular to this day. Nintendo continued to support the system in North America through the first half of the decade, even releasing a new version of the system's console, the NES-101 model (known as the HVC-101 in Japan), to address many of the design flaws in the original console hardware. The last game released in Japan was *Takahashi Meijin no Bōken Jima IV (Adventure Island IV)*, while in North America, *Wario's Woods* was the last licensed game and *Sunday Funday* was the last unlicensed game.[19] In the wake of ever decreasing sales and the lack of new software titles, Nintendo of America officially discontinued the NES by 1995.[20] Despite this, Nintendo of Japan kept producing new Nintendo Famicom units until September 2003,[21] and continued to repair Famicom consoles until October 31, 2007, attributing the decision to discontinue support to an

increasing shortage of the necessary parts.[22] [23]

North American bundle packages

For its complete North American release in 1986, the NES was released in two different bundles, the Control Deck and Deluxe Set. The console itself was identical, but each bundle was packaged with different game paks and accessories. The Control Deck retailed from US$129.95 and included the console itself, two game controllers, and the Super Mario Bros. game pak.[24] The Deluxe Set retailed for US$249.99 and consisted of the console, a R.O.B. accessory, an NES Zapper (Light gun) and two game paks: *Duck Hunt* and *Gyromite*.[20]

The Nintendo Entertainment System / Control Deck console

For the remainder of the NES's commercial lifespan in North America, Nintendo frequently repackaged the console in new configurations to capitalize on newer accessories or popular game titles. The NES Action Set, which initially sold for US$149.99 but by 1991 had dropped to approximately US$100,[25] replaced the Deluxe Set, and included the console, the NES Zapper, two game controllers and a multicart version of *Super Mario Bros.* and *Duck Hunt*.[24] The Action Set became the most successful of the packages released by Nintendo. One month later, in December 1988, to coincide with the release of the Power Pad floor mat controller, Nintendo released a new Power Set bundle, consisting of the console, the Power Pad, the NES Zapper, two controllers and a multicart containing *Super Mario Bros.*, *Duck Hunt* and *World Class Track Meet*.[26] In 1990, a Sports Set bundle was released, including the console, an NES Satellite infrared wireless multitap adapter, and four game controllers.[25]

Two more bundle packages were released using the original model NES console. The Challenge Set included the console, two controllers and a *Super Mario Bros. 3* game pak. The Basic Set, first released in 1987, included only the console and two controllers with no pack-in cartridge.[25] Instead, it contained a book called the *Official Nintendo Player's Guide*, which contained detailed information for every NES game made up to that point. Finally, the console was redesigned for both the North American and Japanese markets as part of the final Nintendo-released bundle package. The console was released under the name Control Deck in North America and AV Family Computer in Japan. The package included the new style console and one redesigned "dogbone" game controller. Released in October 1993 in North America, this final bundle retailed for US$49.99 and remained in production until the discontinuation of the NES in 1995.[20]

Regional differences

Although the Japanese Famicom, North American and European NES versions included essentially the same hardware, there were certain key differences between the systems.

The Famicom Disk System was a peripheral available only for the Japanese Famicom that used games stored on "Disk Cards", reminiscent of 3" Quick Diskettes.

Different case design

The Famicom featured a top-loading cartridge slot, a 15-pin expansion port located on the unit's front panel for accessories (as the controllers were hard-wired to the back of the console) and a red and white color scheme.[27] The NES featured a front-loading cartridge slot and a more subdued gray, black and red color scheme. An expansion port was found on the bottom of the unit and the cartridge connector pinout was changed.

60-pin vs. 72-pin cartridges

The original Famicom and the re-released AV Family Computer both utilized a 60-pin cartridge design,[15] which resulted in smaller cartridges than the NES, which utilized a 72-pin design.[28] Four pins were used for the 10NES lockout chip.[29] Ten pins were added that connected a cartridge directly to the expansion port on the bottom of the unit. Finally, two pins that allowed cartridges to provide their own sound expansion chips were removed. Some early games released in North America were simply Famicom cartridges attached to an adapter (such as the T89 Cartridge Converter) to allow them to fit inside the NES hardware.[15] Nintendo did this to reduce costs and inventory by using the same cartridge boards in North America and Japan. The cartridge dimensions of the original Famicom measured in at 5.3$_{x}$3 inches, compared with 4.1$_{x}$5.5 in. for its North American redesign.

Peripherals

A number of peripheral devices and software packages were released for the Famicom. Few of these devices were ever released outside of Japan.

- *Family BASIC* is an implementation of BASIC for the Famicom that came with a keyboard. It allowed the user to program their own games.[30] It was considered for release in the United States, but ultimately rejected.[31]

Famicom MODEM

The *Famicom MODEM* is a modem that allowed connection to a network which provided content such as financial services,[32] but it was only available in Japan. A modem was, however, tested in the United States, by the Minnesota State Lottery. It would have allowed players to buy scratchcards and play the lottery with their NES. It was not released in the United States because some parents and legislators voiced concern that minors might learn to play the lottery illegally and anonymously, despite assurances from Nintendo to the contrary.[33]

Famicom Network System

External sound chips

The Famicom had two cartridge pins that allowed cartridges to provide external sound enhancements. They were originally intended to facilitate the Famicom Disk System's external sound chip. These pins were removed from the cartridge port of the NES and relocated to the bottom expansion port. As a result, individual cartridges could not make use of this functionality and many NES localizations suffered from technologically inferior sound compared to their equivalent Famicom versions. *Castlevania III: Dracula's Curse* is a notable example of this problem.[34]

Hardwired controllers

The Famicom's original design includes hardwired, non-removable controllers. In addition, the second controller featured an internal microphone for use with certain games and lacked SELECT and START buttons.[27] Both the controllers and the microphone were subsequently dropped from the redesigned AV Famicom in favor of the two seven-pin controller ports on the front panel used in the NES from its inception.[35]

Unlike the NES, the Famicom's controllers were hardwired to the system itself. The 2nd controller eliminated the Start and Select buttons, replacing them with a microphone and a volume control slider.

Lockout circuitry

The Famicom contained no lockout hardware and, as a result, unlicensed cartridges (both legitimate and bootleg) were extremely common throughout Japan and the Far East.[36] The original NES (but not the top-loading NES-101) contained the 10NES lockout chip, which significantly increased the challenges faced by unlicensed developers. Tinkerers at home in later years discovered that disassembling the NES and cutting the fourth pin of the lockout chip would change the chip's mode of operation from "lock" to "key", removing all effects and greatly improving the console's ability to play legal games, as well as bootlegs and converted imports. NES consoles sold in different regions had different lockout chips, so games marketed in one region would not work on consoles from another region. Known regions are: USA/Canada (3193 lockout chip), most of Europe (3195), Asia (3196) and UK, Italy and Australia (3197). Since two types of lockout chip were used in Europe, European NES game boxes often had an "A" or "B" letter on the front, indicating whether the game is compatible with UK/Italian/Australian consoles (A), or the rest of Europe (B). Rest-of-Europe games typically had text on the box stating "This game is not compatible with the Mattel or NES versions of the Nintendo Entertainment System". Similarly, UK/Italy/Australia games stated "This game is only compatible with the Mattel or NES versions of the Nintendo Entertainment System".

Audio/video output

The original Famicom featured an RF modulator plug for audio/video output,[27] while its redesign, the AV Famicom, featured only RCA composite output.[35] On the other hand, the original NES featured both an RF modulator and RCA composite output cables, but the top-loading NES 2 featured only RF modulator output.[37] The original North American NES was the first and one of the only game consoles to feature direct composite video output, and thus having the ability to be connected to a composite monitor.

Third-party cartridge manufacturing

In Japan, seven companies, namely Nintendo, Konami, Capcom, Namco, Bandai, Taito and Hudson Soft, manufactured the cartridges for the Famicom.[38] This allowed these companies to develop their own customized chips designed for specific purposes, such as Konami's VRC 6 and VRC 7 sound chips that increased the quality of sound in their games.

European "Mattel" and "NES" Versions

In the UK, Italy and Australia, two versions of the NES were released, the "Mattel Version" and "NES Version". When the NES was first released in those countries, it was distributed by Mattel and Nintendo decided to use a lockout chip specific to those countries, different from the chip used in other European countries. When Nintendo took over European distribution in 1990, they produced consoles that were then labeled "NES Version". The differences between the two are the text on the front flap, a smoother finish on the top and bottom of the "MATTEL Version" console and being compatible with US and Canadian NES systems.

Game controllers

The game controller used for both the NES and the Famicom featured an oblong brick-like design with a simple four button layout: two round buttons labeled "A" and "B", a "START" button and a "SELECT" button.[39] Additionally, the controllers utilized the cross-shaped joypad, designed by Nintendo employee Gunpei Yokoi for Nintendo Game & Watch systems, to replace the bulkier joysticks on earlier gaming consoles' controllers.[40]

In addition to featuring a revised color scheme that matched the more subdued tones of the console itself, NES controllers could be unplugged. They nevertheless lacked the microphone featured in Famicom controllers.

The original model Famicom featured two game controllers, both of which were hardwired to the back of the console. The second controller lacked the START and SELECT buttons, but featured a small microphone. Relatively few games made use of this feature. The earliest produced Famicom units initially had square A and B buttons.[41] This was changed to the circular designs because of the square buttons being caught in the controller casing when pressed down and glitches within the hardware causing the system to freeze occasionally while playing a game.

The NES dropped the hardwired controllers, instead featuring two custom 7-pin ports on the front of the console. Also in contrast to the Famicom, the controllers included with the NES were identical to each other—the second controller lacked the microphone that was present on the Famicom model and possessed the same START and SELECT buttons as the primary controller. Some NES localizations of games, such as *The Legend of Zelda*, which required the use of the Famicom microphone in order to kill certain enemies, suffered from a lack of a hardware to do so.[27]

The NES Zapper, a light gun accessory

A number of special controllers designed for use with specific games were released for the system, though very few such devices proved particularly popular. Such devices included, but were not limited to, the NES Zapper (a light gun), the R.O.B.,[42] the Power Pad, the Power Glove,[43] and the LaserScope.[44] The original Famicom featured a deepened DA-15 expansion port on the front of the unit, which was used to connect most auxiliary devices.[27] On the NES, these special controllers were generally connected to one of the two control ports on the front of the unit.

Nintendo also made two turbo controllers for the NES called NES Advantage and the NES Max. Both controllers had a Turbo feature, a feature where one tap of the button represented multiple taps. The NES Advantage had two knobs that adjusted the firing rate of the turbo button from quick to Turbo, as well as a "Slow" button that slowed down the game by rapidly pausing the game. The "Slow" button did not work with games that had a pause menu or pause screen and can interfere with jumping and shooting. The NES Max also had the Turbo Feature, but it was not adjustable, in contrast with the Advantage. It also did not have the "Slow" button. Its wing-like shape made it easier to hold than the Advantage and it also improved on the joystick. Turbo features were also featured on the NES Satellite, the NES Four Score, and the U-Force.

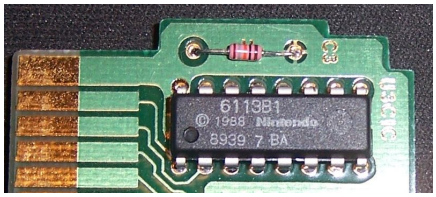
Near the end of the NES's lifespan, upon the release of the AV Famicom and the top-loading NES 2, the design of the game controllers was modified slightly. Though the original button layout was retained, the redesigned device abandoned the brick shell in favor of a dog bone shape. In addition, the AV Famicom joined its international counterpart and dropped the hardwired controllers in favor of detachable controller ports. However, the controllers included with the Famicom AV had cables which were a three-feet long, as opposed to the standard six-feet of NES controllers.[35]

In recent years, the original NES controller has become one of the most recognizable symbols of the console. Nintendo has mimicked the look of the controller in several recent products, from promotional merchandise to limited edition versions of the Game Boy Advance.[45]

Hardware design flaws

The official NES Cleaning Kit was intended to address flaws in the NES design that caused cartridge connectors to be particularly susceptible to interference from dirt and dust.

When Nintendo released the NES in the U.S., the design styling was deliberately different from that of other game consoles. Nintendo wanted to distinguish its product from those of competitors and to avoid the generally poor reputation that game consoles had acquired following the video game crash of 1983. One result of this philosophy was a front-loading zero insertion force (ZIF) cartridge socket designed to resemble the front-loading mechanism of a VCR. The ZIF connector worked quite well when both the connector and the cartridges were clean and the pins on the connector were new. Unfortunately, the ZIF connector was not truly zero insertion force. When a user inserted the cartridge into the NES, the force of pressing the cartridge down and into place bent the contact pins slightly, as well as pressing the cartridge's ROM board back into the cartridge itself. Repeated insertion and removal of cartridges caused the pins to wear out relatively quickly and the ZIF design proved far more prone to interference by dirt and dust than an industry-standard card edge connector.[28] Exacerbating the problem was Nintendo's choice of materials; the slot connector that the cartridge was actually inserted into was highly prone to corrosion.[46]



The 10NES authentication chip contributed to the system's reliability problems. The circuit was ultimately removed from the remodeled NES 2.

Problems with the 10NES lockout chip frequently resulted in the console's most infamous problem: the blinking red power light, in which the system appears to turn itself on and off repeatedly because the 10NES would reset the console once per second. The lockout chip required constant communication with the chip in the game to work.[47] Dirty, aging and bent connectors would often disrupt the communication, resulting in the blink effect.[28] Alternatively, the console would turn on but only show a solid white, gray, or green screen. Users attempted to solve this problem by blowing air onto the cartridge connectors, licking the edge connector, slapping the side of the system after inserting a cartridge, shifting the cartridge from side to side after insertion, pushing the ZIF up and down repeatedly, holding the ZIF down lower than it should have been and/or cleaning the connectors with alcohol which, observing the back of the cartridge, was not endorsed by Nintendo. Many of the most frequent attempts to fix this problem instead ran the risk of damaging the cartridge and/or system. In 1989, Nintendo released an official NES Cleaning Kit to help users clean malfunctioning cartridges and consoles.

With the release of the top-loading NES-101 (NES 2) toward the end of the NES's lifespan, Nintendo resolved the problems by switching to a standard card edge connector and eliminating the lockout chip. All of the Famicom systems used standard card edge connectors, as did Nintendo's subsequent game consoles, the Super Nintendo Entertainment System and the Nintendo 64.

In response to these hardware flaws, "Nintendo Authorized Repair Centers" sprang up across the U.S. According to Nintendo, the authorization program was designed to ensure that the machines were properly repaired. Nintendo would ship the necessary replacement parts only to shops that had enrolled in the authorization program. In practice, the authorization process consisted of nothing more than paying a fee to Nintendo for the privilege. In a recent trend, many sites have sprung up to offer Nintendo repair parts, guides and services, that replace those formerly offered by the authorized repair centers.

Third-party licensing

Nintendo's near monopoly on the home video game market left it with a degree of influence over the industry exceeding even that of Atari during Atari's heyday in the early 1980s. Unlike Atari, which never actively courted third-party developers (and even went to court in an attempt to force Activision to cease production of Atari 2600 games), Nintendo had anticipated and encouraged the involvement of third-party software developers—but strictly on Nintendo's terms. To this end, a 10NES authentication chip was placed in every console and another was placed in every officially licensed cartridge. If the console's chip could not detect a counterpart chip inside the cartridge, the game would not load.[47] Because Nintendo controlled the production of all cartridges, it was able to enforce strict rules on its third-party developers, which were required to sign a contract by Nintendo that would obligate these parties to develop exclusively for the system, order at least 10,000 cartridges, and only make five games per year.[48]

Unlicensed games

Unlicensed games, such as Wisdom Tree's *Bible Adventures*, were often released in cartridges which looked very different from typical NES Game Paks.

Several companies, refusing to pay the licensing fee or having been rejected by Nintendo, found ways to circumvent the console's authentication system. Most of these companies created circuits that used a voltage spike to temporarily disable the 10NES chip in the NES.[49] A few unlicensed games released in Europe and Australia came in the form of a dongle that would be connected to a licensed game, in order to use the licensed game's 10NES chip for authentication.

Atari Games created a line of NES products under the name Tengen and took a different approach. The company attempted to reverse engineer the lockout chip to develop its own "Rabbit" chip. However, Tengen also obtained a description of the lockout chip from the United States Patent and Trademark Office by falsely claiming that it was required to defend against present infringement claims in a legal case. Nintendo sued Tengen for copyright infringement, which Tengen lost as it could not prove that the illegally obtained patent documents had not been used by the reverse engineering team. Tengen's antitrust claims against Nintendo were never finally decided.[50]

Following the introduction of the Sega Mega Drive/Genesis, Nintendo began to face real competition in the industry and in the early 1990s was forced to reevaluate its stance towards its developers, many of whom had begun to defect to other systems. When the console was reissued as the NES 2, the 10NES chip was omitted as a cost-saving measure. Games marketed for the NES after that point still included a 10NES chip in order to work with the large installed base of original NES consoles.

Pirated clones of NES hardware remained in production for many years after the original had been discontinued. Such devices were frequently built to superficially resemble younger consoles, such as this one modeled after a PS One.

Hardware clones

A thriving market of unlicensed NES hardware clones emerged during the heyday of the console's popularity. Initially, such clones were popular in markets where Nintendo never issued a legitimate version of the console. In particular, the Dendy (Russian: Дéнди), an unlicensed hardware clone produced in Taiwan and sold in the former Soviet Union, emerged as the most popular video game console of its time in that setting and it enjoyed a degree of fame roughly equivalent to that experienced by the NES/Famicom in North America and Japan. The Family Game was marketed in Argentina, resembling the original hardware design. The Micro Genius (Simplified Chinese: 小天才) was marketed in Southeast Asia as an alternative to the Famicom, Samurai was the popular PAL alternative to the NES and in Central Europe, especially Poland, the Pegasus was available.

The unlicensed clone market has flourished following Nintendo's discontinuation of the NES. Some of the more exotic of these resulting systems have gone beyond the functionality of the original hardware and have included variations such as a portable system with a color LCD (e.g. PocketFami). Others have been produced with certain specialized markets in mind, such as an NES clone that functions as a rather primitive personal computer, which includes a keyboard and basic word processing software.[51] These unauthorized clones have been helped by the invention of the so-called NES-on-a-chip.[52]

As was the case with unlicensed software titles, Nintendo has typically gone to the courts to prohibit the manufacture and sale of unlicensed cloned hardware. Many of the clone vendors have included built-in copies of licensed Nintendo software, which constitutes copyright infringement in most countries.

Although most hardware clones were not produced under license by Nintendo, certain companies were granted licenses to produce NES-compatible devices. The Sharp Corporation produced at least two such clones: the Twin Famicom and the SHARP 19SC111 television. The Twin Famicom was compatible with both Famicom cartridges and Famicom Disk System disks.[53] It was available in two colors (red and black) and used hardwired controllers (as did the original Famicom), but it featured a different case design. The SHARP 19SC111 television was a television which included a built-in Famicom.[54] A similar licensing deal was reached with Hyundai Electronics, who licensed the system under the name Comboy in the South Korean market. This deal with Hyundai was made necessary because of the South Korean government's wide ban on all Japanese "cultural products", which remained in effect until 1998 and ensured that the only way Japanese products could legally enter the South Korean market was through licensing to a third-party (non-Japanese) distributor (see also Japan–Korea disputes).[55]

More recently, in 2010, Hyperkin developed the RetroN3, which, besides NES carts, also runs SNES and Genesis carts, as well as their Japanese counterparts Famicom, Super Famicom and Mega Drive.

Technical specifications

Original chassis/casing

The original Japanese Famicom was predominantly white plastic, with dark red trim. It featured a top-loading cartridge slot and grooves on both sides of the deck in which the hardwired game controllers could be placed when not in use.[27]

The original version of the North American NES used a radically different design. The NES's color scheme was two different shades of gray, with black trim. The top-loading cartridge slot was replaced with a front-loading mechanism. The slot is covered by a small, hinged door that can be opened to insert or remove a cartridge and closed at other times. The dimensions of this model are 10 in (250 mm) wide by 8 in (200 mm) long by 3.5 in (89 mm) high.[56] When opened, the cartridge slot door adds an additional 1 in (25 mm) height to the unit.

Redesigned model

The NES-101 control deck alongside its similarly redesigned NES-039 game controller.

The NES-101 model of the Nintendo Entertainment System (HVC-101 model in Japan), known informally as the "top-loader", uses the same basic color scheme, although there are several subtle differences. The power switch is colored a bright red and slides into the on and off position, similar to the SNES, instead of the original push-button. Also, there is no LED power indicator on the unit. Like the original Family Computer, it uses a top-loading cartridge slot. The NES-101 model was redesigned after the (also top loading) SNES and indeed they share many of the same design cues. The NES-101 model is considerably more compact than the original NES-001 model, measuring 6" by 7" by 1.5". The NES-101 model offered only RF outputs instead of the RF and RCA (mono) outputs offered on the original NES-001 model,[37] whereas the HVC-101 model of the Family Computer offered RCA connectors only.[35]

Cartridges

North American cartridges (or "Game Paks", pictured) were significantly longer than their Japanese counterparts, but were not as wide.

All officially licensed North American (NTSC) and European (PAL) cartridges, or "carts", are 5.25" (13.3 cm) tall, 4.75" (12 cm) wide and .75" (2 cm) thick. Originally, NES carts were held together with 5 small, slotted screws. Later games (post-1987) were redesigned slightly to incorporate two plastic clips molded into the plastic itself, eliminating the need for the top two screws.[57] This is why older NES carts are referred to as "5-screw" and are distinguishable by their flat tops and, as the name suggests, five screws instead of three. Around this time, the standard screws were changed to 3.8 mm security screws to further secure the ROMs inside from tampering. The back of the cartridge bears a label with instructions on handling. These labels were gray for standard games and gold (or in rare cases silver) for games that featured battery backup. With the exception of *The Legend of Zelda* and *Zelda II: The Adventure of Link*, which were available in gold-plastic carts, all licensed NTSC and PAL cartridges were a standard shade of gray plastic. Unlicensed carts were produced in black (Tengen, American Video Entertainment and Wisdom Tree), robin egg blue (Color Dreams and Wisdom Tree) and gold (Camerica) and were all slightly different shape and style than a standard NES cart. Nintendo also produced yellow-plastic carts for internal use at Nintendo Service Centers, although these "test carts" were never made available for purchase by consumers.

Japanese (Famicom) cartridges are shaped slightly differently, measuring only 3" (7.6 cm) in length, but 5.3" (13.5 cm) in width. While the NES used a 72-pin interface, the Famicom system used a 60-pin design. Some early NES games (most commonly *Gyromite*) were actually 60-pin Famicom PCBs and ROMs with a built-in converter.[15] Unlike NES games, official Famicom carts were produced in many colors of plastic. Adapters, similar in design to the popular accessory Game Genie, are available that allow Famicom games to be played on an NES.

Central processing unit

Versions of the NES console released in PAL regions incorporated a Ricoh 2A07 CPU.

For its central processing unit (CPU), the NES uses an 8-bit microprocessor produced by Ricoh based on a MOS Technology 6502 core. It incorporates custom sound hardware and a restricted DMA controller on-die. To save some space on the silicon, the Ricoh CPU omitted the 6502's BCD (binary coded decimal) mode. NTSC (North America and Japan) versions of the console use the Ricoh 2A03 (or RP2A03), which runs at 1.79 MHz.[58] PAL (Europe and Australia) versions of the console utilize the Ricoh 2A07 (or RP2A07), which is identical to the 2A03 save for the fact that it runs at a slower 1.66 MHz clock rate and has its sound hardware adjusted accordingly.[59]

Memory

A static ram chip from *NES* clone 2 X 8 bit.

The NES contains 2 KiB of onboard work RAM. A game cartridge may contain expanded RAM to increase this amount. It also has 2 KiB of video RAM for the use of the picture processing unit (PPU), 256 bytes of OAM (Object Attribute Memory) to hold a display list, and 28 bytes of palette RAM. The system supports up to 32 KiB of program ROM at a time, but this can be expanded by orders of magnitude by the process of bank switching. Additionally, cartridges may contain 16,360 bytes (nearly 16 KiB) of address space reserved as "Expansion Area", which often contained an 8 KiB SRAM. Expanded Video memory (VROM or VRAM) may also be available on the cartridge (on-cartridge mapping hardware also allowing further Video expansion past 12 KB).[58]

Video

The NES uses a custom-made Picture Processing Unit (PPU) developed by Ricoh. The version of the processor used in NTSC models of the console, named the RP2C02, operates at 5.37 MHz, while the version used in PAL models, named the RP2C07, operates at 5.32 MHz.[59] Both the RP2C02 and RP2C07 output composite video.[58] Special versions of the NES's hardware designed for use in video arcades use other variations of the PPU. The PlayChoice-10 uses the RP2C03, which runs at 5.37 MHz and outputs RGB video at NTSC frequencies. Two different variations were used for Nintendo Vs. Series hardware: the RP2C04 and the RP2C05. Both of these operate at 5.37 MHz and output RGB video at NTSC frequencies. Additionally, both use irregular palettes to prevent easy ROM swapping of games.[60]

All variations of the PPU feature 2 KiB of video RAM, 256 bytes of on-die sprite position / attributable RAM (object attribute memory or OAM) and 28 bytes of on-die palette RAM to allow selection of background and sprite colors. This memory is stored on separate buses internal to the PPU. The console's 2 KiB of onboard RAM may be used for tile maps and attributes on the NES board and 8 KiB of tile pattern ROM or RAM may be included on a cartridge. Using bank switching, virtually any amount of additional cartridge memory can be used, limited only by manufacturing costs.[58]

The system has an available color palette of 48 colors and 5 grays. Red, green and blue can be individually darkened at specific screen regions using carefully timed code. Up to 24 colors may be used on one scan line: a background color, four sets of three tile colors and four sets of three sprite colors. This total does not include color de-emphasis.[58]

A total of 64 sprites may be displayed onscreen at a given time without reloading sprites mid-screen. Sprites may be either 8 pixels by 8 pixels, or 8 pixels by 16 pixels, although the choice must be made globally, as it affects all sprites. Up to eight sprites may be present on one scanline, using a flag to indicate when additional sprites are to be dropped. This flag allows the software to rotate sprite priorities, increasing maximum amount of sprites, but typically causing flicker.[58]

The PPU allows only one scrolling layer, though horizontal scrolling can be changed on a per-scanline basis. More advanced programming methods enable the same to be done for vertical scrolling.[58]

The standard display resolution of the NES is 256 horizontal pixels by 240 vertical pixels. Typically, games designed for NTSC-based systems had an effective resolution of only 256 by 224 pixels, as the top and bottom 8 scanlines are not visible on most television sets. For additional video memory bandwidth, it was possible to turn off the screen before the raster reached the very bottom.[58]

Video output connections varied from one model of the console to the next. The original HVC-001 model of the Family Computer featured only radio frequency (RF) modulator output. When the console was released in North

America and Europe, support for composite video through RCA connectors was added in addition to the RF modulator. The HVC-101 model of the Famicom dropped the RF modulator entirely and adopted composite video output via a proprietary 12-pin "multi-out" connector first introduced for the Super Famicom / Super Nintendo Entertainment System. Conversely, the North American re-released NES-101 model most closely resembled the original HVC-001 model Famicom, in that it featured RF modulator output only.[41] Finally, the PlayChoice-10 utilized an inverted RGB video output.

Audio

The NES board supported a total of five sound channels. These included two pulse wave channels of variable duty cycle (12.5%, 25%, 50% and 75%), with a volume control of sixteen levels and hardware pitch bending supporting frequencies ranging from 54 Hz to 28 kHz. Additional channels included one fixed-volume triangle wave channel supporting frequencies from 27 Hz to 56 kHz, one sixteen-volume level white noise channel supporting two modes (by adjusting inputs on a linear feedback shift register) at sixteen preprogrammed frequencies and one differential pulse-code modulation (DPCM) channel with six bits of range, using 1-bit delta encoding at sixteen preprogrammed sample rates from 4.2 kHz to 33.5 kHz. This final channel was also capable of playing standard pulse-code modulation (PCM) sound by writing individual 7-bit values at timed intervals.[58]

NES Test Station

The NES Test Station was a Nintendo Entertainment System testing machine made by Nintendo in 1988. It is a NES-based unit designed for testing NES hardware, components and games. It was only provided for use in World of Nintendo boutiques as part of the Nintendo World Class Service program. Visitors were to bring items to test on the station, often with assistance from a technician or store employee.

The NES Test Station features a Game Pak slot and connectors for testing various components (AC adapter, RF switch, Audio/Video cable, NES Control Deck, controllers and accessories) at the front, with a knob selector in the center to select the component to test. The unit itself is very large, weighing almost forty pounds, and securely hooks up to the television through both AV Cables and RF Switch in one wire. The user can choose which output to use for gameplay by pressing the RF/AV for Audio/Video Cable connection, or leave it unpressed for RF Switch connection. The television it's hooked up to (normally nineteen inches) is meant to be placed on top of it. On the front edge are three colored button switches: an illuminated red Power switch, a blue Reset switch and a green switch for alternating between AV and RF connections when testing an NES Control Deck. The different knob selections are:

- Game Pak Channel (for testing Game Paks)
- Control Deck and Accessories Channel (includes tests for NES Controllers, the Zapper, R.O.B. and Power Pad)
- Audio Video Channel
- AC Adaptor Channel
- RF Switch Channel
- System Channel (for testing a Control Deck)

The testing simply displays the selected output's results as either 'Pass' or 'Fail. Very little is known about this equipment. Nintendo later provided an add-on for testing Super NES components and games, named the Super NES Counter Tester.

Reception

Legacy

The NES/Famicom was one of the most influential video game systems ever produced. It also had the longest-lasting production run, lasting 20 years from July 1983 before being discontinued September 2003 in Japan. The NES was released at a time when interest in video games was fading. After the "video game crash" of the early '80s, many retailers and adults treated electronic games as a passing fad.[61] Five years later, in 1988, video gaming was a multi-billion dollar industry.[62] Before the NES/Famicom, Nintendo was known as a moderately successful Japanese toy and playing card manufacturer. The popularity of the NES/Famicom helped Nintendo grow into an internationally recognized name almost synonymous with video games[63] and set the stage for Japanese dominance of the video game industry.[64] With the NES, Nintendo also changed the relationship between console manufacturers and third-party software developers by restricting developers from publishing and distributing software without licensed approval. This lead to higher quality software titles, which helped to change the attitude of a public that had grown weary from poorly-produced titles for other game systems of the day.[13] The NES was the first system to use special technology to lock-out unauthorized cartridges.[65]

The NES hardware was also very influential. Nintendo chose the name "Nintendo Entertainment System" for the US market and redesigned the system so it would not give the appearance of a child's toy. The front-loading cartridge input allowed it to be used more easily in a TV stand with other entertainment devices (like a video cassette player). The controller was radically different from those of previous consoles,[66] replacing the joystick with a 4-way directional "control pad."[40] Unlike a joystick, the control pad could be manipulated precisely and easily with a single thumb. As the industry adopted the idea, it became universally known as the "directional pad," "D-pad," or "cross pad." Nearly every major game system after the NES incorporated a D-pad onto the primary controller. In later years, Nintendo was recognized with multiple industry awards for the innovation.[67] [68] [69]

Many prominent game franchises originated on the NES. The system's hardware limitations led to game design similarities that still influence video game design and culture. Some of the more important franchises that debuted on the NES were Nintendo's own *Super Mario Bros.*,[70] *The Legend of Zelda*[71] and *Metroid*,[72] Capcom's *Mega Man*[73] franchise, Konami's *Castlevania*[74] franchise, Square Soft's *Final Fantasy*[75] and Enix's *Dragon Quest*[76] (now Square Enix's) franchises. All of these still exist today.

NES imagery, especially its controller, has become a popular motif for a variety of products,[77] [78] [79] including Nintendo's own Game Boy Advance.[45] Clothing, accessories, and food items adorned with NES-themed imagery are still produced and sold in stores. Such items include hats, shirts, underwear, wallets, wrist-bands, belt buckles, tins containing mint candy, and energy drinks.

See also

- List of Nintendo Entertainment System games
- List of Family Computer games
- List of Family Computer Disk System games
- List of Nintendo Entertainment System emulators
- Nintendo World Championships

Notes

^ a: For distribution purposes, Europe and Australasia were divided into two regions by Nintendo. The first of these regions consisted of France, the Netherlands, West Germany, Norway, Denmark and Sweden and saw the NES released during 1986. The console was released in the second region, consisting of the United Kingdom, Republic of Ireland and Italy, as well as Australia and New Zealand, the following year.

^ b: In Japan, Nintendo sold an optional expansion peripheral for the Famicom, called the Famicom Disk System, which would enable the console to run software from proprietary floppy disks.

^ c: The original Famicom included no dedicated controller ports. See game controllers section.

^ e: The NES was the overall best-selling system worldwide of its time. In Japan and the United States, it controlled 85 to 90 percent of the market.[5] It was not as successful in Europe, where it was at in most ten to twelve percent of households.[16] Nintendo sold 61.9 million NES units worldwide: 19.35 million in Japan, 34 million in the Americas and 8.5 million in other regions.[1]

^ f: The commonly bundled game *Super Mario Bros.* popularized the platform game genre and introduced elements that would be copied in many subsequent games[80]

^ g: Atari broke off negotiations with Nintendo in response to Coleco's unveiling of an unlicensed port of *Donkey Kong* for its Coleco Adam computer system. Although the game had been produced without Nintendo's permission or support, Atari took its release as a sign that Nintendo was dealing with one of its major competitors in the market.[10]

^ h: Super Mario Bros. is often erroneously included in lists of launch titles. See its article for more information.

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- Nintendo Entertainment System (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Nintendo/NES/) at the Open Directory Project

PV-1000

Manufacturer	Casio
Release date	October 1983[1]
Introductory price	14,800¥
Media	ROM Cartridge
CPU	Z80A clocked at 3.579 MHz
Memory	2KB RAM
Display	256x192 resolution, 8 colours
Input	Joystick
Successor	Casio Loopy

The ***PV-1000*** was a video game console manufactured by Casio and released in Japan in 1983. The PV-1000 was powered by a Z80A micro-processor, and had only 2 KB RAM available, with 1 KB devoted to its character generator. It had a 256x192 pixel resolution and had 8 available colours. It was released alongside a computer known as the PV-2000, which is compatible with PV-1000 controllers but not games. In the same year Casio released two other consoles, the PV-7 and the PV-16 which were MSX computers. The PV-1000 initially sold for 14,800¥.

Casio failed to achieve a significant market share. It is said to have been pulled from the shelves within a matter of weeks, making the system extremely rare.

Games

Only 15 games for the Casio PV-1000 were released.

- *Amidar*
- *Punch Boy*
- *Mahjongg*
- *Dig-Dug*
- *Pachinko UFO*
- *Pooyan*
- *Space Panic*
- *Super Cobra*
- *Turpin*
- *Tutankhamon*
- *Warp*

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Epoch Cassette Vision

The Epoch Cassette Vision with a Galaxian cartridge.

Manufacturer	Epoch Co.
Type	Video game console
Release date	● July 30, 1981
Introductory price	13,500 yen
Media	ROM cartridge
Input	Internal controllers
Successor	Super Cassette Vision

The **Epoch Cassette Vision** was a video game console made by Epoch and released in Japan on July 30, 1981. Despite the name, the console used cartridges, not cassettes, and it has the distinction of being the first successful programmable console video game system to be made in Japan. The system retailed for 13,500 yen, with games going for 4,000. It is believed, though not confirmed, that Sega and/or SNK made games for the Cassette Vision. Its graphics were less refined than the Atari 2600, and the only controls were 4 knobs (2 to a player, 1 for horizontal movement, 1 for vertical) built into the console itself, along with 2 fire buttons to a player. Though the Cassette Vision was not a fantastic seller, it managed to spawn off a smaller, cheaper version called the **Cassette Vision Jr.** and a successor called the **Super Cassette Vision**. The latter was released in 1984, and was sold in Europe, with little success. Except for their failed Game Pocket Computer handheld system, Epoch never had another system released.

Cassette Vision Games

- Astro Command - Astro Command was and is an Action game released by Epoch for the Cassette Vision in 1983.
- Baseball - Baseball was and is a Baseball game released by Epoch for the Cassette Vision 1981.
- Battle Vader - Battle Vader was and is a Shoot 'em up released by Epoch for the Cassette Vision in 1982.
- Big Sports 12 - Big Sports 12 was and is a Sports game released by Epoch for the Cassette Vision in 1981.
- Elevator Panic
- Galaxian
- Grand Champion
- Kikori no Yosaku
- Monster Block
- Monster Mansion (Donkey Kong clone)
- New Baseball
- PakPak Monster

Cassette Vision Specifications

Cassette Vision's controllers are integrated into the body.

Cassette Vision

- 2 x 2-directional lever switches
- 4 x Push buttons
- 4 x Revolving dials
- 1 x Course swich
- 1 x Select button
- 1 x Start button
- 1 x AUX. button

Cassette Vision Jr.

- 1 x 2-directional lever switch
- 4 x Push buttons
- 1 x Select button
- 1 x Start button

Cassette Vision hardware has only the controllers and power supply circuit. Other components including 1chip CPU, Memory and Video Processor are on the cartridge circuit board.

Super Cassette Vision Games

- Astro Wars
- Astro Wars II - Battle in Galaxy
- BASIC Nyuumon
- **Boulder Dash**
- Comic Circus
- **Doraemon**
- **Dragon Ball: Dragon Daihikyō**
- **Dragon Slayer**
- Elevator Fight
- **Lupin III**
- **Mappy**
- Milky Princess
- **Miner 2049er**
- Nebula
- Nekketsu Kung-Fu Load
- **Pole Position II**
- Pop and Chips
- Punch Boy
- Rantou Pro-Wrestling
- Shogi Nyuumon
- **Sky Kid**
- Star Speeder
- Super Base Ball
  - Giants Hara Tatsunori no Super Base Ball
- Super Golf
- Super Mahjong

- Super Sansu-Puter
- Super Soccer
- TonTon Ball
- WaiWai(Y2) Monster Land
- Wheelie Racer

Super Cassette Vision Specifications

- CPU: uPD7801G (NOT Z80 Clone)
- RAM: 128B (uPD7801G internal)
- ROM: 4KB (uPD7801G internal)
- Video Processor: EPOCH TV-1
- VRAM: 4KB (2 x uPD4016C-2) + 2KB (EPOCH TV-1 internal)
- Colour: 16
- Sprites: 128
- Display: 256x256 (NOT 309x246)
- Sound Processor: uPD1771C
- Sound: 1 channel (Tone, Noise or 1bit PCM)
- Controllers: 2 x hard-wired joysticks

External links

- Epoch's official website [1]
- EPOCH Super Cassette Vision Emulator for Win32 [2]
- EPOCH Super Cassette Vision hardware info [3] (in Japanese)
- Epoch Cassette Vision hardware information [4] (in Japanese)
- Yeno & Epoch Super Cassette Vision [5]

Sega Master System

Top: The PAL version of SMS.
Bottom: The PAL version of SMS II.

Manufacturer	Sega
Type	Video game console
Generation	Third generation (8-bit era)
Retail availability	• JP October 20, 1985 (with the name Mark III)[1] • NA June 1986[1] • EU September 1987[1] • JP October 1987 (with the name Master System)[2] • BR September, 1989
Introductory price	US$ 200[3]
Discontinued	JP 1989 NA 1992[4] EU 1996 BR 1998
Units sold	13 million [5] [6] [7]
Media	ROM cartridge and card
CPU	8-bit Zilog Z80 at 3,58 MHz (3,579545 MHz)[8]
Storage capacity	Sega Card (256 kbits max. capacity)
Memory	64 kbits (8 KB)[9] [10]
Display	NTSC or PAL based on the TMS9918 video chip

Controller input	2 controller ports[11] [11] 1 expansion slot[11]
Best-selling game	• INT 1 November 1986 *Alex Kidd in Miracle World*[12]
Predecessor	SG-1000
Successor	Mega Drive/Genesis

The ***Master System*** (マスターシステム *Masutā Shisutemu*) (abbreviated to **SMS**) is a third-generation 8-bit cartridge-based video game console that was manufactured and released by Sega in 1986 in North America, seven months after the original NES,[13] and in 1987 in Europe. Its original Japanese incarnation was the "Sega Mark III", which was first released in 1985.

When the system was later released in North America it was sold in two incarnations: a bare-bones console with one controller bundle called the **Sega Base System** and a bundle with two controllers and a light gun entitled the Sega Master System. It was this latter configuration that became the more popular and better known of the two, and the system almost immediately became synonymous with this bundle. The system itself appears to have originally been intended to have been referred to as the "Sega Power Base" in English-speaking markets, and the Sega Genesis/Mega Drive adapter that lets Master System games be played on that console was later referred to as the "Power Base Converter".

In the European, Oceanic, and Brazilian markets, this console launched Sega onto a competitive level comparable to Nintendo, due to its wider availability, but it failed to put a dent in the North American and Japanese markets. The Master System was released as a direct competitor to the Nintendo Entertainment System in the third videogame generation. Despite its shaky performance in the major territories, it enjoyed over a decade of life in smaller markets.[14] The later Sega Game Gear is effectively a hand-held Master System, with a few enhancements,[14] although it required an adapter to play actual Master System cartridges.[14]

In 2009, the Master System was named the 20th best video game console of all time (out of 25) by the video gaming website IGN.[15]

History

To compete with Nintendo's NES/Famicom in Japan, Sega decided to develop a console system of its own. The SG-1000 and Mark III were available in Japan in the mid-1980s, and the successor to the Mark I/II, the Sega Mark III, was released in 1984.[16] Sega witnessed the early success of the Nintendo Entertainment System, and entered into the American console market. Sega redesigned the Mark III, renamed it the Sega Master System, and released it in 1986, after the NES first came out.

Sega's Master System was technically superior to the NES,[17] capable of displaying twice as many colours on screen and featuring a CPU twice as fast as the one used in the NES; it arguably trumped the Nintendo Entertainment System in every possible technical respect and was released nationwide in the United States the same year, 1986. However, technical superiority affected the market share little as the popularity and game library was lacking compared to those on the NES.[17]

The original SMS could play both cartridges and the credit card-sized "Sega Cards," which retailed for cheaper prices than carts but had less code. The SMS also featured accessories such as a light gun and 3D glasses which were designed to work with a range of specially coded games.

The Master System technology lived on in Sega's Game Gear, which was based on the technology found in the Master System. The console had two game formats which were cartridges and a Sega Game Card format. The cards held only 256K of data (cartridges held over 4 times that amount), but the advantage to both Sega and the consumer was the fact that the cards were cheaper to manufacture, and sold for less than the carts did. The console featured a

range of built in games that played whenever a cart or card was not inserted; the different models of the console each featured different built-in titles. The Mark III was also backwards compatible with SG-1000 software.

During its lifespan, the Master System was built in several variations.

Origin

Designed by Hideki Sato, the designer of the original Sega Game 1000 (エスジー1000 *Esujī Sen*) (abbreviated to **SG-1000**), was a cartridge-based video game console manufactured by Sega, which was first released to the Japanese market on Friday, July 15, 1983 for ¥15,000 (US$241.50),[18] is the primary man responsible for every Sega arcade and home hardware system, including its most successful console, the **Mega Drive** (メガドライブ *Mega Doraibu*), (abbreviated to **MD** or **Genesis**).[19]

The SG-1000, along with its direct successor the SG-1000 II, marked Sega's first entry into the home video game hardware business, and while neither system was popular,[20] they provided the basis for the more successful Sega Mark III which eventually became the Sega Master System.[20]

Japan

The Sega Mark III was released in Japan on Sunday, October 20, 1985 for ¥15,000 to compete with the Family Computer, following on from the SG-1000 and SG-1000 II. The Mark III was built similarly to the SG-1000 II, with the addition of improved video hardware and an increased amount of RAM.

The system was backwards compatible with earlier SG-1000 titles. As well as the standard cartridge slot, it had a built-in slot, formerly known as expansion slot for Sega My Cards, which were physically identical to the cards for the Sega SG-1000 "Card Catcher" add-on. While in Japan there were many titles in this format published for both the SG-1000 and Mark III, only a few were published in the West (the numbering changes between Tonka and Europe):

- 4001 - My Hero
- 4002 - Ghost House
- 4003 - Teddy Boy
- 4004 - TransBot
- 4005 - F-16 Fighting Falcon
- 4007 - Super Tennis
- 4010 - Spy vs. Spy
- 4018 - Great Soccer
- 4080 - Hang-On
- 4081 - F-16 Fighter (the European release of F-16 Fighting Falcon)
- 4083 - Spy vs. Spy (European release)
- 4084 - Bank Panic

The Mark III was redesigned as the Sega Master System for release in other markets. This was mainly a cosmetic revamp and the internal components of the console remained virtually the same. The redesigned console was itself released in Japan in 1987, with the addition of a built-in Yamaha YM2413 FM sound chip, Rapid Fire Unit, and 3-D glasses adapter; all of which were separate accessories for the Mark III.

The Sega Mark III, the original Japanese version of the Master System

The Mark III controllers

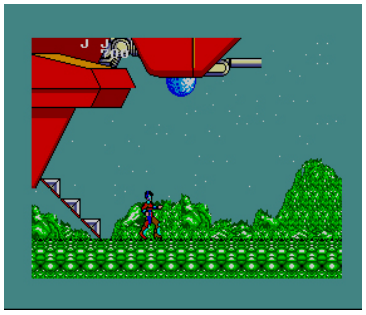
Sega Master System game cartridges released outside Japan had a different shape and pin configuration to the Japanese Master System/Mark III cartridges. This may be seen as a form of regional lockout.

Typical of the era, the Master System had several different mascot characters, the most prominent of which was Alex Kidd.

In a lot of respects, Alex Kidd was Sega's first official mascot character for approximately 5 years, from 1986 up until the introduction of Sonic the Hedgehog in 1991.[21] [22] A handful of games featuring Sonic the Hedgehog were produced for the Master System, but none of these were ever released in Japan for the system.

Neither the Mark III nor the Japanese Master System were commercially successful, due to strong competition from the Family Computer, which held the 95% of the market share there.

The last licensed release in Japan was *Bomber Raid*, released by Sega on February 4, 1989.


Screenshot of Zillion, JJ in front of the Mothership on Planet X.

North America

The system was redesigned and sold in the United States under the name Sega Master System in June 1986, less than a year after the Nintendo Entertainment System (NES) was released. The console sold for $200. The Master System was subsequently released in other locales and markets, including a second release in Japan in 1987 under the new Master System name.

By 1988, Nintendo commanded 83% of the North American video game market share[23] and the rights to the Master System in North America were sold to Tonka, but its popularity continued to decline due to Nintendo's policies in spite of the company's success in gaining a position on the market for the system.[24] One of Nintendo's policies was that its third-party licensees could not release any video game on competing consoles. The lack of third-party support left the Master System deprived of many arcade and NES hit titles. Activision and Parker Brothers were the only two third-party companies publishing for the Master System in North America, but both companies stopped supporting the Master System in 1989[4] and neither companies had released more than five video game titles for the platform.

In 1990, Sega was having success in North America with its Sega Genesis and as a result took back the rights from Tonka for the Master System. It designed the **Sega Master System II**, a low-cost Master System that lacked the reset button, expansion port (which was never used), and card slot of the original. Since the card slot was used as a connector to synchronize the 3D glasses with the original Master System, the SMS2 couldn't use the 3D glasses. In an effort to counter Nintendo's *Super Mario Bros.*, the new system included *Alex Kidd in Miracle World* playable without any cartridges; hence replacing the built-in *Snail Maze* and *Hang-On/Safari Hunt* of the original system.

Sega Master System II

Sega marketed the Master System II heavily; nevertheless, the unit sold poorly in North America. In 1991, Nintendo was forced by the U.S government to abandon the restriction it held on its third party licensees, but the Master System had already been eclipsed long ago with no signs of ever recovering. By early 1992, the Master System's sales were virtually nonexistent in North America and production ceased.

The last licensed release in the United States was *Sonic the Hedgehog*, released by Sega in fall 1991. Some European games were released in Canada for some time after.[25]

Europe

In Europe, the Master System was very successful. Sega marketed the Master System in many countries, including several in which Nintendo did not sell its consoles. It enjoyed strong third party support in the continent, including from American video game publishers that had not released titles for the platform in North America.

In Germany, it had some success, where it was distributed by Ariolasoft beginning in winter 1987.

In France, the console was first distributed by Mastertronic France then from September 1988 to September 1991 by Virgin Loisirs and then from September 1991 by Sega France. The Master System sold more than a million units in this region.

In the United Kingdom, it was distributed by Mastertronic, who later merged with the Virgin Group.

In Italy it was distributed by Giochi Preziosi and in its first years it overshadowed the Nintendo Entertainment System. The NES only gained a good market share later in its lifespan, after the release of the Sega Mega Drive.

The console was produced far longer in Europe than in Japan and North America. It is generally considered a success in Europe where it competed and managed to rival the NES. Because of the success in Europe, Sega decided to open its Sega Europe division.

Due to its architectural similarity to the Game Gear, software companies were easily able to make versions of their games for both the Master System and Game Gear. In fact, many Game Gear titles that were released in North America and Japan were released alongside Master System versions of those games in Europe.

As in North America, Sega launched the redesigned Sega Master System II in 1990. This system included *Alex Kidd in Miracle World*, and later *Sonic the Hedgehog*, as a built-in game.

The last licensed release in Europe was *The Smurfs: Travel the World*, released by Infogrames in 1996. Its successor, the Mega Drive, which was also successful in Europe, was supported up until this time as well. However, both were discontinued so that Sega could concentrate on the Sega Saturn.[26]

Brazil

Sega Master System III compact: Brazilian variation of Master System II.

Brazil was the most successful market for the Master System. Tec Toy, Sega's distributor in Brazil, was responsible for marketing and sales. Both the Master System I and II have slight differences in the external appearance of the console, but are still extremely similar to the Master System outside of Brazil.

At least five versions of the console were released between 1989 and 1995 and several games had been translated into Portuguese. The characters in these games had also been modified so that they appealed to Brazilian mainstream audiences (for example, *Wonder Boy in Monster Land* featured Mônica, the main character from a popular children's comic book in Brazil, created by Maurício de Souza). Brazil also produced many original games, like *Sítio do Pica Pau Amarelo* (based on Monteiro Lobato workmanship), *Castelo Rá-Tim-Bum* (from the TV Cultura series) and *TV Colosso* (from the Rede Globo series).

As of 2010, both Master System and Sega Mega Drive are still being produced in Brazil, now with several games running direct from the memory, and, as of 2006, the cartridge slots have been removed from the Master System, as the cartridges aren't marketed anymore.

The latest version is called **Master System Evolution**, includes 132 built-in games.

Tec Toy games

In 2002, Tec Toy, motivated by the success of the Sega Master System in the Brazilian market, decided to continue producing more games. By the end of the 1990s, there were well over 70 Brazilian variants of the original Master System games. The system was rereleased again by changing the color of the console to a white hue. A number of games were exclusively released in the Brazilian market for the Master System.[27]

Master System 3

Master System Compact: wireless variant developed in Brazil.

The latest version is the "Master System 3" (a completely different unit to the original "Master System III" which was a grey Master System II). It has a brand new modern black design, with details in blue. Even with the visual changes, it was not renamed, save switching the roman number in the name to a decimal number. Although outwardly similar to the Master System II, the Master System 3 featured internal changes that allowed it to handle cartridges up to 8 megabits (1024 kilobytes) in size.

The Master System 3 came with 131 games built in, including games like *Sonic the Hedgehog*, *Alex Kidd* and *Golden Axe*.

One of the more notable Master System consoles in Brazil was wireless **Master System Compact** developed by Tec Toy. The console transmits the A/V signal through RF, dispensing cable connections. It was produced from 1994 to 1997 and is still a target for console collectors. A similar version, called **Master System Girl**, was also released in an attempt to attract female consumers. The only difference in this version is a strong pink casing and pastel buttons.

Later, Game Gear games were ported to the Master System and several original Brazilian titles were made for the system. Tec Toy also produced a licensed version of the fighting game *Street Fighter II* for the Master System. The console production was familiar to the Brazilians, which explains the success in that market.

The Master System Girl

Overview

Overall, the Sega Master System was mildly successful worldwide, but failed to capture the Japanese and North American markets. However, Sega was able to garner a greater market share with the Master System's successor, Sega Mega Drive/Genesis in Europe, Brazil, and North America.

The Sega Master System was re-released in a smaller handheld form factor in late 2006. This small handheld device is powered by 3 AAA batteries, has a brighter active matrix screen, and contained 20 Game Gear and Sega Master System games. It was released under several brands including Coleco[28] and PlayPal.[29] In 2009, Master System Evolution (a new version) was released in Brazil.

Official Sega Packs

This list shows a fraction of what exists so everything on Sega packages, except with console controllers and accessories, there are many worldwide collectors items.[30]

Various accessories and collectibles items, were partially released by third-party for the Master System.[31]

This also included games packages, such as the games packages Marksman Shooting & Trap Shooting,[32] Hang On & Safari Hunt,[33] Marksman Shooting / Trap Shooting / Safari Hunt[34] (as a three-pack) as well as many other collectors items.

- 3000 Sega Master System (with a maze game) Hang On / Safari Hunt
- 3001 SegaScope package
- 3005 Sega Master System (with Astro Warrior/Hang On in cartridge)
- 3005-05B Sega Master System (Alex Kidd)
- 3006 Sega Master System 2 (Alex Kidd)
- 3006-05A Sega Master System 2 (Sonic the Hedgehog)
- 3006-18 Sega Master System 2
- 3010 Sega Master System (Hang On in cartridge or card)
- 3010A Sega Master System Plus (Hang On/Safari Hunt)

Technical specifications

CPU

The Master System`s CPU is a 8/16-bit Zilog Z80.[35] The maximum addressable memory is 64 KB.

CPU reference[36]	
Processor	Zilog Z80
Clock Rates (NTSC)	*Input:* 2.5 MHz *Bus:* 3.579545 MHz, ? MHz, or ? MHz
Clock Rates (PAL)	*Input:* 2.5 MHz *Bus:* 3.546893 MHz, ? MHz, or ? MHz
Clock Rates (SECAM)	*Input:* 2.5 MHz *Bus:* 3.546893 MHz, ? MHz, or ? MHz
Buses	24-bit and 8-bit address buses, 8-bit data bus
Additional Features	• DMA • Opcode • Timed IRQ (not sure) • Parallel I/O processing (not sure)

Video

- **Graphics**: VDP (Video Display Processor) derived from Texas Instruments TMS9918A
  - Up to 32 simultaneous colors available (one 16-color palette for sprites or background, an additional 16-color palette for background only) from a palette of 64 (can also show 64 simultaneous colors using programming tricks)
  - Screen resolutions 256×192 and 256×224. PAL/SECAM also supports 256×240
  - 8×8 pixel characters, max 463 (due to VRAM space limitation)
  - 8×8 or 8×16 pixel sprites, max 64
  - Horizontal, vertical, and partial screen scrolling

Audio

- **Sound (PSG)**: Texas Instruments SN76489 (note that the Sega Master System, Game Gear, and Mega Drive / Genesis used a slightly altered clone of the newer SN76489A, while the older SG-series used the original SN76489)
  - 4 channel mono sound (3 Square Waves, 1 White noise)
  - 3 tone generators, 10 octaves each, 1 white noise generator
- **Sound (FM)**: Yamaha YM2413
  - Mono FM synthesis
  - Switchable between 9 tone channels or 6 tone channels + 5 percussion channels
  - Included as built-in "accessory" with Japanese Master System (1987)
  - Supported by certain games only

Onboard RAM

- **Boot ROM**: 64 kbit (8 KB) to 2048 kbit (256 KB), depending on built-in game
- **Main RAM**: 64 kbit (8 KB), can be supplemented by game cartridges
- **Video RAM**: 128 kbit (16 KB)
- **Game Card slot** (not available in the Master System II)
- **Game Cartridge slot** (not included on newer Brazilian models, as these have built-in games)
  - Japanese and South Korean consoles used 44-pin cartridges, the same shape as SG-1000 cartridges
  - All other consoles use 50-pin cartridges[37] with a wider shape
  - The difference in cartridge style is a form of regional lockout
- **Expansion slot**
  - Unused, pinout compatible with 50-pin cartridges (but opposite gender) in all regions

Unit dimensions

- **Dimensions**[38] :
  - Width: 365 mm, Depth: 170 mm, Height: 69 mm

Media input

One of the most unusual features of the Sega Master System is its dual media inputs: one cartridge slot and one card slot. The card slot accepted small cards about the size of a credit card, much like the later PC Engine/TurboGrafx.

The cards and cartridges both serve the purpose of holding software. However, the cartridges had a much higher capacity, while the cards were much smaller. Sega used the cards for budget games, priced lower than the typical game.

Almost all cards are games, but the 3-D glasses card served an entirely different purpose. The 3-D glasses plug into the console via the card slot, and allow 3-D visual effects for specially designed cartridge games. In this fashion, both media inputs worked in tandem.

The card slot was removed in the redesigned Master System II, providing support for only cartridges. This helped to reduce the cost of manufacturing the console since the cards were unpopular and few card-based games were made. Most of the card games were later re-released as cartridges.

A floppy disk drive add-on for the original Master System was developed but was never released.

Peripherals

Game controllers

- Controller 3 – 2 buttons, hole for a screw-in thumbstick
- Controller 4 – 6 buttons, very similar to the Mega Drive's 6 button pad; released in Brazil only.
- Control Stick - 2 buttons and a stick similar to a gear stick, but on the right side and the buttons are on the left side.
- Light Phaser – Light gun, not compatible with Mega Drive light gun games.
- Sega Remote Control System - remote controller
- Sega Sports Pad - trackball controller
- Sega Handle Controller - (Steering Wheel controller for driving-/airplane games)
- SG Commander - a standard controller with built in rapid fire.

Standard controllers

The Master System controller has only 2 buttons, one of which additionally performs the function of the traditional "Start" button; the pause button is on the game console itself. The original controllers, like Sega's previous systems, has the cord emerging from the side; in 1987 the design was changed to the now-typical top emerging cord. Some controllers also include a screw-in thumb stick for the D-pad.

The Master System's controller

The controller uses the prevailing *de facto* standard Atari-style 9-pin connector and can be connected without modification to all other machines compatible with that standard, including the Atari 2600, Commodore Amiga, Atari ST, Commodore 64, Amstrad CPC and ZX Spectrum with Kempston interface or similar.

When *Street Fighter II* was released (in Brazil only), a new six-button controller similar to the Sega Mega Drive controller was also released. The current Brazilian Master System consoles come with two six-button controllers.

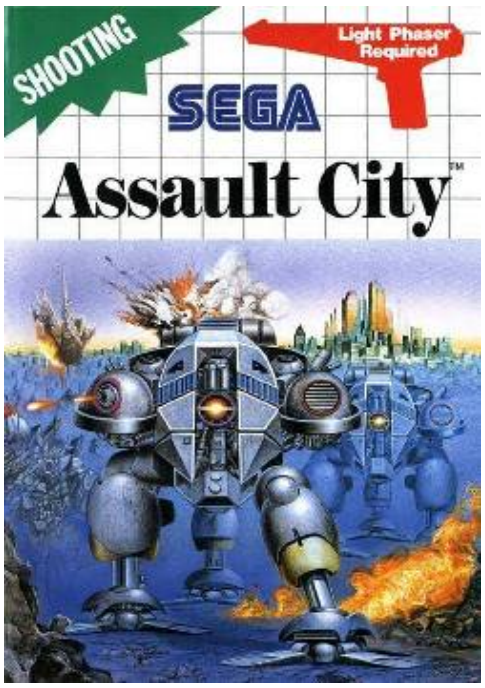
The later Mega Drive/Genesis controllers generally work fine on the Master System, with buttons B and C corresponding to 1 and 2 respectively and the other buttons not doing anything. A few Master System games, such as *Alien Syndrome* will not function properly with these controllers, and must be played with original Master System controllers, even on a Genesis/Mega Drive equipped with a Power Base Converter.

Light Phaser

The **Light Phaser** was a light gun created for the Sega Master System, modeled after the *Zillion* gun from the Japanese anime series of the same name. The phaser was heavier than its Nintendo counterpart, the Nintendo Zapper, but considered by some to have a more responsive trigger and more accurate targeting. As with the Nintendo Zapper, the Light Phaser looked realistic enough to warrant parental pressure to alter the device so that police would not confuse it with a real gun. Altered Light Phasers are distinguished by a hand-painted neon orange tip and are much rarer than their solid color counterparts. Tec Toy also released a blue Light Phaser in Brazil.

The Sega Light Phaser

List of games using the Light Phaser



Assault City Light Phaser version

For the Master System was a lot of games in development that specifically can be played with the Light Phaser, are among others the following:[39]

1. Marksman Shooting
2. Trap Shooting
3. Safari Hunt
4. Shooting Gallery
5. Gangster Town
6. Missile Defense 3-D
7. Rescue Mission
8. Rambo III
9. Wanted
10. Operation: Wolf
11. Assault City1
12. Laser Ghost
13. Space Gun

1)Assault City is a shooter that can be played either with a controller or a ***Light Phaser*** (if you have the phaser compatible version of the game). There are two versions of the game available; the other version can also be played with a gamepad.[40]

SegaScope 3-D Glasses


3-D Glasses and card adapter

The LCD shutter glasses rapidly alternate between the left and right lenses being opaque, used in tandem with two different alternating images flashed from the TV synchronized with the switching of the 3-D Glasses to create a natural stereoscopic 3D effect. The Master System glasses can only be used in the original Master System, since it hooks up directly to the card port not found in the Master System II. Such a system allows 3-D graphics in full color. The technology takes advantage of the fact that televisions display an interlaced image, displaying the left image in the top frame and the right image in the bottom frame, so it tends not to work with non-standard televisions and most capture cards, which tend to combine fields. The same technique has been used with similar glasses for some 3-D films in movie theaters, though these have largely been replaced by newer methods that would not work on a home TV. Only eight Master System games are 3-D compatible.

- *Blade Eagle 3-D*
- *Line of Fire* (hold buttons 1 and 2 while switching the system on for 3-D mode)
- *Maze Hunter 3-D*
- *Missile Defense 3-D* (also requires the Light Phaser gun)
- *Out Run 3-D* (can also be played in 2-D mode without glasses)
- *Poseidon Wars 3-D* (can also be played in 2-D mode without glasses)
- *Space Harrier 3-D* (can also be played in 2-D mode without glasses via a code)
- *Zaxxon 3-D* (playable in 2-D via a code)

With the use of the Master System Converter/Power Base Converter, all peripherals are fully compatible with the Sega Mega Drive.

Remote Control System

The remoteler is a joypad with a built infrared system and a receiver for the signals. Manufactured by WKK Industries, it is not an official product from Sega and was distributed only in small amounts.

Compatibility with Mega Drive/Genesis

Power Base Converter.

The Mega Drive/Genesis is backward compatible with the Master System, despite having a differently shaped cartridge slot. Sega developed a pass-through device for the Mega Drive/Genesis, allowing Master System cartridges to be played on the newer system. It was called the Power Base Converter in the US, the Mega Adapter in Japan and the Master System Converter in Europe. The somewhat large device plugs into the Mega Drive's cartridge slot, covering the entire circular top of the system. Master System cartridges and cards can then be inserted into the device and played on the Mega Drive using Mega Drive controllers. Due to its size and shape, the converter will not fit properly with the Mega Drive II, necessitating the use of the Europe-only Master System Converter II, or a third-party converter cartridge.

Games

On the original release of the Master System, a hidden game known as *Snail Maze* is built in the console, which was a number of labyrinth puzzles with a time limit. This game can be accessed from the system BIOS by starting the system without a game cartridge inserted and holding Up the buttons 1 and 2 simultaneously.[41]

Astro Warrior is integrated into one version of the console (the **Sega Base System**, which was slightly less expensive and lacked the Light Phaser).

Hang-On and *Safari Hunt* are also integrated into another version of the console. Additionally, the original North American release of the console (which included the built-in *Snail Maze*) came bundled with a cartridge containing both *Hang On* and *Safari Hunt*. Some versions only had Hang-On built in.

Alex Kidd in Miracle World is integrated into Master System II consoles in North America, Australia and Europe. *Sonic the Hedgehog* is integrated into newer PAL Master System II consoles. It was later ported to the Sega Game Gear.

Game cartridges for Japanese Sega Mark III (left), North American/PAL Sega Master System (right).

A marketing agreement between Sega and the producers of the anime *Zillion* resulted in both a game (*Zillion*) based on the anime series and the design of the Light Phaser attachment: the protagonists of the show use a pistol which is nearly identical to the Light Phaser, including the cable.

Virtual Console

A number of Master System games are available for download on Nintendo's Wii Virtual Console in North America, PAL territories and Japan.

The first game released for this service was *Hokuto no Ken*, on February 26, 2008, and later, *Fantasy Zone*, released on March 11. Both were released in Japan, at a standard cost of 500 Wii Points (though *Hokuto no Ken* costs 600 points, due to the game's source license). In North America, *Wonder Boy* was the first SMS game released for the service on March 31, 2008.[42] *Fantasy Zone* was also announced, but its release date was on April 14, 2008.[43] In Europe, both *Fantasy Zone* and *Wonder Boy* were released on the same day.[44]

The option to switch to FM audio, for the handful of games that used it, is available for all regions.[45]

Market share

When the Master System was released, it had a low impact on the video game market, selling only 125,000 consoles in the first four months.[46] Due to strong International support (mainly in European markets and in other regions like Brazil), the Master System is the second best selling Sega console with 13 million units were sold worldwide, only the Mega Drive/Genesis sold more.[47]

See also

- List of Sega Master System games

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External links

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Atari 7800

Manufacturer	Atari, Inc., Atari Corporation
Type	Video game console
Generation	Third generation (8-bit era)
Release date	May 21, 1984 (announcement)[1] [2] June 1984 (original release) January 1986 (re-release) 1987
Introductory price	US$140
Discontinued	January 1, 1992
Media	ROM cartridge
CPU	Atari SALLY 6502 ("6502C") clocked at 1.19-1.79MHz,
Memory	4KB RAM, 4KB BIOS ROM, 48KB Cartridge ROM Space
Display	160x240, 320x240 (160x288/320x288 if PAL), 25 on-screen colours out of possible 256
Backward compatibility	Atari 2600
Predecessor	Atari 5200
Successor	Atari XE Game System

The **Atari 7800 ProSystem**, or simply the **Atari 7800**, is a video game console re-released by Atari Corporation in January 1986. The original release had occurred two years earlier under Atari Inc. The 7800 had originally been designed to replace Atari Inc.'s Atari 5200 in 1984, but was temporarily shelved due to the sale of the company after the video game crash. In January 1986, the 7800 was again released and would compete that year with the Nintendo Entertainment System and the Sega Master System.

It had simple digital joysticks; it was almost fully backward-compatible with the Atari 2600; and it was affordable (originally priced at US$140).

In 2009, IGN chose the 7800 to be their 17th best video game console of all time.[3]

Introduction

The Atari 7800 ProSystem was the first game system from Atari Inc. designed by an outside company, General Computer Corporation (GCC). The system had been designed in 1983 through 1984 with an intended mass market rollout in June 1984, but was canceled shortly thereafter due to the sale of the company to Tramiel Technology Ltd on July 2, 1984. The project was originally called the Atari 3600, though was later renamed the Atari 7800.

Several key factors influenced the design of the 7800. First, Atari had been facing mounting pressure from the ColecoVision, which boasted graphics that more closely mirrored arcade games of the time than Atari's reigning 2600 VCS system. Second, the Atari 5200 (the original intended successor to the Atari 2600 VCS) had been widely criticized for not being able to play Atari 2600 VCS games without an adapter. Finally, dropping prices of home computers like the Commodore 64 had caused many to believe that buying a home computer was a better investment because it provided more detailed gameplay and could be used for other purposes such as word processing.

Previous game consoles sometimes had a difficult time replicating the arcade experience in home versions of popular arcade games. In particular, home versions of arcade games sometimes had problems with flickering and slow down when more than a few moving objects appeared on the screen at once. GCC, which had a background in creating arcade games, designed their new system with a graphical architecture similar to arcade machines of the time. The 7800 featured the ability to move around a tremendous amount of objects (75-to-100) that far exceeded previous consoles. Powering the system was an Atari SALLY 6502 (Atari's slightly custom 6502, sometimes described as a "6502C") processor running at 1.79 MHz, similar to the processor found in home computers (Atari 8-bit, Apple II, Commodore 64) and other consoles (Atari 5200 and Nintendo Entertainment System).

In response to the criticisms of the Atari 5200, the Atari 7800 could play almost all Atari 2600 games out of the box, without the need for an adapter. In addition, it featured a return to a digital controller.

To address the concerns of parents that home computers were a better investment than consoles, the system was designed to be upgraded to a full-fledged home computer. A keyboard was developed, and the keyboard had an expansion port (which was the SIO port from Atari's 8-bit computer line, though the 7800 could not run Atari computer programs) allowed for the addition of peripherals such as disk drives and printers.

To enhance the gaming experience further, GCC had also designed a 'high score cartridge,' a battery-backed RAM cartridge designed for storing game scores. On the side of the 7800 was an expansion port, reportedly for a planned connection with a laserdisc player.

Original 1984 release

The 7800 was initially released in southern California in June 1984, following an announcement on May 21, 1984 at the Summer Consumer Electronics Show.[1] Thirteen games were announced for the system's launch, including *Ms. Pac-Man*, *Pole Position II*, *Centipede*, *Joust*, *Dig Dug*, *Desert Falcon*, *Robotron: 2084*, *Galaga*, *Xevious*, *Food Fight*, *Ballblazer*, *Rescue on Fractalus!*, and *Track and Field*. Atari was a sponsor of the 1984 Summer Olympics and planned to push the 7800 aggressively in time for Christmas that year.

One month later, Warner Communications sold Atari's Consumer Division to Jack Tramiel. All projects were halted during an initial evaluation period.

The Atari 7800 languished on warehouse shelves until it was re-introduced in January 1986 after strong 2600 sales the previous Christmas.[4]

Atari's launch of the 7800 under Tramiel was far more subdued than Warner had planned for the system in 1984 with a marketing budget of just $300,000. Additionally, the keyboard and high score cartridge were canceled, the expansion port was removed from later production runs of the system and, in lieu of new titles, the system was launched with titles intended for the 7800's debut in 1984.

Graphics

The graphics are generated by a custom Graphics Processing Unit called MARIA which is very different from other second and third generation consoles, and made it more difficult for game programmers to make the transition. Instead of a limited number of hardware sprites, the MARIA allows for a much larger number of sprites described in a list of display lists. Each display list contains sprite entries with pointers to graphics data, color information, and horizontal positioning. The same display list is used for multiple rasters with the pointers being automatically adjusted. However, managing and displaying a large number of sprites required much more CPU time (both directly and indirectly since the MARIA would halt the CPU when drawing sprites) than consoles with hardware sprites and backgrounds.

MARIA has a number of different graphics modes which are either 160 pixels wide or 320 pixels wide. While the 320 pixel modes theoretically enable the 7800 to create games at higher resolution than the 256 pixel wide graphics found in the Nintendo Entertainment System and Sega Master System, the intense processing demands of MARIA typically meant that programmers created their games using the lower 160 pixel modes.

The 7800 features a broad (for its time) palette of 256 colors. Depending on various parameters, each individual sprite can use from 1 to 12 colors, with 3 colors (plus a 4th "transparency" color) being the most common. In this format, the sprite is referenced to one of 8 palettes, where each palette holds 3 assignable colors. There is also an assignable background color, which will be visible wherever another object has not covered it up. In total the system can utilize 25 colors on a scanline at one time.[5]

The graphics resolution, color palette assignments, and background color can be adjusted in between scanlines. Although it is a more advanced programming technique, this isn't really a "trick". The designers deliberately included this feature, and documented its use in the original 1983 "Atari 3600 Software Guide".[5] Games often used this feature to render high resolution text in one area of the screen, while displaying more colorful graphics with less resolution in the gameplay area. Demos also exist which use this feature to place all 256 colors on the screen at the same time.

The MARIA's approach had advantages and disadvantages when it came to generating graphics in software during the lifespan of the 7800. It excelled at moving around large numbers of sprites on a static screen without the screen flickering that plagued other 8-bit systems. Its flexible design enabled it to play games which used display list manipulation to generate a pseudo 3D appearance such as *Ballblazer* (1987) and *F-18 Hornet* (1988). While side-scrolling games in the vein of *Super Mario Bros.* are possible on the system (1990's *Scrapyard Dog* is the best example), it is significantly harder to develop such a title than on a tile-based system such as the Nintendo Entertainment System.

Sound

A common criticism of the 7800 regards its use of the TIA to provide 2-channel sound effects and music, resulting in sound quality that is virtually identical to the Atari 2600 VCS from 1977. While the inclusion of 2600 hardware is required to maintain compatibility with the older system, this drove up production costs and reduced available space on the 7800's motherboard. As such, the 7800 does not include additional hardware for generating sound as it does with graphics and the sound hardware is considered the weakest part of the system.

To compensate for this, GCC's engineers allowed games to include a POKEY audio chip in the cartridge which substantially improved the audio quality. To ensure software developers had an economical means of producing better sound than TIA, GCC had originally planned to make a low-cost, high performance sound chip, GUMBY, which could also be placed in 7800 cartridges to enhance its sound capabilities further. This project was cancelled when Atari was sold to Jack Tramiel.

Despite having the capability to support sound chips in cartridges, almost no 7800 cartridges feature POKEY hardware for enhanced sound. *Ballblazer*, released in 1987, uses the POKEY to generate all music and sound effects.

Similarly, *Commando*, released in 1989, uses a POKEY to generate in-game music while the TIA generates the game's sound effects for a total of 6 channels of sound.

Lockout features

Following the debate over *Custer's Revenge*, an Atari 2600 VCS title with adult themes, Atari had concerns over similar adult titles finding their way onto the 7800 and displaying adult graphics on the significantly improved graphics of the MARIA chip. To combat this, they included a digital signature protection method which prevented unauthorized 7800 games from being played on the system.

When a cartridge was inserted into the system, the 7800 BIOS included code which would generate a digital signature of the cartridge ROM and compare it to the signature stored on the cartridge. If a correct signature was located on the cartridge, the 7800 would operate in 7800 mode, granting the game access to MARIA and other features. If a signature was not located, the 7800 remained in 2600 mode and MARIA was unavailable. All 7800 games released in North America had to be digitally signed by Atari. This digital signature code is not present in PAL 7800s, which use various heuristics to detect 2600 cartridges, due to export restrictions.

Comparison with the Atari 2600 VCS

The Atari 7800 differs from the 2600 in several key areas. It features a full Atari SALLY 6502 processor whereas the 2600 VCS has a stripped down 6507 processor running at a slower speed. It has additional RAM (Random Access Memory) and the ability to access more cartridge data at one time than the 2600. The most substantial difference, however, is a graphics architecture which differs markedly from either the Atari 2600 VCS or Atari's 8-bit line of computers.

The 7800's compatibility with the Atari 2600 is made possible by including many of the same chips used in the Atari 2600. When operating in "2600" mode to play Atari 2600 titles, the 7800 uses a Television Interface Adapter (TIA) chip to generate graphics and sound. The processor is slowed to 1.19 MHz, enabling the 7800 to mirror the performance of the 2600s stripped-down 6507 processor. RAM is limited to 128 bytes found in the RIOT and game data is accessed in 4K blocks.

When in "7800" mode (signified by the appearance of the full screen Atari logo), the graphics are generated entirely by the MARIA graphics processing unit, all system RAM is available and game data is accessed in larger 48K blocks. The system's SALLY 6502 runs at its normal 1.79 MHz instead of the reduced speed of 2600 mode. The 2600 chips are used in 7800 mode to generate sound as well as switch and controller interfaces.

Software library

While the 7800 can actually play hundreds of titles due to its compatibility with the Atari 2600, there was limited third party support for the 7800 and less than 100 titles were specifically designed for it.

Availability of current arcade conversions

At the time, a key driver for success with a home console was the number of home conversions it had of popular arcade games. This had been a primary reason for the success of the Atari 2600 VCS against systems like the Intellivision.

During the Atari 7800's life cycle, Atari found themselves struggling to get developers to create 7800 versions of then-popular arcade titles because of a controversial policy employed by Nintendo. When Nintendo revived the industry, they signed up software development companies to create NES games under a strict license agreement which imposed serious restrictions on what they were allowed to do. One of the key clauses was that companies who made Nintendo games were not allowed to make that game on a competing system for a period of two years.

Because of the market success of the NES, companies chose to develop for it first and were thus barred from developing the same games on competing systems for two years. The software libraries of the Atari 7800 and Sega Master System suffered tremendously as a result.

Some NES titles were developed by companies who had licensed their title from a different arcade manufacturer. While the creator of the NES version would be restricted from making a competitive version of an NES game, the original arcade copyright holder was not precluded from licensing out rights for a home version of an arcade game to multiple systems. Through this loophole, Atari 7800 conversions of *Mario Bros.*, *Double Dragon*, *Commando*, *Rampage*, *Xenophobe*, *Ikari Warriors* and *Kung Fu Master* were licensed and developed.

Third-party software support

Third party development for the 7800 was limited as most game companies were locked into exclusive agreements with Nintendo for the NES. Eleven titles were developed and sold by three third-party companies under their own labels for the 7800 (Absolute Entertainment, Activision, and Froggo) with the rest published by Atari themselves. However, most Atari development was contracted out.

Peripherals

Unlike the NES or Sega Master System, there were few peripherals for the 7800. The most notable peripheral was the XG-1 lightgun, which came bundled with the Atari XE Game System. The XG-1 was fully compatible with the 7800 and was sold separately for other Atari systems. Atari released four 7800 light gun games: *Alien Brigade*, *Crossbow*, *Meltdown*, and *Barnyard Blaster*.

The gamepad of the Atari 7800.

In response to criticism over ergonomic issues in the 7800's Pro-Line controllers, Atari later released joypad controllers with European 7800s, which were similar in style to controllers found on Nintendo and Sega Systems.

The 7800 included an expansion port which would have allowed for the addition of a computer keyboard, connection to laserdisc players to play laserdisc games and other peripherals.

A High Score cartridge was designed to save scores for up to 65 separate games. [In 1999, Curt Vendel with a schematic and ROM code from Gary Rubio—the former Atari liaison to GCC on the Atari 7800 project, reproduced a new run of Atari 7800 high-score cartridges.]

A dual joystick holder was designed for games like *Robotron 2084* and future games like *Battlezone* and others, but not produced.

Market performance

The Atari 7800 remained officially active between 1986 and 1991. On January 1, 1992, Atari Corp. formally announced that production of the Atari 7800, the Atari 2600, the Atari 8-bit computer line, and the Atari XE Game System would cease. By the time of the cancellation, Nintendo's NES dominated the North American market, controlling 80% while Atari Corp. controlled just 12%.[6]

Despite trailing the Nintendo Entertainment System in terms of number of units sold, the 7800 was a profitable enterprise for Atari Corp., benefiting largely from Atari's name and the system's 2600 compatibility. Profits were strong due to low investment in game development and marketing. Nonetheless, the 7800 failed to help Atari regain its dominance in the videogame industry.

Homebrew community and emulation

When emulators of 1980s video game consoles began to appear on home computers in the late 1990s, the Atari 7800 was one of the last to be emulated. The lack of awareness of the system, the lack of understanding of the hardware, and fears about the digital signature lockout initially caused concerns. Since that time, however, the 7800 has been emulated successfully and is now common on emulation sites. One such program is ProSystem, written in C/C++ for the Microsoft Windows operating system.[7] It uses the Windows API and DirectX to display what it emulates in both PAL and NTSC.

The digital signature long prevented homebrew games from being developed until the original encryption generating software was discovered. When the original digital signature generating software was turned over to the Atari community, development of new Atari 7800 titles began. In addition, the Atari community has slowly uncovered the original 7800 development tools and released them into the public domain. New tools, documentation, source code and utilities for development have since been created which has sponsored additional homebrew development. Several new commercial Atari 7800 titles such as Beef Drop, B*nQ, Pac Man Collection, Combat 1990, Santa Simon, and Space War have been created and released.

Perhaps the most interesting recent development was the creation of the Cuttle Cart II, a device that allowed the Atari 7800 to read MMC cards containing binary files of Atari 7800 programs. The Cuttle Cart II has enabled more people to play the entire 2600 and 7800 library on an original system as well as binaries of unreleased games and new homebrew titles.

The Cuttle Cart II was a success by homebrew standards, selling out both production runs and commanding high prices on eBay.

New mainstream releases

In 2004, Atari (now owned by Infogrames) released the first Atari Flashback console. This system resembled a miniature Atari 7800 and joysticks and had 20 built in games (five 7800 and fifteen 2600 titles). While the unit sold well, it was controversial among Atari fans. Atari had given the engineering firm, Legacy Engineering, extremely limited development timelines. The firm was forced to build the Flashback using NES-On-A-Chip hardware instead of recreating the Atari 7800 hardware. As a result, the Flashback has been criticized for failing to properly replicate the actual Atari gaming experience.

Legacy Engineering was later commissioned to create another 7800 project that never made it to market. A reseller with millions of unsold Atari 2600 and 7800 games acquired from the Tramiels looked into remaking the system and bringing it to market as a way for new customers to play old Atari games. The project was cancelled after prototypes were made.

A new Atari 7800 expansion module [8] is being released by Legacy Engineering which will greatly increase the capabilities of the console, with the ability to save games as well as vastly improved sound capabilities using the YM2151 shound chip to name a few, will breath new life into a console that should have deserved much greater fanfare.

Unreleased games

As with most game consoles, there were many more games in development for the 7800 than were actually released. However, very few prototypes have been located, due to Tramiel Atari's reluctance to make them in the first place. Atari 7800 prototypes tend to be highly coveted by collectors, often fetching hundreds of dollars when sold. Some collectors are unwilling to share the rare items publicly as doing so risks decreasing the value of their prototypes.

Nonetheless, some unreleased Atari 7800 games, as well as early versions of released games have been released to the public. A few have been manufactured and sold.

These include

- *Klax* (Programmed by Blue Sky Software). The game was nearly completed when canceled.[8] For years, it was traded privately until a ROM was made available to the general public. Later, the developer appeared to create additional levels for the community.
- *Gato* (Programmed by Ibid Inc Software). Released on the XE Game System, an Atari 7800 version was started but not completed beyond a simple demo.
- *Missing in Action* (Programmed by Sculptured Software for TNT Games). A side scrolling adventure that was about 85% complete when cancelled. The game is mostly playable with some later collision detection issues requiring cheats to get past.
- *Pit-Fighter* (Programmed by Imagitec Design). An early demo of the game has been found, with crude graphics, no sound and poor collision detection.
- *Rescue on Fractalus!* (Programmed by GCC). A conversion of the popular computer game was released by GCC in 2004. The game was partially complete with a running engine but no enemies.[9]
- Other 7800 games remain lost, despite indications that development occurred. The most notable of these are *Skyfox* (shown on the back of the original system box) and *Electrocop* (artwork has since been uncovered).

Engineering Notes list Tempest as a game that was between 15–20% completed for the Atari 7800; no code to date has been found. The Atari Museum located and posted unreleased box art and notes for a 7800 version of Crystal Castles. No code to date has been found for that game either. Atari's earlier 7800 games listing showed Millipede as one of the games in the line up; however, it does not appear that it was ever started or worked on.

Source Code Release

The source code for 13 games, as well as the OS and development tools (for the Atari ST computer system) were discovered in a dumpster behind the Atari building in Sunnyvale, California.[10] Commented assembly language source code was made available for *Centipede*, *Commando*, *Crossbow*, *Desert Falcon*, *Dig Dug*, *Food Fight*, *Galaga*, *Hat Trick*, *Joust*, *Ms. Pac-Man*, *Super Stunt Cycle*, *Robotron: 2084* and *Xevious* game titles.[11]

Technical specifications

- CPU: Atari SALLY 6502 ("6502C")
  - Speed: 1.79 MHz, drops to 1.19 MHz when the TIA or RIOT chips are accessed
  - (note: Unlike a standard 6502, *SALLY* can be halted to allow other devices to control the bus)
- RAM: 4 KB (2 6116 2Kx8 RAM ICs)
- ROM: built in 4 KB BIOS ROM, 48 KB Cartridge ROM space without bankswitching
- Graphics: MARIA custom graphics controller
  - 160x240 (160x288 PAL) resolution or 320x240/288 resolution
  - 25 color palette out of 256 colors (16 hues * 16 luma), different graphics modes restricted the number of usable colors and the number of colors per sprite
  - Direct Memory Access (DMA)
  - Graphics clock: 7.16 MHz

- I/O: Joystick and console switch IO handled byte 6532 RIOT and TIA
- Ports: 2 joystick ports, 1 cartridge port, 1 expansion connector, power in, RF output
- Sound: TIA video and sound chip, same as the 2600. Only the sound is used in 7800 games. Both video and sound are used in 2600 games.
  - Optional POKEY sound chip on cartridge for improved sounds.

System revisions

Prototypes:

- Atari 3600, original model number
- Atari CX-9000 Video Computer System

Production:

- Atari CX7800, two joystick ports on lower front panel. Side expansion port for upgrades and add-ons. Bundled accessories included two CX24 Pro-Line joysticks, AC adapter, switchbox, RCA connecting cable, and Pole Position II cartridge.
- Atari CX7800, second revision. Slightly revised motherboard, added an additional timing circuit. Expansion port connector removed from motherboard but is still etched. Shell has indentation of where expansion port was to be.
- Atari CX7800, third revision. Same as above but with only a small blemish on the shell where the expansion port was.

See also

- History of Atari
- List of Atari 7800 games
- List of Atari 2600 games

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External links

- Atari 7800.com - Interesting Site Celebrating the Atari 7800 (http://www.atari7800.com)
- AtariAge – Comprehensive Atari 7800 database and information (http://www.atariage.com/software_search.html?SystemID=7800)
- Atari 7800 Information & Resources (http://www.atari7800.org)
- Atari Museum – Technical files archive (http://archives.atarimuseum.com/archives/archives-techdocs-7800.htm)
- Atari Museum – Full History of the Atari 7800 (http://www.atarimuseum.com/videogames/consoles/7800/7800menu/)

Atari XEGS

Manufacturer	Atari Corporation
Type	Video game console/personal computer
Generation	Third generation (8-bit era)
Release date	1987
Introductory price	US$199
Media	ROM cartridge
CPU	MOS Technology 6502C
Memory	64KB RAM
Display	320 x 192, 16 on-screen colours out of possible 256
Backward compatibility	Atari 8-bit computers
Predecessor	Atari 7800
Successor	Atari Jaguar

The **Atari XE Video Game System** (Atari XEGS) is a video game console released by Atari Corporation in 1987. Based on the Atari 65XE computer, the XEGS is compatible with the existing Atari 8-bit computer software library. Additionally, it is able to operate as a stand alone console or full computer with the addition of its specially designed keyboard. In computer mode, it's able to use the full line of peripherals released for the 8-bit computer line. Shipping in a console with joystick only and a deluxe model with a separate keyboard, joystick and light gun, the console failed in the marketplace, and was succeeded by the Atari Jaguar.

History

Under the auspices of Jack Tramiel, Atari re-released two game consoles in 1986: the Atari 7800, which had previously been released in a brief test run in 1984; and the Atari 2600jr, an updated version of the Atari VCS/2600. The XEGS followed, building on Atari's 8-bit computer line which had started with the Atari 400 and 800.[1] In practice the XEGS is essentially a repackaged Atari 65XE, in a move not unlike that taken for the Atari 5200, which is effectively a repackaged Atari 400 computer. However, unlike the 5200, the XEGS is still compatible with the existing range of Atari 8-bit computer software and peripherals, and thus could function as a home computer.[2]

The console was conceived in an attempt to increase Atari's console market share while improve flagging sales of the Atari 8-bit family. Providing a "beginning computer" and "sophisticated game console" in one device that would convince more retailers and software developers to support the platform. In May 1987, Atari's then Director of

Communications, Neil Harris, updated the online Atari community by outlining this plan, noting that the XEGS was intended to further the 8-bit line by providing mass-merchants with a device that was more appealing to their markets.[3]

The console was not a success. Unusually, the system co-existed with the Atari 2600jr and Atari 7800 on store shelves [4] and was occasionally featured alongside those systems in Atari print ads and television commercials.[5] It was eventually followed by the Atari Lynx handheld system and the Atari Jaguar.

Games

The XEGS shipped with the Atari 8-bit version of *Missile Command* built in,[2] *Flight Simulator II*, and *Bug Hunt* which was compatible with the light gun. As the XEGS is compatible with the earlier 8-bit software, many games released under the XEGS banner were simply older games rebadged, to the extent that some games were shipped in the old Atari 400/800 packaging, with only a new sticker to indicate that they were intended for the XEGS.[1]

Peripherals

The XEGS was released in a basic model with a joystick, and the deluxe model bundled with the joystick and two peripherals. A keyboard, which allowed it to function as a home computer, and the XG-1 light gun: the first light gun produced by Atari, which is also compatible with the Atari 7800 and atari 2600.[6] [2] Packages containing only a console and a joystick were also available, with the keyboard and the lightgun available separately.[7]

In addition the XEGS can use the standard Atari 8-bit peripherals, allowing the use of devices such as disk drives, modems and printers.[2]

XEGS Keyboard

XEGS Joystick

XG-1 Light Gun

See also

- History of Atari
- List of Atari XEGS games

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Action Max

Manufacturer	Worlds of Wonder
Type	Video game console
Generation	Third generation
Retail availability	1987
Media	VHS tape

Action Max is a console using VHS tapes for games. It was created in 1987 by Worlds of Wonder.

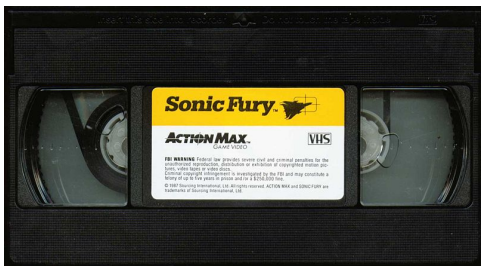
The system required its owner to also have a VHS player, as the console did not have a way to play tapes itself. Using a light gun (or two for 2-player games) players would shoot at the screen. To make this work a red sensor first had to be connected to the television screen, which would flash a circle when something on the screen was targetable. The gaming was strictly point-based and dependent on shot accuracy. Players could not truly "lose" or "win" a game. This, along with the fact that the only real genre on the system were light gun games that played exactly the same way every time, greatly limited the system's appeal and lead to its quick downfall.

The Action Max had a very limited release outside the US and only one PAL game is suspected to have been made.

Like the Fairchild Channel F, this unit had an internal speaker.

Games

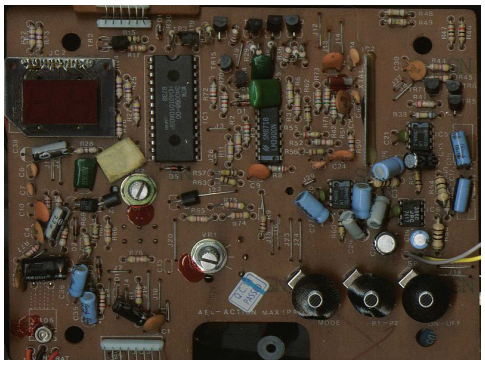
- .38 Ambush Alley
- Blue Thunder
- Hydrosub: 2021
- The Rescue of Pops Ghostly
- Sonic Fury
- Fright Night (unreleased)



Sonic Fury (PAL)

Technical specifications

- CPU: HD401010
- Internal Speaker
- 2 Character, 7 segment LCD score display



An Action Max (PAL) PCB.

See also

- NEMO a similar, unreleased system.

Modern day

Even though DVD recorders were introduced to the market several years after this product was discontinued, a DVD-R copy of pre-recorded VHS tapes for this game are technically compatible with this game since the Action Max hardware was more dependent on the video signal than the actual hardware that plays it.

The console can also be compatible with DVD-Rs of simple homebrew video footage created with video editing software employing the proper visual criteria for the Action Max's functionality.

External links

- Action Max Calibration Screen [1]
- Action Max on OLD-COMPUTERS.COM [2]
- Action Max Emulator [3]

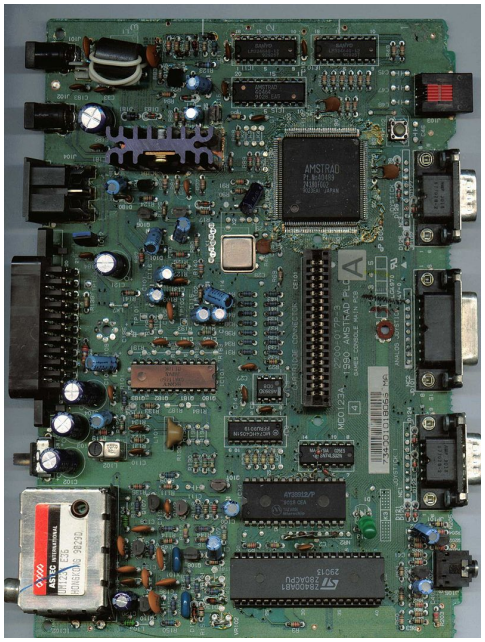
Amstrad GX4000

Manufacturer	Amstrad
Type	Video game console
Generation	Third generation
Retail availability	1990
Media	Cartridge
CPU	Zilog Z80A

The **GX4000** was Amstrad's short-lived attempt to enter the games console market.[1] The console was released in Europe in 1990 and was based on the still-popular CPC technology.[1] The GX4000 was actually a modified CPC 6128 Plus computer. This allowed the GX4000 to be compatible with a majority of CPC Plus computer line software. Initial reviews were favourable — the console had impressive enhanced graphics and sound, a huge colour palette of 4096 (more than the 16 bit Sega Mega Drive), hardware sprites and hardware scrolling.[1] It retailed for £99 and came bundled with driving game *Burnin' Rubber*. GX4000 game cartridges could also be used by the new 464 and 6128 Plus computers released at the same time.

Technical specifications

- CPU: 8/16-bit Zilog Z80A at 4 MHz[1]
- Graphics:
  - 16 sprites
  - Resolution: from 160x200 to 640x200[1]
  - 4096 colour palette - 32 onscreen[1]
- Memory: 64 kB RAM,[1] 16 kB VRam, 32 kB ROM[1]
- I/O: Audio output, 2x digital controller connectors, Analog controller port (IBM standard), Light gun connector (RJ11 socket), Audio & RGB video output (8-pin DIN), Scart connector (audio & video), power supply socket from external PSU, power supply socket from monitor.[1]
- Sound: 3-channel stereo; AY-3-8912 chip[1]
- Game Format: cartridge[1]



Amstrad GX4000 PCB.

Games

In all, exactly 25 games were produced and distributed for the GX4000.[1] The majority of games were made by UK-based companies Ocean and U.S. Gold. Notable games were the pack-in title: *Burnin' Rubber*, *RoboCop 2*, *Pang*, *Plotting* (AKA *Flipull*), *Navy Seals* and *Switchblade*. The last was later released for the CPC range with only minor concessions, mainly colour. The GX4000 was only manufactured for a matter of months before it was discontinued.

Reception

The GX4000 was a commercial failure. This was in part due to Amstrad lacking the marketing power compared to the producer of Sega Mega Drive (released in November 1990 in Europe) or eventually the Super Nintendo Entertainment System.[1] There was little available software at launch,[1] with some games being released months late or cancelled entirely. To make matters worse, several GX4000 games were simply CPC games from previous years rereleased onto a cartridge. This was not inspiring and users were not prepared to pay £25 for a cartridge game that they could buy for £3.99 on cassette instead.

Like Commodore's C64GS system, essentially a cut down C64 in much the same way as the GX4000 was a cut down CPC+, Amstrad greatly overestimated how much extra people were willing to pay for the reliability and instant loading times of cartridge technology. Within a few weeks of the initial launch, the system could be bought at discounted prices.

Many readers complained about lack of coverage in Amstrad magazines, *Amstrad Computer User* & *Amstrad Action*. *Amstrad Action* continued to give coverage for the machine when possible and included a complete rundown on every game released for the console that ran for three issues well after the GX4000's demise.

The designer of the Plus, Cliff Lawson, claimed that the GX4000 was "technically at least on a par" with the SNES and that the machine faltered due to a lack of games and Amstrad not having the marketing budget to take on Nintendo and Sega.

References

[1] "GX4000 at Old Computers" (http://www.old-computers.com/museum/computer.asp?st=2&c=1082). Old-Computers.com. . Retrieved 2008-05-06.

External links

- Listing and pictures of Amstrad GX4000 games (http://www.pcwking.netfirms.com/cartridge.html)
- Old-Computers.com page on the GX 4000 (http://www.old-computers.com/museum/computer.asp?st=2&c=1082)
- Complete list of GX 4000 games (http://andercheran.aiind.upv.es/~amstrad/docs/carts.htm)
- The CPCwiki article about the GX4000. Lots of info (http://cpcwiki.eu/index.php/Plus)

Commodore 64 Games System

Manufacturer	Commodore International
Type	Video game console
Generation	Third generation (8-Bit era)
Media	Cartridge

The **Commodore 64 Games System** (often abbreviated **C64GS**) was the cartridge-based game console version of the popular Commodore 64 home computer. It was released by Commodore in December 1990 as a competitor in the booming console market. It was only ever released in Europe and was a considerable commercial failure.

During its short life, the C64GS came bundled with a cartridge with four games: *Fiendish Freddy's Big Top O'Fun*, *International Soccer*, *Flimbo's Quest* and *Klax*.

The C64GS was not Commodore's first gaming system based on the C64 hardware. However, unlike the 1982 MAX Machine (a game-oriented computer based on a very cut-down version of the same hardware family), the C64GS was internally very similar to the "proper" C64 with which it was compatible.

Available software

Support from games companies was limited, as many were unconvinced that the C64GS would be a success in the console market. Ocean Software were the most supportive, offering a wide range of titles, some C64GS cartridge-based only, offering features in games that would have been impossible on cassette-based games, others were straight ports of C64 games. Domark and System 3 also released a number of titles for the system, and conversions of some Codemasters and Microprose games also appeared.

The software bundled with the C64GS, a four-game cartridge containing *Fiendish Freddy's Big Top O'Fun*, *International Soccer*, *Flimbo's Quest* and *Klax*, were likely the most well-known on the system. These games, with the exception of *International Soccer*, were previously ordinary tape-based games, but their structure and control systems (no keyboard needed) made them well-suited to the new console. *International Soccer* was previously released in 1983 on cartridge for the original C64 computer.

Ocean produced a number of games for the C64GS, among them a remake of *Double Dragon* (which seemed to be more linked to the NES version than the original C64 cassette version), *Navy SEALS*, *Robocop 2*, *Robocop 3*, *Chase HQ 2: Special Criminal Investigation*, *Pang*, *Battle Command*, *Toki* , *Shadow of the Beast* and *Lemmings*. They also produced *Batman The Movie* for the console, but this was a direct conversion of the cassette game, evidenced by the screens inciting the player to "press PLAY" that briefly appeared between levels. Some of the earliest Ocean cartridges had a manufacturing flaw, where the connector was placed too far back in the cartridge case. The end result was that the cartridge could not be used with the standard C64 computer. Members of Ocean staff had to manually drill holes in the side of the cartridges to make them fit.

System 3 released *Last Ninja Remix* and *Myth: History in the Making*, although both were also available on cassette. Domark also offered two titles, *Badlands* and *Cyberball*, which were available on cartridge only.

Through publisher The Disc Company a number of Codemasters and Microprose titles were also reworked and released as compilations for the C64GS. *Fun Play* featured three Codemasters titles: *Fast Food Dizzy*, *Professional Skateboard Simulator* and *Professional Tennis Simulator*. *Power Play* featured three Microprose titles: *Rick Dangerous*, *Stunt Car Racer* and *Microprose Soccer*, although *Rick Dangerous* was produced by Core Design, not Microprose themselves. *Stunt Car Racer* and *Microprose Soccer* needed to be heavily modified to enable them to run on the C64GS.

Uncharacteristically, Commodore never produced or published a single title for the C64GS beyond the bundled four-game cartridge. *International Soccer* was the only widely-available game for the C64GS but had actually been written for the C64.

Hardware-based problems

The C64GS was plagued with problems from the outset. Firstly, despite the wealth of software already available on cartridge for C64, the lack of a keyboard meant that most could not be used with the console. This meant that people often bought secondhand C64 software on cartridge only to find that the games were not compatible. The C64 version of *Terminator 2: Judgment Day* was designed for the console, but was included on a cartridge that required the user to press a key to access the game, rendering it unplayable.

To partially counter the lack of a keyboard, the basic control system for the C64GS was a joystick supplied by Cheetah called the Annihilator. This joystick, while using the standard Atari 9-pin plug, offered two independent buttons, with the second button located on the base of the joystick. This 9-pin plug was standard of many systems of the era, and the joysticks were fundamentally compatible with the ZX Spectrum's Kempston Interface and the Sega Master System. The Cheetah Annihilator joystick was poorly built and had a short life, and was not widely available, making replacements difficult to come by.

Primary reasons for failure

Prior to the console's release, Commodore had generated a great deal of marketing hype to generate interest in an already crowded market. *Zzap! 64*, a Commodore 64 magazine of the era, reported that Commodore had promised "up to 100 titles before December", even though December was two months from the time of writing. In reality 28 games were produced for the console during its shelf life - most of which were compilations of older titles, and a majority of which were from Ocean. Of those 28 titles, only 9 were cartridge exclusive titles, the remainder being ports of older cassette-based games.

While most of the titles that Ocean announced did appear for the GS (with the notable exception of *Operation Thunderbolt*), a number of promises from other publishers failed to materialise. Although Thalamus, The Sales Curve, Mirrorsoft and Hewson had expressed an interest, nothing ever materialised from these firms. Similar problems plagued rival company Amstrad when they released their GX4000 console the same year.

There were other reasons attributed to the failure of the C64GS, the major ones being the following:

- *Poor software support:* Most existing software on cartridge did not function well with the C64GS, and enthusiasm from publishers was low. Ocean Software, Codemasters, System 3, Microprose and Domark developed titles for the system, but probably only because the games were compatible with the original C64, providing the titles with a commercial safety net in case the C64GS failed. And failure to reprogram the games for use with the cut-back system was another blame for the fault.
- *The C64 computer:* The C64GS was essentially a cut-back version of the original Commodore 64, and the games developed for it could also be run on the original computer. The C64 was already at an affordable price, and the C64GS was sold for the same. People preferred to keep with the original C64, particularly since the cassette

versions of games could often be picked up for a fraction of the cost of the cartridge versions, and did not seem to mind the much longer loading times as much as Commodore had perhaps banked on.
- *Obsolete technology:* The C64 was introduced in 1982; by 1990 the technology was way past its prime.
- *An already saturated console market:* The 8-bit C64GS entered the market in 1990 parallel to newer 16-bit consoles such as the Mega Drive and the Super Nintendo. The Nintendo Entertainment System and Sega Master System were already dominating the market and did so until around 1992.
- *TV hookup*, joystick support and cartridge slots were already found on regular C64 machines. Hence normal C64s were already recognized as "game consoles" despite looking more like a home computer with an integrated keyboard.

Several years later Commodore's next attempt at a games console, the Amiga CD32, encountered many of the same problems although overall it was a lot more successful than the C64GS.

Technical specifications

The specifications of the C64GS is a subset of those of the C64, the main differences being the leaving out of the unnecessary user port, serial bus port, and tape drive port. These ports are in fact present, the system board being the C64C's board, but simply not exposed at the rear.

Internal hardware

- Microprocessor CPU:
  - MOS Technology 8500 (the 6510/8500 being a modified 6502 with an integrated 8-bit I/O port)
  - Clock speed: 0.985 MHz (PAL)
- RAM:
  - 64 KB (65,535 bytes).
  - 0.5 KB Color RAM
- ROM:
  - 20 KB (7 KB KERNAL, 4 KB character generator providing two 2 KB character sets)

The ROM contains two important differences to a standard C64 ROM. The first is that switching on the machine without a cartridge present results in a character-based animation asking the user to insert a cartridge. The second is an additional set of windowing commands, designed to compensate for the lack of a keyboard. However, there is no known software that uses it.

- Video hardware: MOS Technology VIC-II MOS 8569 (PAL)
  - 16 colors
  - Text mode: 40×25; user-defined characters; smooth scrolling
  - Bitmap modes: 320×200, 160×200 (multicolor)
  - 8 hardware sprites, 24×21 pixels
- Sound hardware: MOS Technology 8580 "SID"
  - 3 voices, ADSR programmable.
  - 4 Waveforms: Triangle, Sawtooth, Variable Pulse, Noise
  - Oscillator Synchronization, Ring modulation
  - Programmable Filter: High Pass, Low Pass, Band Pass, Notch Filter

I/O and power supply

- I/O ports:
  - High-quality Y/C (S-Video) (8-pin DIN plug) with chroma/luma out and sound in + out, used with some Commodore video monitors (DIN-to-phono plug converter delivered with monitor).
  - Composite video (one-signal video output to monitor included in afore mentioned 8-pin DIN plug, and separate integrated RF modulator antenna output, which also carries sound, to TV on an RCA socket)
  - 2 × screwless DE9M game controller ports (Atari 2600 de facto standard, supporting one digital joystick each
  - Cartridge slot (slot for edge connector with 6510 CPU address/data bus lines and control signals, as well as GND and voltage pins; used for program modules)
- Power supply: 5V DC and 9V AC from external "monolithic power brick", attached to computer's 7-pin female DIN-connector

See also

- Commodore 64
- Commodore MAX Machine

External links

- "The C64 Console!" / "Inside the future: The C64GS" [1] – By Ed Stu, *Zzap 64* magazine, issue 66, October 1990
- The Commodore C64 Games System [2] – Photos and information from Bo Zimmermann's collection

The Fourth Generation

History of video game consoles (fourth generation)

In the history of computer and video games, the **fourth generation** (more commonly referred to as the **16 bit era**) began on October 30, 1987 with the Japanese release of Nippon Electric Company's (NEC) PC Engine (known as the TurboGrafx-16 in North America). Although NEC released the first fourth generation console, this era was dominated by the rivalry between Nintendo and Sega's consoles; the Super Nintendo Entertainment System (the Super Famicom in Japan) and the Mega Drive (named the Sega Genesis in North America due to trademark issues). Nintendo was able to capitalize on its previous success in the third generation and won a dominant market share in the fourth generation as well. Sega was also successful in this generation and began a new franchise, Sonic the Hedgehog, to compete with Nintendo's Mario series of games. Several other companies released consoles in this generation, but, with the exception of the Neo Geo from SNK, none of them were widely successful. Nevertheless, several other companies started to take notice of the maturing video game industry and began making plans to release consoles of their own in the future.

Home consoles

TurboGrafx-16

The PC Engine was the result of a collaboration between Hudson Soft and NEC and launched in Japan on October 30, 1987. It launched in North America during August 1989, under the name TurboGrafx-16.

Initially, the PC Engine was quite successful in Japan, partly due to titles available on the then-new CD-ROM format. NEC released a CD add-on in 1990 and by 1992 had released a combination TurboGrafx and CD-ROM system known as the Turbo Duo.

In the USA, NEC used Bonk, a head-banging caveman, as their mascot and featured him in most of the TurboGrafx advertising from 1990 to 1994. The platform was well received initially, especially in larger markets, but failed to make inroads into the smaller metropolitan areas where NEC did not have as many store representatives or as focused in-store promotion.

The PC Engine failed to maintain its sales momentum or to make a strong impact in North America. The TurboGrafx-16 and its CD combination system, the Turbo Duo, ceased manufacturing in North America by 1994, though a small amount of software continued to trickle out for the platform. NEC released the 32-bit PC-FX console the same year in Japan. Plans were underway for a North American release of the PC-FX, but an already flooded market of platforms, including the more powerful 3DO and Atari Jaguar systems, caused TTI, who by then had the US rights to the TurboGrafx platform, to halt its North American release plans.

In Japan, a number of more adult titles were also available for the PC-Engine, such as a variety of strip mahjong games (such as the Super Real Mahjong series), which set it apart from its competitors.

Sega Mega Drive/Genesis

The Sega Mega Drive was released in Japan on October 29, 1988.[1] The console was released in New York City and Los Angeles on August 14, 1989 under the name Sega Genesis, and in the rest of North America later that year.[2] The Mega Drive was launched in Europe and Australia on November 30, 1990.

Sega initially had a hard time overcoming Nintendo's ubiquitous presence in the American consumer's home. That changed in late 1990, as Sega built their marketing campaign around their new mascot Sonic the Hedgehog,[3] pushing the Genesis as the "cooler" alternative to Nintendo's console[4] and inventing the term "Blast Processing" to suggest that the Genesis was capable of handling games with faster motion than the SNES.[5] Their advertising was often directly adversarial, leading to commercials such as "Genesis does what Nintendon't" and the "'SEGA!' scream".[6]

When the arcade game *Mortal Kombat* was ported for home release on the Genesis and Super Nintendo Entertainment System, Nintendo decided to censor the game's gore, but Sega kept the content in the game, via a code entered at the start screen (A,B,A,C,A,B,B). Sega's gamble paid off, as its version of *Mortal Kombat* received generally higher and more favorable reviews in the gaming press and outsold the SNES version three to one. This violence also led to Congressional hearings to investigate the marketing of violent video games to children, and to the creation of the Interactive Digital Software Association and the Entertainment Software Rating Board. With the new ESRB rating system in place, Nintendo reconsidered its position for the release of *Mortal Kombat II*, and this time outsold Sega's version.[7] [8] Sega, however, ran into a minor roadblock with the popularity of fighting games with advanced controls, because its controller only featured three action buttons. In response, Sega introduced a 6-button controller. Most new games could still be played with the original 3-button controller, however, but the company suggested its gamers buy and adopt the new 6-button model.

Despite the Genesis's success in North America, the Mega Drive was never popular in Japan. By late 1995, Sega was supporting five different consoles and two add-ons, and Sega of Japan chose to discontinue the Mega Drive to concentrate on the new Sega Saturn. While this made perfect sense for the Japanese market, it was disastrous in North America: the market for Genesis games was much larger than for the Saturn, but Sega was left without the inventory or software to meet demand.[9]

Super Nintendo Entertainment System

Nintendo executives were initially reluctant to design a new system, but as the market transitioned to the newer hardware, Nintendo saw the erosion of the commanding market share it had built up with the Famicom (called Nintendo Entertainment System outside Japan).[10] Nintendo's fourth-generation console, the Super Famicom, was released in Japan on November 21, 1990; Nintendo's initial shipment of 300,000 units sold out within hours.[11] The machine reached North America on August 23, 1991,[12] and Europe and Australia in April 1992.

Despite stiff competition from Sega's Mega Drive console, the Super NES eventually dominated the 16-bit console market worldwide,[13] and would even remain popular well into the 32-bit generation.[14] Nintendo's market position was defined by their machine's increased video and sound capabilities.[15]

Neo Geo

Released by SNK in 1990, the Neo Geo was a home console version of the major arcade platform. Compared to its console competition, the Neo Geo had much better graphics and sound, but the prohibitively expensive launch price of $649.99 USD made the console only accessible to a niche market. A less expensive version, retailing for $399.99, did not include a memory card, pack-in game or extra joystick.

Add-ons

Nintendo, NEC and Sega also competed with hardware peripherals for their consoles in this generation. NEC was the first with the release of the TurboGrafx CD system in 1990. Retailing for $499.99 at release, the CD add-on was not a popular purchase, but was largely responsible for the platform's success in Japan. Sega made two attempts: the Sega Mega-CD (renamed Sega-CD in North America) and the Sega 32X, neither of which were very successful. The Mega CD was plagued by a high price tag ($300 at its release) and a limited library of games. The 32X faced a number of problems, primarily technical and commercial: the peripheral would occasionally not work with some consoles, and some retailers were not able to meet the initial demand for the add-on, leading to shortages. A unique add-on for the Sega console was Sega Channel. Sega Channel was a subscription based service hosted by local television providers. It required hardware that plugged into a cable line and the Sega.

Nintendo made an attempt with their successful Satellaview and Super Game Boy. The former was a satellite service released only on the Japanese market and the latter an adapter for the Super Nintendo that allowed Game Boy games to be displayed on a TV in color. Interestingly, Nintendo, working along with Sony, also had plans to create a CD-ROM drive for the Super NES, similar to the Sega CD, but eventually decided not to go through with that project, opting to team up with Philips in the development of the add-on instead. Sony decided to go ahead with the CD-ROM development and used the name "PlayStation" for their own stand-alone CD-based console, overseen by former SNES sound-chip engineer, Ken Kutaragi. The PlayStation went on to badly hurt CD-i sales, and Philips dropped the product line in 1998.

PC Engine CD-ROM²

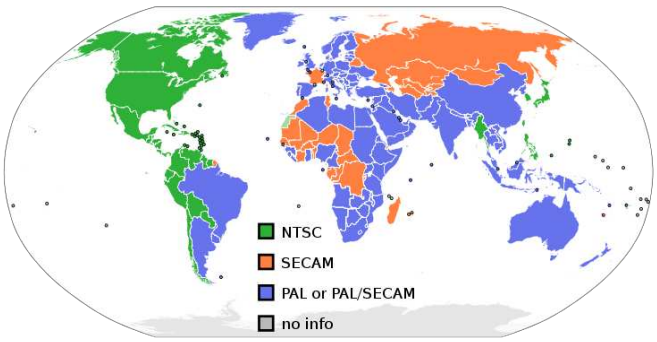
Sega Mega CD

Sega 32X

Satellaview

Super Game Boy

European and Australian importing



green - NTSC, blue - PAL, or switching to PAL, orange - SECAM, olive - no information

The fourth generation was also the era when the act of buying imported US games became more established in Europe, and regular stores began to carry them. This was perhaps because the PAL region has a refresh rate of 50Hz (compared with 60 Hz for NTSC) and a vertical resolution of 625 interlaced lines (576 effective), compared with 525/480 for NTSC. This means that a game designed for the NTSC standard without any modification would run 17% slower and have black bars at the top and bottom when played on a PAL television. Developers often had a hard time converting games designed for the American and Japanese NTSC standard to the European and Australian PAL standard. Companies such as Konami, with large budgets and a healthy following in Europe and Australia, readily optimized several games (such as the *International Superstar Soccer* series) for this audience, while most smaller developers did not.

Also, few RPGs were released in Europe because they would have needed to be translated into many different languages. RPGs tend to contain much more text than other genres, so one of the biggest problems was simply fitting all of the full translations into one cartridge. The cost of creating multiple full translations was also prohibitive. Only the UK and Australia saw any number of RPG releases, and even then the number was a fraction of what was being released in Japan. For the Mega Drive, there were numerous PAL releases of RPGs. Examples include *Phantasy Star II*, *III* and *IV*, *Shining in the Darkness* and its sequels *Shining Force I* and *II*, *Sword of Vermilion*, *Super Hydlide*, *Landstalker*, *Story of Thor*, *Soleil* and *Light Crusader*. A few of them received French and German translations [16] .

Popular US games imported at this time included *Final Fantasy IV* (known in the USA as *Final Fantasy II*), *Final Fantasy VI* (known in the USA as *Final Fantasy III*), *Secret of Mana*, *Street Fighter II*, *Chrono Trigger*, and *Super Mario RPG*. *Secret of Mana* and *Street Fighter II* would eventually receive official release in Europe.

Comparison

Name	TurboGrafx-16/PC-Engine	Sega Mega Drive/Genesis	Neo Geo	Super Nintendo Entertainment System/Super Famicom
Console				
Launch prices (USD)	US$249.99	US$190.00	US$649.99 (Gold version) US$399.99 (Silver version)	US$199.99
Release date	• JP October 30, 1987 • NA September 1, 1989 • EU 1990	• JP October 29, 1988 • NA September 15, 1989 • EU November 30, 1990	• JP 1990 • NA 1991	• JP November 21, 1990 • NA August 23, 1991[12] • EU April 11, 1992

Media	HuCard CD-ROM (add-on)	Cartridge CD-ROM (Sega CD add-on) Data card (Power Base Converter add-on)	Cartridge CD-Rom (Neo Geo CD - was released as a separate system) [17] Data card (Europe/Japan)[17]	Cartridge Magnetic disc (Japan only) CD-ROM (Aborted add-on) Floptical (Japan only)[17]
Best-selling games	Bonk's Adventure[18]	*Sonic the Hedgehog 2*, 6 million (as of June 2006)[19]	Samurai Shodown	*Super Mario World*, 20 million (as of June 25, 2007)[20]
Backward compatibility	None	Sega Master System (using Power Base Converter)	None	Game Boy (using Super Game Boy)
Accessories (retail)	• TurboGrafx-CD • TurboTap • TurboStick • Super System Card • TurboBooster • TurboBooster Plus	• Mega CD/Sega CD • Sega 32X • Mouse • Menacer • Power Base Converter • Sega Activator • Multitap	• Neo Geo Controller Pro • Neo Geo Memory Card • Neo Geo CD	• Super Scope • Multitap • Super Game Boy • SNES Mouse • Super Advantage
CPU	HuC6280A (modified 65SC02) 1.79 or 7.16 MHz	Motorola 68000 7.67 MHz (7.61 MHz PAL) Zilog Z80 3.58 MHz	Motorola 68000 12 MHz Zilog Z80 4 MHz	Nintendo-custom 5A22 (based on 65C816) 3.58 MHz (3.55 MHz PAL)
Memory	8 KiB work RAM 64 KiB video RAM	64 KiB main RAM 64 KiB video RAM 8 KiB audio RAM	64 KiB main RAM 74 KiB video RAM 2 KiB audio RAM	128 KiB main RAM 64 KiB video RAM 64 KiB audio RAM

Other

Amiga CDTV
Released in 1991

CD-i
1991-1998[21]

Worldwide sales standings

Console	Units sold
Super Nintendo Entertainment System/Super Famicom	49.10 million[22]
Sega Mega Drive/Genesis	[23]
TurboGrafx-16/PC Engine	10 million[24]
Mega-CD (Mega Drive/Genesis add-on)	6 million[24]
Sega 32X (Mega Drive/Genesis add-on)	665,000 (as of 1994)[25]
CD-i	570,000[21]

Handheld systems

The first handheld game console released in the fourth generation was the Game Boy, on April 21, 1989. It went on to dominate handheld sales by an extremely large margin. Despite featuring a monochrome screen, when its closest competitor, the Atari Lynx, included color graphics, a backlight, and networking capabilities,[26] its comparatively short battery life and high price proved to be the Lynx's undoing.[27] Two major franchises made their debut on the Game Boy; *Tetris*; the Game Boy's killer application, and Pokémon. The third major handheld of the fourth generation was the Sega Game Gear. It featured graphics capabilities comparable to the Master System, but it also inherited the same shortcomings as the Lynx. While it did not sell as few units as the Lynx, its bulky design and low battery life caused it to be pushed to the sidelines.[28]

Other handheld consoles released during the fourth generation included the TurboExpress, a handheld version of the TurboGrafx-16 released by NEC in 1990, and the Game Boy Pocket, an improved model of the Game Boy released about two years before the debut of the Game Boy Color. While the TurboExpress was another early pioneer of color handheld gaming technology and had the added benefit of using the same game cartridges or 'HuCards' as the TurboGrafx16, it had even lower battery life than the Lynx and Game Gear; about three hours on six AA batteries; and numerous hardware problems, selling only 1.5 million units by 2007.[29]

Comparison

Console	Game Boy	Atari Lynx	Sega Game Gear	TurboExpress
Image				
Launch price	¥12,500[30] US$89.95[31]	US$189.99	¥14,500 US$149.99 AUD $155	US$299.99[32]
Release date	April 21, 1989 August, 1989 1990	September 1989 1990	October 6, 1990 1991 1992	November 16, 1990 1991
Units sold	118.69 million (as of December 31, 2009),[33] including Game Boy Color units[34]	less than 500,000 (as of July 30, 2007)[35]	11 million (as of July 30, 2007)[36]	1.5 million[36]
Media	Cartridge	Cartridge	Cartridge	Datacard

Best-selling games	*Tetris*, 35 million (pack-in / separately).[37] *Pokémon Red*, *Blue*, and *Green*, approximately 20.08 million combined (in Japan and the US) (details).[38] [39]	Unknown	Sonic the Hedgehog 2	Bonk's Adventure
Backward compatibility	Original Cartriges compatible with later models	None	Sega Master System (using Cartrige Adapter)	None

Other

Gamate
Released in 1991[40]

Watara Supervision
Released in 1992

Mega Duck/Cougar Boy
Released in 1993

Software

While many of them originated in the 8-bit era, many of the major franchise titles came of age and solidified their grip on the market in the 16-bit era. *Metroid*, *Zelda*, *Star Fox*, *Kirby*, *Dragon Quest*, *Final Fantasy*, *Seiken Densetsu* (*Secret of Mana*), *Sonic the Hedgehog*, *Donkey Kong*, *Street Fighter*, *Mortal Kombat*, *Mega Man X*, and many others had either their first releases or some of their most popular titles during the 16-bit era.

Sonic the Hedgehog was Sega's bid to compete head-to head with Nintendo's Mario franchise. Debuting in 1991, Sega's marketing of the Sonic franchise was key to Sega's success in the video game market during the early years of this generation. Though a critical and commercial success, *Sonic the Hedgehog* and its sequels were never able to surpass Mario in popularity.

Metroid II was released for the Game Boy and *Super Metroid* was released in 1994 on a comparatively large 24 megabit cartridge for the SNES. Super Metroid still is regarded by many gaming organizations as one of the "best games of all time."[41]

The Legend of Zelda: A Link to the Past, courted popularity that was larger than that of its predecessors on the NES. It was one of the few action-adventures to be released early in the SNES's lifecycle. *Zelda II* on the NES had been mostly action-based and was side-scrolling, while *A Link to the Past* drew more inspiration from the original *Zelda* game with its top-down adventure format.

Dragon Quest V and *VI* were released on the Japanese Super Famicom, as well as remakes of the first three games originally released for the NES and a dungeon crawler spin-off: *Torneko's Great Adventure*, which started Chun Soft's popular *Fushigi no Dungeon* series.

Star Fox was the first SNES game to feature the Super FX chip.

Final Fantasy V was released only in Japan, while *Final Fantasy IV* and *Final Fantasy VI* were released in North America with their original numeration shifted. While the series was very successful in Japan early on, it was not

until the release of *Final Fantasy VII* on the PlayStation that it reached blockbuster status outside Japan.

Secret of Mana reintroduced the *Seiken Densetsu* series, originally conceived as a *Final Fantasy* spin-off, to Europe and North America.

Street Fighter II, a port of the arcade original to the SNES, was the second game in the series to produce a lasting fanbase and set many of the trends seen in fighting games today, most notably its colorful selection of playable fighters from different countries across the globe. As of 2008, it is Capcom's best-selling consumer game of all time.[42]

Phantasy Star is Sega's RPG franchise that was established 1987 on the Sega Master System. It was the first console RPG game to reach Europe; almost a decade before *Final Fantasy VII*. Three sequels were released to the Mega Drive. With its sci-fi theme, the franchise was different from the fantasy-themed *Dragon Quest*.

Thunder Force II, *III* and *IV* were all released for the Mega Drive, but the third never reached Europe and the fourth was called *Lightening Force: Quest for the Darkstar* (sic) in the US.

Seeking to follow the example of the above titles, several more franchises were born during this era. While game sequels were far from uncommon during the 8-bit era and even before, it was at this time that the potential for continuing series games was realized.

Notes

[1] Console Database Staff. "Sega Mega Drive/Genesis Console Information" (http://www.consoledatabase.com/consoleinfo/segamegadrive/index.html). http://www.consoledatabase.com. Console Database/Dale Hansen. . Retrieved 2007-10-18.

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References

TurboGrafx-16

From Top to Bottom, The North American/UK design and the Japanese Design.

Manufacturer	NEC Corporation
Type	Video game console
Generation	Fourth generation
Retail availability	● October 30, 1987 August 29, 1989 November 22,1989 1990 (Import, No full PAL release)
Discontinued	Spring 1993 ● December 16, 1994 1995
Units sold	Worldwide: 10 million[1] United States: 2.5 million[1]
Media	HuCard, CD-ROM(only with the CD-ROM² add-on)
CPU	Hudson Soft HuC6280
Successor	PC-FX

TurboGrafx-16, fully titled as ***TurboGrafx-16 Entertainment SuperSystem*** and known in Japan as the ***PC Engine*** (ＰＣエンジン"), is a video game console developed by Hudson Soft and NEC, released in Japan on October 30, 1987, and in North America on August 29, 1989.

The TurboGrafx-16 has an 8-bit CPU and a dual 16-bit GPU; furthermore, it is capable of displaying 482 colors at once out of 512.

Although there was no full-scale PAL release of the system, imported PC Engine consoles were largely available in France and Benelux through major retailers thanks to the unlicensed importer Sodipeng (*Société de Distribution de la PC Engine*, a subsidiary of Guillemot Corporation).[2]

In the United Kingdom, Telegames released a slightly altered version of the US model simply as the **TurboGrafx** around 1990 in extremely limited quantities.[3]

With dimensions of 14 cm x 14 cm x 3.8 cm (5.5in x 5.5in x 1.5in), the NEC PC Engine holds the record for the world's smallest game console ever made. (*Guinness World Records Gamer's Edition* (2008))

In 2009, the TurboGrafx-16 was ranked as the 13th greatest video game console of all time by IGN.[4]

PC Engine

The PC Engine gamepad.

The PC Engine was a collaborative effort between the relatively young Hudson Soft (founded in 1973) and NEC. NEC's interest in entering the lucrative video game market coincided with Hudson's failed attempt to sell designs for then-advanced graphics chips to Nintendo[5] in an earlier, lower-profile scenario similar to Nintendo's rejection of Sony's designs for a Super Famicom CD attachment which evolved into the PlayStation.

The PC Engine is a very small video game console, due primarily to a very efficient three-chip architecture and its use of "HuCards" (*Hu*dson *Card*; also referred to as "TurboChip" in North America and based on the BeeCard technology Hudson piloted on the MSX). The cards were about the size of a credit card (though slightly thicker), similar to the card format used by the Sega Master System for budget games. However, unlike the Sega Master System (which also supported cartridges), the TurboGrafx-16 used HuCards exclusively. TG-16 featured an enhanced MOS Technology 65SC02 processor (dubbed the HuC6280 by Hudson) and a custom 16-bit graphics processor, as well as a custom video color encoder chip, all designed by Hudson. The 'HE System' logo found on the manual of every Japanese game stood for "Hudson Entertainment System".

The TurboGrafx-16 was the first console to have an optional CD module, allowing the standard benefits of the CD medium such as more storage, cheaper media costs, and redbook audio. The efficient design, backing of many of Japan's major software producers, and the additional CD ROM capabilities gave the PC Engine a very wide variety of software, with several hundred games for both the HuCard and CD formats.

The PC Engine was extremely popular in Japan, beating Nintendo's Famicom in sales soon after its release, with no fewer than twelve console models released from 1987 to 1993.

Despite the system's success, it started to lose ground to the Super Famicom. NEC made one final effort to resuscitate the system with the release of the Arcade Card expansion, bringing the total amount of RAM up to a then-massive 2048K; a few Arcade Card games were conversions of popular Neo Geo titles. The expansion was never released in North America.

New games were released for the PC Engine up until 1999.[6]

TurboGrafx-CD

The TurboGrafx-16 was the first video game console to have a CD-ROM peripheral [7] (following the PC-Engine Super CD-ROM² add-on in Japan, although the FM Towns Marty was the first Japanese console to have a built-in CD-ROM). The TurboGrafx-CD debuted at a prohibitive $399.99 (and did *not* include a pack-in game). *Monster Lair* (*Wonder Boy III: Monster Lair*) and *Fighting Street* (*Street Fighter*) were the initial TurboGrafx-CD titles. *Ys Book I & II* soon followed. However, the TurboGrafx-CD catalog grew at a very slow rate compared to the library of TurboChip (HuCard) titles.

The TurboGrafx-CD came packaged in a very large box, 85% of which was filled with protective styrofoam inserts. By some accounts, no other video game console (or peripheral) has been packaged in such an overkill manner. The TurboGrafx-CD did however come with a large plastic "carrying case" that could comfortably hold the TurboGrafx-16 base system, TurboGrafx-CD, all AC adapters, 2 – 3 controllers, and a few games.

Although the TurboGrafx-CD library was relatively small, American gamers could draw from a wide range of Japanese software since there was no region protection on TG-CD / PC Engine CD-ROM software. Many mail order

(and some brick-and-mortar) import stores advertised Japanese PCE CD and HuCard titles in the video game publications of the era.

Rivalry with Nintendo and Sega

In North America, the TurboGrafx-16 was first released in late August 1989, in New York and Los Angeles. Initially, the TurboGrafx-16 was marketed as a direct competitor to the NES (Nintendo Entertainment System) and early television ads touted the TG-16's superior graphics and sound. These early television ads featured a brief montage of the TG-16's launch titles: *Blazing Lazers*, *China Warrior*, *Vigilante*, *Alien Crush*, etc. The TG-16 was also in direct competition with the Sega Genesis, which had had its own New York/Los Angeles test-market launch two weeks prior, on August 14.[8] The Genesis launch was accompanied by an ad campaign mocking NEC's claim that the TurboGrafx-16 was the first 16-bit console.

Another problem for the TG-16 was its relatively limited hardware. The Genesis came with only one controller, but it provided a port for a second; the TG-16 only had one controller port. Players who wanted to take advantage of the simultaneous multiplayer modes in their games were required to buy the Turbo Tap (a multitap accessory which permitted five controllers to be plugged into the system), in addition to the necessary extra controllers. The Genesis also benefited from a pack-in game bundle that included an impressive translation of the arcade game *Altered Beast* (1989), which included big, bold sprites and colors as well as digital sound effects. In contrast, the TG-16's initial pack-in game was *Keith Courage in Alpha Zones* (1989), a modest action platform game that did not show off the capabilities of the TG-16 in nearly the same way *Altered Beast* did for the Genesis (or *Super Mario World* for the later SNES).[9]

In Japan the PC Engine outsold Sega's console. In North America and Europe the situation was reversed, with both Sega and Nintendo dominating the console market at the expense of NEC.

Both Sega and NEC released CD peripherals (Sega CD versus Turbo CD), color handhelds (Sega Game Gear versus TurboExpress), and even "TV tuners" for their respective handheld systems.

In 1992, comic book-like ads featuring Johnny Turbo were published by TTi. The ads mocked Sega, in particular the Sega CD. However, by this point the TG-16 had been defeated by the Genesis in the marketplace, which was by then dominated by the battle between the Genesis and the Super Nintendo.

Despite this former rivalry, many TurboGrafx-16 games are currently available via Nintendo's Virtual Console service.

Limitations in the 16-bit era

Although touted and marketed at the time as a next generation "16-bit" console, the TurboGrafx-16 was, in fact, built around an 8-bit microprocessor as its CPU. While its CPU was of the previous 8-bit generation, the overall speed of the hardware was somewhat comparable to contemporary 16-bit machines. Sometimes criticized as an inaccurate gauge of overall speed, NEC touted the TurboGrafx-16 as having a higher MIPS rating than both the Genesis and Super NES. While true, drawing direct comparisons between the TurboGrafx-16, Genesis, and Super NES CPUs is difficult due to differences in architecture, bit bandwidth, speed measurements in MHz/MIPS, and the way those measurements are related to overall speed due to said architectural differences. Any attempt to make direct comparisons should generally be considered highly dubious. The reality was that there were many things the Genesis and Super NES CPUs did better from a programming standpoint than the TurboGrafx-16 CPU and vice versa. NEC's marketing department played on the fact that the TurboGrafx-16 was designed with a dual 16-bit graphics chipset, and chose to view it as a hybrid system. This proved to be a bit of a marketing gaffe, and backfired on NEC in the North American market somewhat as more and more people learned the TurboGrafx-16 was, in reality, an 8-bit system.

The TurboGrafx-16 featured a 16-bit custom video color encoder chip, 16-bit video display controller, and an 8-bit CPU with an integrated custom programmable sound generator. This three chip architecture allowed for larger and more numerous sprites, an expanded color palette, more onscreen colors, and improved sound capabilities compared to other systems available in the 8-bit console market when it launched. In many ways this made it comparable to other systems in the 16-bit market. Yet still, it was hindered in that it lacked the ability to draw more than a single layer of background scrolling, whereas its 16-bit competition at the time heavily featured multiple plane parallax scrolling. NEC attempted to remedy this problem in the SuperGrafx by including an additional video display controller that allowed it to not only draw multiple plane backgrounds, but multiple sprite planes as well. Another area the TurboGrafx-16 had a notable disadvantage was in the amount of work RAM the system had. While the Genesis and Super NES featured 64KB and 128KB of work RAM respectively, the TurboGrafx-16 had only 8KB available for HuCard games. This meant that there was less RAM available for temporary storage of variables and decompressed graphic data. As a result, self modifying code and/or code featuring storage of a numerous amount of variables was largely ruled out, and almost all decompression of graphic data needed to be done in real time, rather than stored in RAM. The SuperGrafx was given additional work RAM for a total of 32KB. TurboGrafx CD-ROM games used the greatly expanded RAM capacity that was inherent to the hardware, and largely avoided most problems with RAM limitations.

In order to reach a low price point in the market, the original TurboGrafx-16 and PC-Engine systems only supported RF modulation for (monaural) audio/video and required an optional expansion add-on for anything more (the competition by comparison had built-in support for stereo audio, with composite video as well as s-video and RGB output). Later models of the TurboGrafx-16 did eventually provide built-in support for better audio/video capabilities without additional hardware. Another limitation was the single controller port that required the purchase of a multi-player expansion adapter for an additional player (once added however, it did add the unusual capability at that time for up to five independent controllers).

Struggles in North America

Initially, the TurboGrafx-16 sold well in North America, but it generally suffered from a lack of support from third-party software developers and publishers. One reason for this was that many larger software companies such as Konami supported the PC Engine in Japan, but also produced games for Nintendo. Nintendo at the time had engaged in anti-competitive practices that were later ruled illegal, such as enforcing exclusive contracts and punishing developers who developed for more than one system with "chip shortages" around the holiday seasons. As a result of this practice, many developers were compelled to pick the immensely popular NES over the upstart NEC console, resulting in a catch-22 for the TurboGrafx-16: most developers would only consider taking a risk on the TG-16 if it became more popular, and yet it could not accomplish this because only a handful of North American publishers would support it. As a result, most of the games published for the TG-16 were produced by NEC and Hudson Soft.

Another reason for the TG-16's lack of success in North America was the system's marketing. NEC of Japan's marketing campaign for the PC Engine was mainly targeted to the largest metropolitan areas in the country. This proved to be quite successful there, but when the same kind of marketing was used in the much larger North American market, it resulted in a lack of public awareness outside of the big cities. The TG-16 ended up being far more competitive and popular in certain local markets such as New York, Chicago, and Los Angeles, while in smaller and more spread-out areas, it failed miserably.

The TurboGrafx-16 was originally marketed in North America by NEC Home Electronics based in Wood Dale, Illinois, a suburb of Chicago. As the system's popularity fell, the platform was handed over to a new company called Turbo Technologies Incorporated (TTI), based in Los Angeles, California. This company was composed mainly of former NEC Home Electronics and Hudson Soft employees, and it essentially took over all marketing and first-party software development for the struggling system.

By 1991, the Sega Genesis had clearly surpassed the TurboGrafx-16, putting NEC's console in a distant fourth place in the video game market (Nintendo held the #2 and #3 places with the brand new SNES and the aging but still potent NES respectively). NEC, who was relatively new to the market, had an increasingly difficult time convincing consumers who already owned a Sega or Nintendo system to give the TG-16 a try. This may have been in part to the somewhat fractured brand identity of the various systems: in a mascot-heavy era of gaming, the TurboGrafx-16 was represented by Bonk, while the TurboDuo carried on its box a graphic of Air Zonk. Meanwhile, advertising comic books were inserted into copies of various gaming magazines, featuring characters such as the alter-ego of game developer Jonathan C. Brandstetter: Johnny Turbo.

Compounding the problem was that the vast majority of the titles that made the system so successful in Japan were produced for the CD-ROM add-on. In the American market, this add-on was difficult to find outside of large cities, and it was widely considered to be overpriced (debuting at nearly $400). TTI tried to address this issue by releasing a combination system called the TurboDuo, as well as dropping the price of the CD add-on to around $150. Unfortunately, at $300, the cost of the TurboDuo was still too high for most American consumers, even when NEC took the bold step of including seven pack-in titles and a coupon book with the system. Despite all these efforts, the company failed to attract much of a mainstream audience.

Many of the CD games for the Turbo platform were innovative and well-received, but the cost of the add-on system was a strong deterrent to buyers, especially when the competition sold for considerably less. Some of the most popular Japanese releases, such as *Castlevania: Rondo of Blood*, *Ys IV: The Dawn of Ys*, *Tengai Makyo II: Manjimaru* and *Snatcher*, never made it to North American shelves (though the PC Engine version of *Snatcher* was converted over to the Sega CD in North America, Europe & Australia, but never was released in Japan).

Gameplay screenshot of *Castlevania: Rondo of Blood*

In the handheld market, the TurboExpress further suffered from short battery life, a hefty price tag, and a large number of units that were missing pixels in their displays (due mainly to the fact that TFT LCD manufacturing technology was still in its infancy at the time).

Magazine Publications: PC Engine FAN, TurboPlay, and others

The longest running NEC publication was sold in Japan under the name *PC-Engine Fan Magazine* and exclusively dedicated to NEC systems, beating out rival mags Gekkan PC Engine (Shogakukan) and Marukatsu PC Engine (Kadokawa Shoten) to the market by a month in late 1988. Published by Tokuma Shoten, the mag started out as a separate department of Family Computer Magazine, Tokuma's flagship console publication; the "FAN" name was also used by sister titles MSX FAN and Mega Drive FAN.

While it occasionally featured extra pull-out material, its chief recognition among U.S. fans is the *Hyper Catalog* that was released in 1993; it featured an index of all of the Japanese published titles to date. The PC Engine Fan magazine also ran occasional specials, such as selling a second pressing of Magical Chase via mail-order after the original publisher went bankrupt almost immediately after releasing the shooter classic.

Larry Flynt Publications published 14 bi-monthly issues of *TurboPlay Magazine* (June/July 1990 – August/September 1992) dedicated to covering TG-16 and TG-CD hardware and software. It was a spin-off publication of *Video Games & Computer Entertainment* (*VG&CE*), a popular multi-platform gaming magazine of the late 1980s / early 1990s. Every issue of TurboPlay was 32 pages in length and a yearly subscription cost $9.95. An advertisement for TurboPlay was included with every TG-16 console.

Sendai published four quarterly issues of *TURBOFORCE* magazine (September 1992 – Spring 1993). TTi had editorial control over *TURBOFORCE* and used it to promote the launch of the new TurboDuo console. Unlike *TurboPlay* and *DuoWorld*, *TURBOFORCE* was devoid of critical game reviews.

L.F.P. published three bi-monthly issues of *DUOWORLD* magazine (July/August 1993 – November/December 1993) before it was canceled. *DuoWorld* was very similar in format to *TurboPlay*, but with a focus on the newly released TurboDuo console (i.e. *TurboMail* and *TurboNews* became *DuoMail* and *DuoNews*, respectively).

NEC also published a handful of newsletters (*TurboEdge*) and sent them to customers that sent in their TG-16 warranty cards or subscribed to *TurboPlay*. These newsletters were black and white, mostly text, and four to eight pages in length.[10]

TG-16 on TV

During TG-16's 1989 launch, short TV ads appeared across North America. This advertising campaign would expand and become more extensive in 1990, with NEC promoting *Bonk* as the next big thing in video games.

In addition to the advertising in 1990, TG-16, TG-CD, and TurboExpress were briefly covered on PBS' *Computer Chronicles* (two episodes, including "Battle of the Consoles"). Later, when the TurboDuo was launched, it was featured in an episode on "CD-ROM and multimedia software".

Also, Video Power, a video game show (live action gameshow with The Power Team cartoon) syndicated throughout the USA in the early 1990s, featured footage from video games at the end of many episodes. *Blazing Lazers*, *Legendary Axe* (and perhaps other titles) made it into two episodes. *Video Power* rarely featured TG-16 games (focusing on NES and Genesis, instead). In addition, the Nickelodeon game show Nick Arcade featured several TG-16 games in the Video Challenge portion of the show.

Legacy

Today, the TurboGrafx-16 is mainly known for its much-vaunted shoot 'em ups and the Ys & Bonk games. After the system died, NEC decided to concentrate on the Japanese market, where it has had much more success.

In 1994, NEC released a new console, the Japan-only PC-FX, a 32-bit system with a tower-like design; it enjoyed a small but steady stream of games until 1998, when NEC finally abandoned the video games industry. NEC would then partner with former rival Sega, providing a version of its PowerVR 2 Chipset for the Dreamcast.

There is a niche collector's market for TurboGrafx games and Japanese imports, mainly centered around the system's many arcade ports of shooters. Spurring this interest is the fact that Turbo ports from the arcade tended to be closer to the original than Sega Genesis, Super NES, or NES versions, in terms of graphics and sound. Hudson Soft also released some shooters which were exclusive to the Turbo, such as *Super Air Zonk: Rockabilly-Paradise*, *Gate of Thunder*, *Soldier Blade*, *Super Star Soldier*, *Star Parodia* (Japan). The most famous North American shooter is probably *Blazing Lazers* (*Gunhed* in Japan) and was featured in all of the early television ads.

After the demise of TTi, Turbo Zone Direct (TZD), a mail-order company, became the *de facto* source for new TG-16 / Duo hardware, accessories and software.

Several PC Engine/TurboGrafx-16 games are available for download on Nintendo's Virtual Console download service.[11] More games among the "best hits" of the system are planned to be released at as-of-yet undetermined times; the exact number or titles of games selected for future release is still unknown. Since then several TG-16 games became available on the Virtual Console that were originally never released in America for the system.[12] [13]

On October 15, 2007, the game *Gate of Thunder* was released on the Virtual Console in North America, marking the first TurboGrafx-CD game to be released on the North American Virtual Console.

As of July 15, 2009 four PC-Engine games have been released on the Japanese PlayStation Network for play on the PlayStation 3 and PSP. The four games are Bomberman '94, New Adventure Island, Sengoku Mahjong, and Devil's

Crush. The price for all four has been set at 600 Yen.[14] Since then more games have been released on PSN.

Variations

Several variations on the TurboGrafx were released throughout the 1990s.

SuperGrafx

The SuperGrafx is a variation of the standard PC-Engine hardware. This system is very nearly the same as the original PCE, except it has a duplicate set of video chips (and an extra chip to coordinate the two), four times as much RAM, twice as much video RAM, and a second layer/plane of scrolling. The CPU, sound, and color palette was not upgraded making the expensive price tag a big disadvantage to the system. NEC also decided not to include the extra two video chips in the all-in-one Duo replacement system, essentially killing off any chance of the Super Grafx continued support. Only five SuperGrafx games (and one hybrid game - Darius Plus) were released, and the system fell into obscurity.

Minor variations

Other members of the PC Engine family include the Shuttle, the LT (a laptop version similar to the Game Boy Advance SP, but considerably larger), the CoreGrafx I and II, the Duo R and the Duo RX. Contrary to popular belief, the CoreGrafx is not a European version of the PC Engine. It is simply a reengineered version of the original (white) PC Engine with an AV output instead of the original model's RF output. The PC Engine and its derivatives were never officially sold in Europe, although many systems and most accessories and games were available as imports. The PC Engine and its games had been extensively covered by most major European video game magazines and were surprisingly popular.

TurboDuo

In 1992 TTI (Turbo Technologies Inc.) released the TurboDuo, the North American version of the Japanese Duo. The system combined the TurboGrafx-16 and an enhanced version of the CD-ROM drive (the "Super CD-ROM²") into a single unit. The system could play audio CDs, CD+Gs, CD-ROM2 and Super CD games as well as standard HuCards. The Super System Card required for some games when using the original CD add-on as well as some of the Japanese variants of the TurboGrafx was built in to the Duo rather than requiring the card to be inserted at all times when playing CD games. The original pack-in for the Turbo Duo included the system, one control pad, an AC adapter, RCA cables, *Ys Book I & II*, a CD-ROM2 title, and a Super CD disc including *Bonk's Adventure*, *Bonk's Revenge*, *Gate of Thunder* and a secret version of *Bomberman* accessible via an easter egg. The system was also packaged with one random HuCard game which varied from system to system (*Dungeon Explorer* was the original HuCard pack-in for TurboDuo, although many titles were eventually used, such as IREM's *Ninja Spirit* and NAMCO's *Final Lap Twin*, and then eventually a random pick).

TurboExpress


TurboExpress handheld, TV tuner, and games

The TurboExpress was a portable version of the TurboGrafx, released in 1990 for $249.99 (the price was briefly raised to $299.99, soon dropped back to $249.99, and by 1992 it was $199.99). It was the most advanced handheld of its time and could play all the TG-16's HuCard games five years before the Sega Nomad could do the same for Sega Genesis games. Its Japanese equivalent was the **PC Engine GT**". It had a 2.6-inch screen, the same as the original Game Boy, whose keypad layout it was designed after (just like the TG-16 controller's keypad layout was similar to that of the Famicom/NES controller). It shared the capabilities of the TurboGrafx, giving it 512 available colors (9-bit RGB), stereo sound, and the same custom CPU at 7.16 MHz. The optional "TurboVision" TV tuner included RCA audio/video input, allowing the user to use TurboExpress as a video monitor. The "TurboLink" allowed two-player play. *Falcon*, a flight simulator, included a "head-to-head" dogfight mode that could only be accessed via TurboLink. However, very few TG-16 games offered co-op play modes especially designed with the TurboExpress in mind.

Stand-alone systems

- PC Engine (1987)
  - White, only RF output
- PC Engine Shuttle (1989)
  - UFO-shaped system, unique expansion port (no CD option), AV output
- PC Engine SuperGrafx (1989)
  - The only PC Engine unit to contain enhanced HuCard functionality. Only five games were released for it. (Two regular PC Engine releases, Darius Plus and Darius Alpha, were enhanced to utilize the extra sprite capability of the SuperGrafx.)
- PC Engine CoreGrafx (1989)
  - Dark grey, blue label, AV output
- PC Engine CoreGrafx II (1991)
  - Light grey, orange label, AV output, Identical in function to the CoreGrafx

CD-ROM accessories

- PC Engine CD-ROM² (1988)
  - White "briefcase" design matching the style of the original PC Engine. A special adaptor, named RAU-30, is required to connect it to the SuperGrafx.
- PC Engine Super CD-ROM² (1991)
  - A handsome grey-colored CD attachment system add-on, with built-in SystemCard 3.0 to play all Super CD-ROM² games in addition to CD-ROM² game formats. It can be connected directly to the rear pinouts of the original white PC Engine, the PC Engine CoreGrafx, CoreGrafx2, and lastly the SuperGrafx. For the SuperGrafx, this is a much more efficient way to add CD-Rom expansion to it compared to the RAU-30 route. However, this add-on tend to be much more difficult to find.

Portable systems

- PC Engine GT (1990)
  - Portable system, identical in shape and function to the US-released TurboExpress
- PC Engine LT (1991)
  - Semi-portable system (no battery option) similar in size to a normal PC Engine or CoreGrafx. Uses a very large attached screen, and folds up like a laptop (hence the LT moniker)

Duo systems

- PC Engine Duo (1991)
  - Combination PC Engine + CD ROM system + System 3.0 card, dark grey, has a CD door lock and headphone port
- PC Engine Duo R (1993)
  - Same as the Duo, but white/beige with a more streamlined case style, and lacks the lock and headphone port.
- PC Engine Duo RX (1994)
  - Same as the Duo R, slightly blue in colour. The only PCE packaged with a six-button pad.

Others

- X1 Twin
  - Combination of Sharp X1 computer and PC Engine. Only played HuCards. An add-on card was available to provide PC-FX compatibility.
- Pioneer LaserActive
  - Pioneer + NEC released a Laserdisc player with video game modules. One module allowed the use of PC Engine games (HuCard, CD-ROM^2 and Super CD) as well as "LD-ROM^2" titles released on laserdisc that only worked on this setup.

Other region variations

- TurboGrafx-CD - North American version of CD-ROM 2
- TurboExpress - North American version of PC Engine GT
- TurboDuo - North American version of PC Engine Duo
- Vistar 16 [15] (Korean)
- Several clones [16]

Unofficial variations

- Various PC Engine Shuttle clones exist, with varying levels of compatibility with original PC-Engine games. One of the more common types is the "PC Boy".
- New Tai Sang Corporation released bootleg HuCards which were sometimes patched to add features like invincibility. Unlike most bootlegs these closely resembled the original games in terms of packaging, even with color labels and manuals.
- The PC Engine was never officially released in Europe, but some companies imported them and made SCART conversions on a moderate scale. In France, a company known as Sodipeng imported Japanese systems and added an RGB Cable called "AudioVideo Plus Cable". This mod improved the original video signal quality extensively and made the consoles work with SECAM televisions. In Germany, several importers sold converted PC Engines with PAL RF as well as RGB output. The connectors and pinouts used for the latter were frequently compatible with the Amiga video port, with two unconnected pins used for the audio channels.

Unreleased hardware

- A modem was developed but never released (some working prototypes are in circulation, though).
- A SCSI interface for the Duo CD-ROM drive to be used by a PC existed in prototype form only. (it was featured in a TTi-published TurboGrafx-16 oriented magazine in the US and Computer Chronicles #1043)

Peripheral compatibility

All PC Engine systems support the same controller peripherals, including pads, joysticks and multitaps. Except for the Vistar, Shuttle, GT, and systems with built-in CD-ROM drives, all PC Engine units shared the same expansion connector, which allowed for the use of devices such as the CD-ROM unit, game saves and AV output. See the External Links (bottom) for details on this connector.

The TurboGrafx and Vistar units use a different controller port than the PC Engines, but adaptors are available and the protocol is the same. The TurboGrafx offers the same expansion connector pinout as the PC Engine, but has a slightly different shape so peripherals must be modified to fit.

The Super System Card provides 192 kB of RAM, supplementing the built in 64K of DRAM found in the CD interface tray. The PC-Engine Duo/R/RX consoles have the Super System Card's 192 KB of RAM plus the 64K of standard RAM and v3.00 BIOS software built in, and can play both CD-ROM² and Super CD-ROM² games without using any additional cards.

The Arcade Card Pro is designed for the original PC-Engine CD-ROM² and Super CD-ROM² peripherals, adding the 2304 KB of RAM required by Arcade CD-ROM² games. It could, of course, also play standard CD-ROM² and Super CD-ROM² games.

The Arcade Card Duo is for the PC-Engine Duo/R/RX consoles and adds 2048 KB RAM. Because the PC-Engine Duo series of systems have 256K of RAM built-in, this does not need to be provided and is why the Arcade Card Duo contained less RAM and was less expensive than the Pro version.

Note: Because the aforementioned consoles use the same BIOS revision as the Arcade Card Pro, it is not known (as a cost-saving measure) if the Arcade Card Duo includes the BIOS software itself, or if the existing built-in BIOS is used.

The various CD-ROM game types are:

- CD-ROM² (pronounced CD-ROM-ROM) : Standard CD-ROM game.
- Super CD-ROM² : Requires a compatible system or upgrade card.
- Arcade CD-ROM² : Requires an upgrade card.

While the standard CD-ROM² and Super CD-ROM² had RAM for data storage which was accessed directly, the Arcade CD-ROM² cards accessed the RAM in a slightly different way.

Both the Pro and Duo versions of the Arcade Card worked in the same way. Just as with the Super CD-ROM², up to 256 KB of the RAM was able to be accessed directly by the CPU. The other 2048 KB was accessed indirectly by four indirect self incrementing/decrementing address registers. These registers were mapped into memory hardware bank and also mapped into 4 special memory banks. Reading and writing sequential data was speed up and reduced cycle cost due to these new registers. This meant *far* data could be accessed with these four registers without having to map banks of memory into the CPU's logical address range, and could be transferred to VRAM ports faster and easier, as is evidenced by the many conversions of well-animated Neo Geo fighting games to the Arcade CD-ROM². The Arcade card was known to have existed in working prototype form as early as mid '92 from looking at (non public) source code files to Art of Fighting ACD port.

One technique that was used by games pre-dating the Arcade Card upgrade was to store graphics data in the 64K audio RAM (used for ADPCM samples) that was present. This RAM could be directly populated by the CD-ROM hardware (it had a direct DMA channel from the CD controller) without CPU intervention, and the memory could be accessed in an indirect fashion, similar to the Arcade Card but at a much-much slower interface, allowing data stored

in it to appear as a 64 KB stream of linear data that could be easily transferred to the system RAM.

NEC also manufactured a very large line of personal computers, one of which featured a single-speed CD ROM drive identical to the PC Engine version. They were designed to be interchangeable, which is why the PC Engine's IFU-30 CD ROM interface could be purchased without a CD ROM drive.

NEC developed a prototype adaptor that connected a PC through the HuCard slot, allowing the PC to control the PC Engine's CD ROM as it would any normal SCSI drive. Due to falling CD drive prices and the increasing undesirability of a single-speed SCSI drive, it was never released. It was however previewed in NEC's official US TurboDuo magazine.

The Pioneer LaserActive was a laserdisc player with an expansion bay. One of the expansion modules released allowed it to play PC Engine titles (HuCards, CD-ROM^2 and Super CD) as well as games released on laserdisc (LD-ROM^2) that only worked on this setup. Eleven LD-ROM^2 titles were released in Japan, though only three of them were released in North America.

Video formats

All PC Engine hardware is natively NTSC, including the European version which creates PAL-compatible video with the use of a chroma encoder chip not found in any other system in the series.

Technical specifications

- CPU: 8-bit HuC6280A, a modified 65SC02 (a separate branch from the 65C02, of the original MOS 6502) running at 1.79 or 7.16 MHz (switchable by software). Features integrated bankswitching hardware (driving a 21-bit external address bus from a 6502-compatible 16-bit address bus), an integrated general-purpose I/O port, a timer, block transfer instructions, and dedicated move instructions for communicating with the HuC6270A VDC.
- GPU: A dual graphics processor setup. One 16-bit HuC6260 Video Color Encoder (VCE), and one 16-bit HuC6270A Video Display Controller (VDC). The HuC6270A featured Port-based I/O similar to the TMS99xx VDP family.

Display

Resolution

- X (Horizontal) Resolution: variable, maximum of 565 (programmable to 282, 377 or 565 pixels, or as 5.37mhz, 7.159mhz, and 10.76mhz pixel dot clock)[15] Taking into consideration overscan limitations of CRT televisions at the time, the horizontal resolutions were realistically limited to something a bit less than what the system was actually capable of. Consequently, most game developers limited their games to either 256, 336, or 512 pixels in display width for each of the three modes.[16]
- Y (Vertical) Resolution: variable, maximum of 242 (programmable in increments of 1 scanline) It is possible to achieve an interlaced "mode" with a maximum vertical resolution of 484 scanlines by alternating between the two different vertical resolution modes used by the system. However, it is unknown, at this time, if this interlaced resolution is compliant with (and consequently displayed correctly on) NTSC televisions.
- The majority of TurboGrafx-16 games use 256×239,[15] though some games, such as Sherlock Holmes Consulting Detective did use 512×224. Chris Covell's 'High-Resolution Slideshow' uses 512×240.

Color

- Depth: 9 bit
- Colors available: 512
- Colors onscreen: Maximum of 482 (241 background, 241 sprite)
- Palettes: Maximum of 32 (16 for background tiles, 16 for sprites)
- Colors per palette: 16 per background palette (color entry #0 of each background palette must be the same), and 15 per sprite palette (plus transparent, which is displayed as an actual color in the overscan area of the screen)

Sprites

- Simultaneously displayable: 64
- Sizes: 16×16, 16×32, 16×64, 32×16, 32×32, 32×64
- Palette: Each sprite can use up to 15 unique colors (one color must be reserved as transparent) via one of the 16 available sprite palettes.
- Layers: The HuC6270A VDC was capable of displaying one sprite layer. Sprites could be placed either in front of or behind background tiles by manipulating a bit which caused color entry #0 of the background palette(s) to act as transparent.

Tiles

- Size: 8×8
- Palette: Each background tile can use up to 16 unique colors via one of the 16 available background palettes. The first color entry of each background palette must be the same across all background palettes.
- Layers: The HuC6270A VDC was capable of displaying one background layer.

Memory

- Work RAM: 8 kB
- Video RAM: 64 kB

Audio capacity

- 6 Mini-Wavetable audio channels, programmable through the HuC6280A CPU.
- Each channel had a frequency of 3.58Mhz PCM sample clock (while not in D/A mode) with a bit depth of 5 bits. Each channel also was allotted 20 bytes (32×5 bits) of RAM for sample data.
- The waveforms were programmable so the composers were not limited to the standard selection of waveforms (square, sine, sawtooth, triangle, etc.).
- The first two audio channels (1 and 2) were capable of LFO when channel #2 was used to modulate channel #1. This was used to achieve FM-like sound qualities.
- The final two audio channels (5 and 6) were capable of Noise generation.
- Optional software enabled Direct D/A which allows for sampled sound to be streamed into any of the six PCM audio channels. When a channel is in D/A mode the frequency is as fast as the CPU can stream bytes to the port, though in practicality it's limited to 6.99 kHz when using the TIMER interrupt with the smallest loop setting (1023 cpu cycles). Additionally, a programmer could use the scanline interrupt to generate a 15.7khz interrupt system to play samples.
- Each channel has its own DAC and two layer attenuation device (two volume mechanism controls) allowing a combination of two channels in Direct D/A mode to be paired and play back 8-bit, 9-bit, or 10-bit linear PCM samples.
- The addition of the CD-ROM peripheral adds CD-DA sound, and a single ADPCM channel to the existing sound capabilities of the TurboGrafx-16.

Game media

- HuCard (Turbo Chip in North America): A thin, card-like game media. The largest Japanese HuCard games were up to 20 Mbit in size. The name was derived from *Hudson Soft*, the company who developed the game card technology.
- CD: The PC Engine CD was the first home video game console to offer a CD-ROM accessory.
- With only one exception, the SuperGrafx, all PC Engine hardware could play the entire HuCard library, and every CD system could play all of the licensed CD games - with the right system card. Some unlicenced CD games by Games Express required a Duo system, due to their games requiring both a special system card packaged with the games and the 256KB of RAM built into the Duo.

CD hardware technical specifications and information

- Oki MSM5205 ADPCM chip with variable speed input clock, and 64 KB DRAM for audio sample storage. Only one channel of 4-bit compressed audio (decompresses to 12-bit, top 10 bits output through DAC) was supported.
- Programmable, timer controlled, electronic volume attenuator to fade-out the CD-DA and ADPCM audio channels together or individually.
- The PC-Engine CD-ROM interface tray has 64 KB of DRAM for storage of program code and data loaded from the CD.
- The "System Card" contains the BIOS program used to boot CD media and provides functions for software to access CD hardware through a standardized interface. Later System Cards had extra RAM and updates to the BIOS.
- The Duo series has the same BIOS ROM (v3.00) and RAM (256 KB total) as a PC-Engine system equipped with a Super System Card. The Duo implements the memory as a single 256 KB SRAM chip rather than the split 64 KB DRAM / 192 KB SRAM.
- The list of known CD-ROM BIOS revisions are:
  - v1.00 - First release (HuCard, came with the PC-Engine CD-ROM interface unit)
  - v2.00 - Upgrade (HuCard, sold separately)
  - v2.10 - Upgrade (HuCard, sold separately) - bug fix?
  - v3.00 - Final release (built into several products and available as a HuCard - see below)
- The list of known System Card releases are:
  - System Card, v1.00 - First release. Came packaged with the original PC-Engine CD-ROM² System. Also available as a standalone purchase, in case the pack-in System Card was lost or damaged.
  - System Card, v2.00 – BIOS update. The only difference between this and the original System Card is the BIOS code update to v2.00. Otherwise, it is the same.
  - System, Card, v.2.10 – BIOS update. This may have been a bug fix for the System Card v2.00 BIOS code.
  - Super System Card - 1.5 Mbit RAM (192 KB) – RAM upgrade and BIOS update. This expands the RAM available for the CD-ROM unit to 256 KB when including the existing built in DRAM. It also offers a final BIOS update to v3.00. The PC-Engine Duo (Turbo Duo in North America) had 256 KB of RAM and the same v3.00 BIOS built into the system. Games developed for this System Card bore the title ‘Super CD’, and could not be played using an older System Card.
  - Arcade Card Pro - 17.5 Mbit RAM (2240 KB as 2 MB+192 KB) – RAM upgrade. This greatly expands the RAM available for the CD-ROM unit to 2240 KB. The BIOS revision was unchanged from v3.00. Games developed for this System Card bore the title ‘Arcade Card CD’, and could not be played using an older System Card. The Arcade Card Pro includes the extra 192 KB needed by the non Duo CD system. The 2 MB of RAM is accessed through ports or units of single 8 KB banks and is intended for graphics data storage rather than program code; its flexible addressing system allows for rapid transfer of data to VRAM.

- Arcade Card Duo – 16 Mbit RAM (2048 KB) – RAM upgrade. This greatly expands the RAM available for the PC-Engine Duo system to 2048 KB. The BIOS revision was unchanged from v3.00. Games developed for this System Card bore the title 'Arcade Card CD', and could not be played using an older System Card. This will only work on the Duo systems, as it does not include the extra memory built into the Duo system.
- Games Express Card – Bootleg system card. This was a bootleg System Card released by Games Express for play of unlicensed Games Express CD games. Only unlicensed Games Express games could be played on this System Card.

Corresponding CD-ROM products

- PC-Engine Interface Unit (IFU-30), came with System Card (CD-ROM² System, v1.00)
- System Card (CD-ROM² System, v1.00) (standalone, available as a replacement for the above)
- System Card (CD-ROM² System, v2.00)
- System Card (CD-ROM² System, v2.10)
- Super System Card (Super CD-ROM² System, v3.00)
- Arcade Card Pro (Arcade CD-ROM², v3.00)
- Arcade Card Duo (Arcade CD-ROM², v3.00)
- Super CD-ROM² System (Super CD-ROM² System, v3.00)
- PC-Engine Duo (Super CD-ROM² System, v3.00)
- PC-Engine Duo R (Super CD-ROM² System, v3.00)
- PC-Engine Duo RX (Super CD-ROM² System, v3.00)
- SuperGrafx ROM Adapter Unit (RAU-30), a cable with two large ends that allows connecting the SuperGrafx to the IFU-30

Drive unit

- Single-speed CD-ROM drive, managed by an NEC microcontroller and using the SCSI-I interface.
- Transfer rate of 150 kB/s.

Emulation

See also: List of TurboGrafx-16/PC Engine emulators

See also

- List of PC Engine games
- List of TurboGrafx-16 games
- List of TurboGrafx-CD and PC Engine-CD games

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External links

- TurboGrafx-16 (http://www.dmoz.org/Games/Video_Games/Console_Platforms/NEC/) at the Open Directory Project

Mega Drive

Left: Original Japanese Mega Drive
Right: Japanese Mega Drive 2

Manufacturer	Sega
Type	Video game console
Generation	Fourth generation
Retail availability	• JP October 29, 1988 • NA August 14, 1989 (Genesis) • PAL November 30, 1990 • BR 1990
Discontinued	• JP 1995[1] • NA 1997[2] • PAL 1997[2]
Units sold	[3]
Media	ROM cartridge
CPU	Motorola 68000
Online services	Sega Meganet, Sega Channel, XBAND
Best-selling game	*Sonic the Hedgehog 2*, 6 million (as of June 2006)[4]
Predecessor	Sega Master System
Successor	Sega Saturn

The **Mega Drive** (メガドライブ *Mega Doraibu*) is a fourth-generation video game console released by Sega in Japan in 1988 and Europe, Australia and other PAL regions in 1990. The console was released in North America in 1989 under the name **Sega Genesis**, as Sega was unable to secure legal rights to the Mega Drive name in that region.[5] The Mega Drive was Sega's fifth home console and the successor to the Sega Master System, with which it is electronically compatible.

The Mega Drive was the first of its generation to achieve notable market share in Europe and North America. It was a direct competitor of the TurboGrafx-16 (which was released one year earlier in Japan under the name PC Engine, but at about the same time as the Genesis in North America) and the Super Nintendo Entertainment System (which was released two years later). The Mega Drive began production in Japan in 1988 and ended with the last new licensed game being released in 2002 in Brazil.[6]

The Mega Drive is Sega's most successful console, though there is disparity in the number of units sold worldwide.[3] The console and its games continue to be popular among fans, collectors, retro gamers, emulation

enthusiasts and the fan translation scene.[7] There are also several indie game developers continuing to produce games for the console. Many games have been re-released in compilations for newer consoles and/or offered for download on various online services, such as Wii Virtual Console, Xbox Live Arcade, PlayStation Network and Steam.

In 2009, IGN named the console the fifth greatest video game console, out of a field of 25.[8]

History

Although the Sega Master System was a success in Europe, and later also Brazil, it failed to ignite much interest in the North American or Japanese markets, which, by the mid-to-late 1980s, were both dominated by Nintendo's large market shares.[9] [10] [11] Meanwhile in the arcades, the Sega System 16 had become a success. Hayao Nakayama, Sega's CEO at the time, decided to make its new home system utilize a similar 16-bit architecture.[5] The final design was eventually also used in the Mega-Tech, Mega-Play and System-C arcade machines. Any game made for the Mega Drive hardware could easily be ported to these systems.[12]

The original Mega Drive logo

During development the hardware was called "Mark V",[13] but Sega CEO Hayao Nakayama officially named it "Mega Drive." The name was said to represent superiority and speed, with the then powerful Motorola 68000 processor in mind.[14] Sega used the name Mega Drive for the Japanese, European, Asian, Australian and Brazilian versions of the console. The North American version went by the name "Genesis" due to a trademark dispute.[15]

Launch

The Mega Drive was released in Japan on October 29, 1988.[16] Sega announced a North American release date for the system (under the name of Sega Genesis) on January 9, 1989.[17] Sega initially attempted to partner with Atari Corporation for distribution of the console in the US, but the two could not agree to terms and Sega decided to do it themselves.[18] Sega was not able to meet the initial release date and US sales began on August 14, 1989 in New York City and Los Angeles. The Genesis was released in the rest of North America later that year[19] on September 15, 1989 with the suggested retail price of $190, $10 less than originally planned.[5]

A typical in-game screen shot of *Sonic the Hedgehog*, taken from its first level, Green Hill Zone.

The European release was on November 30, 1990. Following on from the European success of the Sega Master System, the Mega Drive became a very popular console in Europe. Unlike in other regions where the NES had been the dominant platform, the Sega Master System was the most popular console in Europe at the time. In the United Kingdom the most well known of Sega's advertising slogans was "To be this good takes AGES, to be this good takes SEGA". Some of these adverts employed adult humour and innuendo with sentences like "The more you play with it, the harder it gets" displayed with an illustration of the waggling of a joystick.[20] A prominent figure in the European marketing was the "Sega Pirate", a talking one-eyed skull that starred in many TV adverts with a generally edgy and humorous attitude. Since the Mega Drive was already two years old at the release in Europe, the many games available at launch were naturally more in numbers compared to the launches in other regions. The ports of arcade titles like *Altered Beast*, *Golden Axe* and *Ghouls 'n Ghosts*, available in stores at launch, provided a strong image of the console's power to deliver an arcade-like experience.[21] The arrival of *Sonic the Hedgehog* in 1991 was just as successful as in North America, with the new Sega mascot becoming popular throughout the continent.[21]

In Brazil, the Mega Drive was released by Tec Toy in 1990, only a year after the Brazilian release of the Sega Master System. Tec Toy also ran the Internet service Sega Meganet in Brazil as well as producing games exclusively for the Brazilian market.[22] On December 5, 2007, Tec Toy released a portable version of Mega Drive with 20 built-in games.[23] [24]

In India, distribution of the Mega Drive was handled by Shaw Wallace,[25] while Samsung handled it in Korea. Samsung renamed the console "Super Aladdin Boy", while retaining the Mega Drive logo on the system in addition to their own.[26]

Console wars

The Mega Drive initially competed against the aging 8-bit NES, over which it had superior graphics and sound. Despite this, the Mega Drive was all but ignored in Japan as soon as it was launched. Despite some positive coverage from magazines Famitsu and Beep!, Sega only managed to ship 400,000 units in the first year.[15] In order to increase sales, Sega released various peripherals and games,[15] including an online banking system and answering machine called the Sega Mega Anser.[27] Despite this, the Mega Drive remained a distant third in Japan behind Nintendo's Super Famicom and NEC's PC Engine throughout the 16-bit era.[28]

For the North American market, new Sega of America CEO Michael Katz instituted a two-part approach to build sales in that region. The first part involved a marketing campaign to challenge Nintendo head-on and emphasize the more arcade-like experience available on the Genesis,[29] summarized by the slogan "Genesis does what Nintendon't".[30] Since Nintendo owned the console rights to most arcade games of the time, the second part involved creating a library of instantly-recognizable titles which used the names and likenesses of celebrities and athletes such as *Pat Riley Basketball*, *Arnold Palmer Tournament Golf*, *James 'Buster' Douglas Knockout Boxing*, *Joe Montana Football*, *Tommy Lasorda Baseball*, *Mario Lemieux Hockey* and *Michael Jackson's Moonwalker*.[31] [32] Nonetheless, it had a hard time overcoming Nintendo's ubiquitous presence in the consumer's home.[33]

In mid-1990, Sega CEO Hayao Nakayama hired Tom Kalinske to replace Katz as CEO of Sega of America. Although Kalinske initially knew little about the video game market, he surrounded himself with industry-savvy advisors. A believer in the razor and blades business model, he developed a four-point plan: cut the price of the console; create a US-based team to develop games targeted at the American market; continue and expand the aggressive advertising campaigns; and replace the bundled game, *Altered Beast*, with a new title, *Sonic the Hedgehog*.[33] The Japanese board of directors initially disapproved of the plan[34] but all four points were approved by Nakayama. Magazines praised *Sonic* as one of the greatest games yet made and Sega's console finally took off as customers who had been waiting for the SNES decided to purchase a Genesis instead.[33] Nintendo's console debuted against an established competitor, while NEC's TurboGrafx-16 failed to gain traction and NEC soon pulled out of the market.[35]

Sega began in 1992 with a number of advantages: a 55% to 45% market share over the Super NES, a lower price, and a tenfold advantage in number of games.[36] Sega's advertising continued to position the Genesis as the "cooler" console,[36] and at one point in its campaign, it used the term "Blast Processing" to suggest that the processing capabilities of the Genesis were far greater than those of the SNES.[37] [38] A Sony focus group found that teenage boys would not admit to owning a Super NES rather than a Genesis.[39] Neither console could maintain a definitive lead in market share for several years, with Nintendo's share of the 16-bit machine business dipping down to 37% at the end of 1993,[40] and Sega accounting for 55% of all 16-bit hardware sales during 1994.[41]

In Europe the Mega Drive maintained support through 1998,[16] where it managed to sell 8 million units,[42] outselling all other consoles up through that time.[16] Brazil also saw success with the Mega Drive, where it held 75% of the market share.[16]

Videogame Rating Council

In 1993 everyone started to notice how violent new video games were becoming, with games like Night Trap for the Sega CD receiving unprecedented media scrutiny. By far the most controversial title of the year, however, was Acclaim's *Mortal Kombat*. Parents and senators alike were outraged by the level of graphic violence depicted in the arcade version of the game, so Nintendo decided to take out the blood in the game, replacing it with "sweat," and they also replaced the arcade's gruesome "fatalities" with less violent finishing moves.[43]

Sega instituted the first ever video game ratings system called the Videogame Rating Council (or VRC) for all Genesis, Sega CD, and GameGear titles, which ranged from the family friendly GA rating to the adults-only ratings of MA-13, and MA-17. Sega would then take a different approach with their release of Mortal Kombat.[43] At face value, the blood was completely gone, not even sweat remained, and most finishing moves toned down even more than the SNES version, but an ominous opening screen about the value of "codes" implied something greater was under the hood. All the arcades blood and uncensored finishing moves could be enabled by entering the infamous "Blood Code."[44] Inclusion of the code let Sega get away with the low rating of MA-13, rather than MA-17, while the SNES version shipped without a rating at all.[44] Despite the ratings system, or perhaps because of it, the Genesis version of Mortal Kombat was well received by gaming press, as well as fans, outselling the SNES version four to one,[45] [46] while Nintendo was criticized for censoring the SNES version of the game.[43] With these rating systems in place, Nintendo decided its censorship policies were no longer needed. Consequently, the SNES port of *Mortal Kombat II* was released uncensored, and this time Nintendo's version was the one to get.[44]

Add-ons

In early 1991, Sega announced the Mega-CD, to be released in Japan in late 1991 and in North America (as the Sega CD) in 1992. While this add-on did contain a faster CPU, more memory, an additional PCM sound chip, and some enhanced graphical capabilities (similar to the SNES's mode 7) compared to the Mega Drive itself,[47] the main focus of the device was to expand the size of games. Cartridges of the day typically contained 8 to 16 megabits of data, while a CD-ROM could hold 640 megabytes (5120 megabits). While it became known for several games, including *Sonic CD* and *Night Trap*, the expansion only sold 6 million units worldwide.[48]

Genesis model 2 with the Sega CD and 32X add-ons attached

At June 1994's Consumer Electronics Show, Sega presented the 32X as the "poor man's entry into 'next generation' games."[49] The 32X was originally conceived by Sega of Japan as a fully compatible Mega Drive based console with enhanced color capabilities.[50] Sega of America R&D head Joe Miller convinced Sega of Japan to convert it into an add-on to the existing Genesis. Although this add-on contained two 32-bit CPUs, it failed to attract either developers or consumers as the superior Saturn had already been announced for release the next year. Originally released in November 1994 (after the release of the Sega Saturn in Japan) for US$159, Sega dropped the price to $99 after only a few months and ultimately cleared the remaining inventory at $19.95.[50] Although initial sales were good, thanks mostly to *Doom* and *Star Wars Arcade*, Sega was only able to move 665,000 units worldwide by the end of 1994.[]

32-bit era and beyond

By the end of 1995, Sega was supporting five different consoles and two add-ons: Saturn, Mega Drive, Game Gear, Pico, Mega CD, 32X and Master System in PAL and some South American (predominantly Brazilian) markets. In Japan the Mega Drive had never been successful and the Saturn was beating Sony's PlayStation, causing Sega of Japan CEO Hayao Nakayama to decide to discontinue the Mega Drive in Japan, and force Sega of America to launch the Saturn early in the summer of 1995. While this made perfect sense for the Japanese market, it was disastrous in North America: the market for Genesis games was much larger than for the Saturn but Sega was left without the inventory or software to meet demand. In comparison, Nintendo concentrated on the 16-bit market and reported the most lucrative holiday season in the industry.[1] It also undercut the Sega of America executives; CEO Tom Kalinske, who oversaw the rise of the Genesis in 1991, and he grew uninterested in the business and resigned in mid 1996.[51]

In 1998, Sega licensed the Mega Drive to Majesco so that it could re-release the console.[2] Majesco began re-selling millions of formerly unsold cartridges at a budget price together with the second model of the Genesis, until it later released a third version of it. In 1998 *Frogger* became the last commercially licensed game to be released in North America.[52]

The Mega Drive was supported until 1998 in Europe, when Sega announced it was dropping support for it.[16] It was discontinued along with its predecessor, the long-lived Sega Master System, to allow Sega to concentrate on its newer console, the Saturn. The Mega Drive's add-ons, the Mega CD and 32X, were also both discontinued at this point, having been the same general failures they were in the other regions.[48]

On May 22, 2006, Super Fighter Team released *Beggar Prince*, a game translated from a 1996 Chinese original. It released worldwide and was the first commercial Genesis game release in North America since 1998.[53]

On September 1, 2008, a group of homebrew enthusiasts[54] [55] released a demo of their upcoming game *Pier Solar and the Great Architects*. It is the first commercial role-playing game specifically developed for the console since 1996.[56]

On December 3, 2008, Super Fighter Team released *Legend of Wukong*, another translation of a 1996 Chinese game. Like *Beggar Prince*, it released worldwide and was the second North American commercial release since 1998.[57]

Emulation

Like many other game consoles, the Mega Drive has a strong following among gaming enthusiasts and fans, even following its decline in the marketplace. The console has enjoyed continued popularity in the second-hand market and through emulation projects.

The first known Mega Drive emulator was called "Megadrive," and was released in 1994. This emulator was only capable of playing *Sonic the Hedgehog* without sound and with numerous errors.[58] In 1996, GenEM became the first fully functional Mega Drive emulator to be released.[59]

In 1997, former Genesis developer Steve Snake[59] began work on a new emulation project that would eventually be known as Kega Fusion, with the goal of perfect emulation. Sega officially commissioned Steve in the following year to create a Windows-compatible version that could be used to market some classic Genesis games in the "Sega Smash Pack."[60]

Another emulator, Gens, began development in 1999. This project achieved widespread popularity in the emulation community[61] and inspired many derivative projects.[62] [63] However, the project ceased development in 2006[61] and never reached the same level of accuracy as Kega Fusion.[64] Both emulators feature online play and can record videos of gaming sessions.[64] [65]

Emulation of the Mega Drive/Genesis is also available on home consoles and handheld units such as Sega's Dreamcast;[66] Nintendo's GameCube,[67] Wii,[68] and DS;[69] GamePark Holdings' GP2X;[70] Sony's PlayStation 2[71] and PlayStation Portable[72] and Microsoft's Xbox[73] and Xbox 360.[74] Emulators have also been produced for

smart phones,[75] such as Apple Inc.'s iPhone[76] as well as various PDAs.[77]

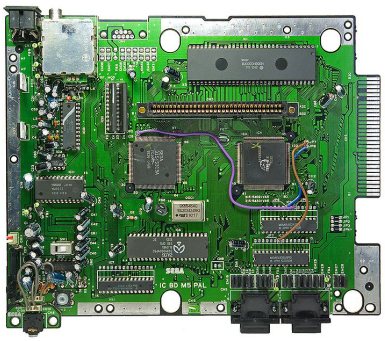
In 2004, a trend emerged toward plug-and-play TV games and Radica Games released a licensed, self-contained, version of the Mega Drive in both North America (as the Play TV Legends Sega Genesis)[78] and Europe (as the Mega Drive 6-in-1 Plug 'n' Play). It contains six popular games in a small control box with a permanently connected control pad. It does not have a cartridge slot and thus is a dedicated console.[79]

The GameTap subscription gaming service includes a Mega Drive emulator and has several dozen licensed Mega Drive games in its catalog.[80] The Console Classix subscription gaming service also includes an emulator and has several hundred Mega Drive games in its catalog.[81]

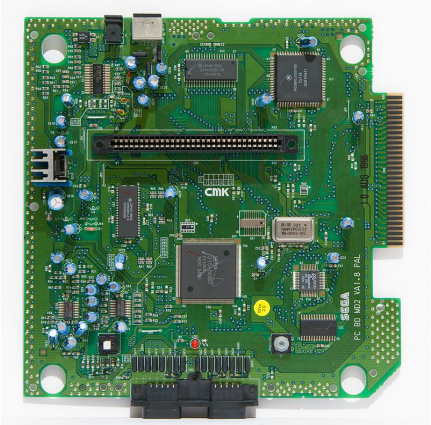
A number of Mega Drive games have been released on compilation discs. These include *Sonic Mega Collection* and *Sonic Gems Collection* for PS2, Xbox and Nintendo GameCube; *Sega Genesis Collection* for PS2 and PSP and most recently *Sonic's Ultimate Genesis Collection* (known as the *Sega Mega Drive Ultimate Collection* in PAL territories) for PlayStation 3 and Xbox 360, which also supports Achievements/Trophies for various actions across all games and graphic smoothing. Some versions do feature slight emulation issues, such as sound problems on the *Sega Genesis Collection*. However, the more recent compilations have save states which work exactly like the save states on computer emulators in that they will save the exact point and conditions that the game was in when a player saved it. The usage of these states do not disqualify a player from acquiring a trophy/achievement in *Sonic's Ultimate Genesis Collection*, as it is a supported game feature.

During his keynote speech at the 2006 Game Developers Conference, Nintendo president Satoru Iwata announced that Sega was going to make a number of Genesis/Mega Drive titles available to download on the Wii's Virtual Console.[82] These games are now available along with other systems' titles under the Wii's Virtual Console.[82] At launch the 16-bit Sega games available on the North American Virtual Console were *Altered Beast* and *Sonic the Hedgehog*. In Europe *Ecco the Dolphin* and *Golden Axe* were also available in addition to the titles available in North America. There are also select Mega Drive titles available on the Xbox 360 such as *Sonic the Hedgehog* and *Sonic 2*.

Technical specifications



Mega Drive Mainboard (PAL)



Mega Drive II Mainboard (PAL)

Processor:	Motorola 68000 16/32-bit processor running at 7.67 MHz
Co-processor (Sound Controller):	Zilog Z80 8-bit at 3.58 MHz
Memory:	64K work RAM (68000), 64K video RAM, 8K work RAM (Z80) Later hardware had an internal 1Kx16 ROM for the license display screen.
Display Palette:	512 colors (3:3:3 RGB)

Onscreen colors:	64 (normal) or 183 (shadow/highlight mode)
Maximum onscreen sprites:	80 (320-pixel wide displays) or 64 (256-pixel wide displays)
Resolution:	256×224, 256×448, 320×224, 320×448, (PAL and NTSC) 256×240, 320×240, 256×480, 320×480 (PAL only), 256×192 (SMS games only)
Sound:	Yamaha YM2612 5 channel FM and 1 channel FM/PCM, Texas Instruments SN76489 4 channel PSG (Programmable Sound Generator)

CPU

The Mega Drive's CPU is a 16/32-bit Motorola 68000.[83] The maximum addressable memory is 16 MB from the ROM ($00000000-00400000 - 4 MB), to the RAM ($00FF0000-00FFFFFF - 64 KB). The 68000 runs at 7.61 MHz in PAL consoles, 7.67 MHz in NTSC consoles.[84] The Mega Drive also includes a Zilog Z80, which serves as the console's primary sound controller and also provides complete Master System compatibility with only a passive adapter. The Mega Drive has 64 KB of work RAM.[14]

Video

The Mega Drive has a dedicated VDP (Video Display Processor) for background graphic and sprite control. This is an improved version of the Sega Master System VDP, which in turn is derived from the Texas Instruments TMS9918. Images can be output at 256 pixels (32 tiles) or 320 pixels (40 tiles) across and 224 scanlines (28 tiles) or 240 scanlines (30 tiles) down. The 240-line resolutions are only used on 50 Hz (i.e. PAL) displays, as the extra lines end up in the overscan of a 60 Hz (NTSC) signal.

NTSC games use the 224-line resolution to free up more vertical blanking time to send more updates to the VDP. Colors are chosen from a total of 512 possible colors, 3 bits per color channel; some games used a small amount of flicker to simulate more colors. Graphics consist of up to 80 sprites on screen and three background planes (Window, ScrollA, ScrollB), two of which (ScrollA and Window) share the same screen space. Palettes are stored in color RAM (CRAM) and consist of 16 colors each for a total of 64 colors.[85]

Audio

There are two primary sound chips which can both be controlled by the Z80 or the M68000; the Yamaha YM2612 FM chip and the Texas Instruments SN76489 PSG chip.[16] The YM2612 is a descendant of the prolific Yamaha YM2203, used in many gaming machines throughout the 1980s and early 1990s. There are 8 kilobytes of dedicated sound RAM available to the Z80.[85] The Yamaha uses six FM channels with four operators each, and its clock speed is the same as that of the main CPU. Stereo sound is output only through the headphone jack on model 1 systems and through AV out on model 2 systems along with mono signal.[14] Changes in the mixing circuit of late model 1 revisions, and all model 2's resulted in the hardware producing more distorted sound output than earlier models that bore the "High Definition Graphics" logo.[86]

Memory

There is 2 KB of Boot ROM, which is also known as the "Trademark Security System" (TMSS). When the console is started, it checks the game for certain code given to licensed developers. Unlicensed games without the code are thus locked out, but if a game is properly licensed, the ROM will display "Produced by or under license from Sega Enterprises Ltd.".[87] Also, as a hardware-feature, with later versions of the Trademark Security System "SEGA" must be written into an area of I/O memory ($A14000) in order to turn on the VDP. The TMSS was the subject of the legal case Sega v. Accolade.

There is also 64 KB of Main RAM. The Main RAM is part of the M68000 address space. Also present is 64 KB of Video RAM,[16] which cannot be accessed directly by CPU and must be read and written via the VDP (Video

Display Processor). The Z80 has 8 kilobytes of RAM mapped into the M68000's address space that is intended to be used for program RAM. The Z80 can also access 32 kilobytes of the M68000s memory using bank-switching which is intended to be provided as a sound bank.

Inputs and outputs

On the front of the console are two controller input ports, which use 9-pin male D-subminiature connectors.[85] On the rear of all first-model Japanese Mega Drive units and on early American Genesis and PAL (European, Australasian and Asian) Mega Drive units is the EXT input port; a DE-9F (9-pin female D-connector) that was used with the Meganet modem peripheral, released only in Japan.[85] The power input is a positive tip barrel connector that requires 9-10 volts DC, at about 0.85-1.2 A, depending on the model. There is also an Expansion input port which is an Edge connector on the bottom right hand side of the console. It is used almost exclusively for connection for the Mega CD/Sega CD, though it was also used for the Sega Genesis 6 Cart Demo Unit (DS-16) in stores. This port is not present on the Genesis 3 model.[14]

The console's A/V output consists of a DIN connector with composite video, RGB video and audio outputs.[14] The Mega Drive and the first model Genesis have an 8-pin DIN socket (same as Sega Master System) which supports mono audio only, while the Mega Drive 2, Multi-Mega/CDX and other models have a 9-pin mini-DIN connector with both mono and stereo audio.[14] Stereo audio for the Mega Drive and the first model Genesis were supplied by the headphone jack, which is not present on later models.[14] Original model European and Asian Mega Drives and North American Geneses also include a built in RF modulator, which outputs via an RCA jack on the rear of the console; other models must use an external RF modulator for RF video/audio.[14]

Master System compatibility

One of the key design features of the console is its backwards compatibility with Sega's previous console, the Sega Master System. The 16-bit design is based upon the 8-bit design, albeit enhanced and extended in many areas. In order to achieve backwards compatibility, the Master System's central processor and sound chip (the Zilog Z80[14] and SN76489 respectively) are included as coprocessors in the Mega Drive, and the Mega Drive's Video Display Processor (VDP) is capable of the Master System's VDP mode 4, though it cannot run in modes 0, 1, 2, or 3 (so the Mega Drive is not compatible with SG-1000 software or Master System software which uses these modes).

Sega Power Base Converter

As the cartridge slot is of a different shape, Sega released the Power Base Converter, a separate device that sits between a Master System cartridge and the Mega Drive's cartridge slot. The Power Base Converter does not contain any Master System components, instead functioning as a pass-through device, and consisting almost entirely of passive circuitry. The converter contains a top slot for cartridge-based games along with a front slot for card-based games, as well as the 3-D glasses adapter. When a Master System game is inserted, the system puts the Z80 in control, leaving the Mega Drive's main 68000 processor idle. The power base converter had inferior capacitors however, meaning that after a few years use, the system may suffer from glitchy play, to rectify this the user must remove the capacitors from the board or replace them.[14]

In Japan the device is known as the "Mega Adapter" (メガアダプタ). The Sega Mega Adapter is built for the Japanese Mega Drive cartridge slot, so it does not fit into the European Mega Drive and Genesis cartridge slot, like Japanese Mega Drive cartridges. It also has the Master System cartridge slot changed to the Sega Mark III/Japanese Master System pinout. Because of the Genesis VDP limitations listed before, it does not run SG-1000/SC-3000 games or Master System games that use the SG-1000 video modes. The Mega Adapter does not have the Yamaha

YM2413 FM chip that enhances the sound of certain games. The PAL variant is called the "Master System Converter" in Europe.[88]

The Power Base Converter is not fully compatible with the redesigned Mega Drive 2. A second version, the "Master System Converter II", was released to address this problem. This second version adapter was produced in a far smaller quantity and only released in Europe.[14]

The only Master System game which does not work with this device is *F-16 Fighting Falcon*.[89] (It is actually the compatibility mode of the Mega Drive/Genesis that is responsible for this, not the Power Base Converter itself)

Some Master System games (such as *Shanghai*) are incompatible with the Mega Drive control pad, so a Master System control pad must be used instead. As it has the same connection port, the Master System pad can be plugged directly into the Mega Drive controller ports without any kind of adapter.

Some Master System games not published by Sega (e.g. Codemasters, HES, and many Tec Toy exclusives) are incompatible with the Mega Drive.

Peripherals

The standard Mega Drive controller features three main buttons and a "start" button usually used for pausing mid-game. The controller itself has a distinctive rounded shape.[84] Sega later released a six-button version in 1993 coinciding with the release of *Street Fighter II: Special Champion Edition*; this pad is slightly smaller and features three more face buttons, similar to the design of buttons on arcade fighting games.[84]

Original three button joypad with later six button version

A number of other peripherals for the Mega Drive were released that add extra functionality. The Menacer Light Gun was developed in response to the Super Scope for the SNES and is only compatible with the *Menacer 6-game cartridge* and a few other games.[90] The Sega Mouse was released for the Mega Drive in the Japanese and European markets,[91] as well as a North American version called the Sega Mega Mouse.[92] A foam-covered bat called the BatterUP and the TeeVGolf golf club were both released for the Mega Drive and SNES and provide support for similar games.[91] [93]

One of the most unsuccessful peripherals released was the Sega Activator. Marketed as a new type of martial arts simulator, it was an octagonal device that lay flat on the floor and read a gamer's physical movements. As the player moved, he/she would trigger infrared laser beams which would then be translated into game inputs. The light beams were easily distorted by a non-flat ceiling, or obstructions, such as blades of a ceiling fan or light fixture.[94] Some games that were configured for it were *Comix Zone*, *Mortal Kombat 3*, and *Greatest Heavyweights of the Ring*, but it could also be used as an alternative to the standard 3-Button controller. *Eternal Champions*, *Mortal Kombat*, and *Street Fighter II: Special Champion Edition* were pack-ins.[95] It required its own power supply to work, and was largely dismissed by consumers due to its unwieldiness and inaccuracy.[95] The $80 price tag didn't help either.[95] The Sega Activator was based on a musical instrument called the Light Harp conceived by musician and martial artist Assaf Gurner.[96] The Sega Activator was ranked the third worst video game controller ever made by IGN editor Craig Harris.[97]

The Mega Drive is also compatible with Sega Master System accessories through use of the Power Base Converter.[16] [98]

Both Electronic Arts (EA) and Sega released multitaps for the system to allow more than the standard two players to play at once.[85] Initially, EA's version, the 4-Play, and Sega's adapter, the Team Player, only supported each publisher's own titles. Later games were created to work on both adapters. Codemasters also developed the J-Cart system, providing two extra ports with no extra hardware, although the technology came late in the console's life and

was only featured on a few games.[99]

Sega Virtua Processor

The graphics in *Virtua Racing* were comparable to those of *Star Fox*[100]

The practice of adding special chips to game cartridges had first been seen in various games on the NES. These chips effectively increased the console's capabilities, enabling visual effects such as split-screen scrolling (*Super Mario Bros. 3*) and enhanced tile switching (*Kirby's Adventure*), as well as providing improved battery backups (*Castlevania 3*). This concept was expanded on the SNES console with on-cartridge DSP chips and RISC processors (most notably the Super FX chip used in *Star Fox*). The Super FX in particular enabled the console to render polygons in real time, as well as enabling scaling, rotation and stretching of much larger sprites than the console could handle on its own (*Super Mario World 2: Yoshi's Island*). The external processors boosted the console's overall performance by offloading most of the rendering tasks from the main CPU.[100]

As these enhancements became more commonplace on the SNES, the stock of existing Genesis games began to look outdated in comparison. Sega quickly began work on an enhancement chip to compete with Nintendo's Super FX, resulting in the Sega Virtua Processor chip.[100] The chip enabled the Genesis to render polygons in real time and provided an "Axis Transformation" unit that handled scaling and rotation. *Virtua Racing*, the only game released for the Genesis to use this chip, ran at a significantly higher and more stable frame rate than similar games on the SNES.[100]

However, the chip was expensive to produce and increased the cost of the games that used it. At US$100, *Virtua Racing* was the most expensive domestic Genesis cartridge to be mass-produced.[100] Two other games, *Virtua Fighter* and *Daytona USA* were confirmed to have been planned for the SVP chip as well, but were instead moved into the Saturn's launch lineup.[100]

Variations


The Sega Multi Mega incorporates the Mega Drive and Mega-CD in one unit

The Mega Drive has received more officially licensed variations than any other console. While only one major design revision of the console was created during its lifespan, each region has its own peculiarities and unique items, while other variations were exercises in reducing costs (such as the removal of the little-used 9-pin EXT. port) or expanding the capabilities of the Mega Drive.[14]

Sega also released a combined, semi-portable Mega Drive/Mega CD unit called the Sega Multi-Mega (Sega CDX in North America and Multi-Mega CDX in Brazil). Only 5,000 units were released in the United States in April 1994, making the unit "rare, very desirable, and quite collectable", according to Sega Force.[101]

Majesco's **Genesis 3** (single-chip and dual-chip versions) retains the Mode 4 support but has the Master System compatibility removed from the bus controller logic.[16] While 68000-based software can still use the Mode 4 capabilities, the Power Base Converter and other adapters are incompatible with this unit.[14]

The **Victor Wondermega** (known in North America as the **JVC X'Eye**) was belatedly released in the North American market in September 1994 - about a year behind JVC's original target date of fall 1993. Its pack-ins included Prize Fighter, Compton's Interactive Encyclopedia and a karaoke disc. JVC hoped to target an older, more

affluent market with its console in the same way that Sega did with the CDX. However, only about 10,000 consoles were sold in all of North America.[101]

ATGames currently produces, and outsources the production of, officially-licensed, emulation-based Mega Drive consoles. These consoles enable the use of Mega Drive and Genesis games from all regions on a single system but do not support the Power Base Converter, Mega/Sega CD units, or the 32X expansion.[102]

Revival

Brazil

The Mega Drive never ceased production in Brazil, though Tec Toy's current models emulate the original hardware. The latest version, called "Mega Drive Guitar Idol", comes with two six-button joypads and a guitar controller with five fret buttons. The *Guitar Idol* game contains a mix of Brazilian and international songs.[103] The console has 87 built-in games, including some new ones from Electronic Arts, originally cellphone games: *FIFA 2008*, *Need for Speed Pro Street*, *The Sims 2* and *Sim City*.[103]

China

In 2008 Chinese company ATGames produced a new Mega Drive compatible console. It features a top-loading cartridge slot and includes two controllers similar to the six-button controller for the original Mega Drive. The console has 15 games built-in, and is region-free, allowing cartridge games to run regardless of their region of origin.[104] ATGames also produces a handheld version of the console.[105] Both machines have been released in Europe by distributing company Blaze Europe.[104]

India

Mitashi, a consumer appliance manufacturer in India, released a version of the Mega Drive called Game-In Xtreme, with a few built in games. Even though the name 'Mega Drive' has never been mentioned, it plays 16-bit Mega Drive cartridges.[106]

North America

In 2009, ATGames released two new officially licensed Genesis consoles. The Firecore,[102] and the Gencore.[107] In addition to that, two new officially licensed Genesis portables also made their debut; the Retrogen,[108] [109] and the Genmobile.[110] The Firecore can play newly developed "Truecolor" games.[102] All the consoles ship with twenty official Genesis games built in (with the exception of the Retrogen which, instead, is shipped with twenty homebrew games).[111]

See also

- List of Sega Mega Drive games
- List of Japanese Sega Mega Drive games
- Variations of the Sega Mega Drive

Content notes

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- Genesis (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Sega/Genesis/) at the Open Directory Project

Neo Geo (console)

Manufacturer	SNK
Type	Video game console
Generation	Fourth generation
Retail availability	1990
Introductory price	US$649.99
Media	ROM cartridge
CPU	Motorola 68000 clocked at 12MHz, Zilog Z80A clocked at 4MHz
Storage capacity	Memory card
Memory	64KB RAM, 74KB VRAM, 2KB Sound Memory
Display	320x224 resolution, 4096 on-screen colours out of a palette of 65536
Dimensions	325 x 237 x 60 mm

The **Neo Geo** is a cartridge-based arcade and home video game system released in 1990 by Japanese game company SNK. The hardware featured comparatively colorful 2D graphics.

The **MVS** (Multi Video System), as the Neo Geo was known to the coin-op industry, offered arcade operators the ability to put up to 6 different arcade titles into a single cabinet, a key economic consideration for operators with limited floorspace. With its games stored on self-contained cartridges, a game-cabinet could be exchanged for a different game-title by swapping the game's ROM-cartridge and cabinet artwork. Several popular franchise-series, including *Fatal Fury*, *The King of Fighters*, *Metal Slug* and *Samurai Shodown*, were released for the platform.

The Neo Geo system was also marketed as a very costly home console, commonly referred to today as the **AES** (Advanced Entertainment System). The Neo Geo was marketed as 24-bit, though it was technically a 16-bit system with an 8-bit Zilog Z80 as coprocessor. The coprocessor was generally used for sound processing.

The NeoGeo was ranked 19th out of the 25 best video game consoles of all time by the video game website IGN in 2009.[1]

History

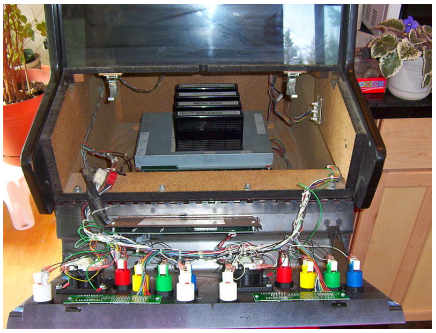
Initially, the (AES) home system was only available for rent to commercial establishments, such as hotel chains, bars and restaurants, and other venues. When customer response indicated that some gamers were willing to buy a $650 console, SNK expanded sales and marketing into the home console market. The Neo Geo console was officially launched on 31 January, 1990 in Osaka, Japan.[2] Compared to the other 16-bit consoles of the time, Neo Geo's graphics and sound were vastly superior. Furthermore, since the AES was identical to its arcade counterpart, the MVS, arcade titles released for the home market were perfect translations. Although its high price tag kept it out of the mainstream gaming market, a strong game lineup likely contributed to the cult status of the Neo Geo, enabling it to outlast the more popular Super Nintendo and Sega Mega Drive/Genesis.

In the United States, the console was planned to debut at $599 USD and included two joystick controllers and a game, either *Baseball Stars Professional* or *NAM-1975*. However, the price was raised and its American launch debuted at $649.99. This package was known as the "Gold System." Later, the "Gold System" was bundled with Magician Lord and Fatal Fury. The system was also released in a "Silver System" package for $399.99, which included one joystick controller and did not include a game. Other games were priced at about $200 (and up). With these "premium" prices, though, most gamers weren't able to afford the system, so the console was only accessible to a niche market.

The home system featured two CPUs: the 16-bit Motorola 68000 main processor running at 12 MHz and the 8-bit Zilog Z80 coprocessor running at 4 MHz. A custom video chipset allowed the system to display 4,096 colors and 380 individual sprites onscreen simultaneously, while the onboard Yamaha YM2610 sound chip gave the system 15 channels of sound with seven channels reserved specifically for digital sound effects. However, the screen resolution for the games were slightly lower than comparable games at the time, and the MVS cabinet used in the United States also had unusual video hardware which made the games' visuals appear slightly more dark and contrasted than other games.

When realtime 3D graphics stormed the arcade industry, the Neo Geo's hardware was unable to follow along. The longevity of Neo Geo games kept it alive in arcades, particularly in Japan, where the newest installment of its flagship franchise, *The King of Fighters*, caused a stir with every new release.

The last official game by SNK for the Neo Geo system, **Samurai Shodown V Special**, was released in 2004. SNK decided to abandon the hardware business due to the rampant piracy of game-cartridges, which SNK believed was partially responsible for its bankruptcy in 2001. SNK ceased to manufacture home consoles by the end of 1997, but continued to release games for both arcade and home for another 8 years.



Inside a four cartridge Neo Geo arcade machine

Measured from the introduction of the arcade hardware in 1990 to the release of the last official home cartridge in 2004, the Neo Geo enjoyed a market lifespan of fourteen years, making it the longest-lived arcade or home console system ever produced. On August 31, 2007, SNK stopped offering maintenance and repairs to Neo Geo home consoles, handhelds, and games.[3] However, they will continue to repair their MVS arcade hardware.

Game ports

The GameTap subscription service currently includes a Neo Geo emulator and a small library of Neo Geo games.

In February 2007, Nintendo announced on their Japanese website that Neo Geo games would appear on the Wii's Virtual Console in Japan; announcements in April and July confirmed placement on the North American Virtual Console,[4] [5] and on October 1, a similar announcement was made for the European Virtual Console.[6] NeoGeo games were made available on the Australian and European Virtual Console on October 5, and North American

Virtual Console on October 8.[7] The first three games released were *Fatal Fury: King of Fighters*, *Art of Fighting*, and *World Heroes*.

NeoGeo games released on the Virtual Console cost 900 Nintendo Points in all regions which is currently $9.00 USD.

NeoGeo games are also available through Xbox Live Arcade. As of July 2009, *Fatal Fury Special*, *Samurai Shodown II*, *Metal Slug 3*, *Garou: Mark of the Wolves* and *The King of Fighters '98* have been released.

It is also hinted that the PSP will have NeoGeo ports as well.[8]

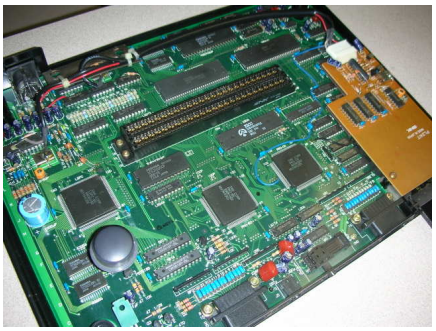
Technical aspects

Each joystick controller was 280mm (width) x 190mm (depth) x 95mm (height) (11 x 8 x 2.5 in.) and contained the same four-button layout as the arcade MVS cabinet.

The arcade machines had a memory card system by which a player could save a game to return to at a later time and could also be used to continue play on the SNK home console of the same name.

The arcade version of the hardware is often referred to as the "MVS," or Multi Video System (available in 1-slot, 2-slot, 4-slot, and 6-slot variations, the latter being capable of up to six cartridges loaded into one machine), with its console counterpart referred to as the "AES", or Advanced Entertainment System (most likely to distinguish it from the Nintendo Entertainment System, the dominating console on the market at the time).

The MVS and AES hardware could execute identical machine code. Owners could move EPROMs from one type to the other, and the game would still run. The program specifics for both MVS and AES game options were contained on every game ROM, whether the cartridge was intended for home or arcade use. However, the arcade and home cartridges do have a different pinout. They were designed this way to prevent arcade operators from buying the cheaper home carts and then using them in arcades. It has been found that in a few home version games, one could unlock the arcade version of the game by inputting a special code.



Neo Geo AES motherboard. Early motherboard revisions such as this one contained daughterboards used to enhance the clarity of the video output.

ROM sizes and startup screens

Specification for ROM size was up to 330 megabits, hence the system displaying "MAX 330 MEGA PRO-GEAR SPEC" upon startup. While no technical advances were required to achieve it, some games, such as Top Hunter, over 100 megabits followed this screen by displaying an animation proclaiming "THE 100MEGA SHOCK!". The original ROM size spec was later enhanced on cartridges with bank switching memory technology, increasing the maximum cartridge size to around 716 Mbit. These new cartridges also caused the system to display "GIGA POWER PRO-GEAR SPEC" upon startup, indicating this enhancement.

Max 330 Mega

The 100Mega Shock!

Giga Power

Graphics

Unlike most other video game consoles of its time, the Neo Geo did not use tilemap background layers. Instead, it relied exclusively on drawing sprites to create the background. Sprites are vertical strips which are 16 pixels wide, and can be 16 to 512 pixels tall. By laying multiple sprites side by side, the system can simulate a background layer. The system can draw up to 384 sprites on the screen at a time, and up to 96 per scanline.

Specifications

Processor

- Main processor: Motorola 68000, often produced by another manufacturer, running at 12 MHz
- Co-processor: Zilog Z80 running at 4 MHz. This is also used as an audio controller.

the arcade game cartridge measures 7.5 inches (190 mm) by 5.34 inches (136 mm)

Memory

- Main memory (used directly by 68000): 64 KB
- Main video memory : 74 KB
  - Video memory: 64 KB
  - Palette memory : 8 KB
  - Fast video RAM : 2 KB
- Sound memory (used directly by Z80): 2 KB

Display

- Display resolution: 320x224 (many games only used the centermost 304 pixels)
- Color palette: 65,536 (16-bit)
- Maximum colors on screen: 4,096 (12-bit)
- Maximum sprites on screen: 384
- Minimum sprite size: 1x2
- Maximum sprite size: 16x512
- Maximum sprites per scanline: 96
- Background layers: 0
- Aspect ratio: 4:3
- A/V output: RF, composite video, RGB (with separate 21 pin RGB cable FCG-9).

Sound

- Sound chip: Yamaha YM2610
- 4 FM channels, 4 operators per channel
- 3 SSG channels
- 1 Noise channel
- 7 ADPCM channels
- Work RAM (sound): 2KB
- Sound ROM 128KB on-board (only less than 32KB used)
- up to 512KB sound ROM on cartridges

Power

- Source: separate DC 5 V (older systems) and DC 9 V adapter (newer systems).
- Consumption: 8 W older Systems, 5 W newer Systems

Dimensions

- Console: 325 mm (width) x 237 mm (depth) x 60 mm (height).
- Controller: 280 mm (width) x 190 mm (depth) x 95 mm (height).

Storage

- Removable memory card: 2KB or 68-pin JEIDA ver. 3 spec memory
  - Any 68-pin memory that fits the JEIDA ver. 3 spec will work

Collecting

Home cartridges

There is a thriving collector's scene for the Neo Geo home systems, especially the original AES home console. This is mainly because of the limited runs received by cartridges, the massive arcade library available, and the system's reputation as a 2D powerhouse. It is still common even to this day for both Neo Geo consoles and cartridges to fetch extremely high prices on eBay and other auction websites, particularly English versions of cartridges as these were produced in lower quantities. A handful of the rarest Neo Geo games can sell for well over $1,000 on eBay.[9] This gives the system an almost cult following, as owners see the system as more of an "investment" rather than an ordinary videogame console. This leads to high resale value on most Neo Geo systems and games and makes the console a "must-have" for a number of video game collectors. The most expensive cartridge for the Neo Geo home system is the European-localized version of *Kizuna Encounter*: there are only five known copies of the game, with the most recently sold copy selling for about $12,000 USD.

Arcade cartridges

Another sub-scene within the Neo Geo collector's market involves the MVS cartridges. Although these were initially designed for arcade use, a strong market has developed around collecting this particular format. The MVS market can be divided into two distinct groups: those who are looking for cheaper alternatives to the expensive rare home carts, and those who are interested in paying premium prices for complete arcade kits.

For those interested primarily in lower prices on rare home games, MVS carts, particularly loose carts or incomplete kits, can offer a cost effective alternative. Most MVS cartridges cost substantially less than their home counterparts. This lower price can be associated with their lack of decoration as most were designed to be installed inside arcade cabinets and lack cartridge artwork or box artwork, the high set-up cost of purchasing the MVS system, and the prevalence of bootleg cartridges. Many of the most common MVS games go for prices between $10–$150.

However, in recent years a growing market has emerged for complete MVS arcade kits. These consist of all the materials that would be initially sent to an arcade operator, including the brown cardboard shipping box (with label), the insert materials to decorate the marqee and arcade cabinet (including separate move lists), warning information, dipswitch settings, in some cases even posters and/or any packing materials. Because many of the items in an MVS kit were designed to be discarded by arcade operators, finding complete arcade kits can be difficult and thus the prices for some complete MVS kits can be quite high.

Because of the conflicting requirements and desires of the two MVS sub-groups, they rarely compete with each other for games.

Counterfeit or bootleg software is regarded in the collectors community as having zero value or very low value. Such software has a reputation for audio and video flaws, and is generally disparaged by fans of the Neo Geo systems. This software is identifiable by visual inspection of the game PCBs, or by comparison of ROM CRC values using a specially designed BIOS.

Other Neo Geo systems

Several home console systems were created based on the same hardware as the arcade games, as well as two handheld systems under the name Neo Geo Pocket.

- Hyper Neo Geo 64 (new hardware, arcade only, dropped)
- Neo Geo CD
- Neo Geo Pocket
- Neo Geo Pocket Color

Graphical development

The Neo Geo was particularly notable for its ability to bring arcade-quality graphics directly into the home. As time went on, programmers were able to further tune the games to produce higher quality graphics than previous years and eventually beyond what was initially thought possible for the system.

One of the pack-in games with the original Japanese release was *NAM-1975*, a side-scrolling shooting game that featured multi-layer scrolling backgrounds. However, the initial Neo Geo games were, graphically speaking, a little less polished than SNK's non-Neo Geo games. By 1991, games like *King of the Monsters* demonstrated the Neo Geo's ability to produce graphic detail that matched or surpassed contemporary arcade games from the period.

In 1992, SNK's *Art of Fighting* marked the beginning of a series of 2-D fighting game innovations. This landmark game brought visual graphic damage to the characters' faces when hit, as well as large character sprites in combination with zoom effects to intensify the action. This zoom feature was also used in the following year's *Samurai Shodown*, whose even more elaborate graphics and gameplay won it Electronic Gaming Monthly's award as the 1993 Game of the Year and launched a successful franchise. The Neo Geo also became known for its shooters,

with the first successful title coming with 1994's *Aero Fighters 2*. The following year's *Pulstar* managed to up the ante on both graphics and gameplay.

Top Hunter, released in 1994, used the 100 Mega Shock, and thus featured extremely fluid and crisp graphics, such as the trees on the wind stage of the game.

By the mid-1990s, SNK was trying to move onto a new platform, notably the Hyper-64. When the new 3-D system failed to take off, however, SNK found itself still developing games for its old 2-D engine. This led programmers to come up with ways to increase the limits of what was initially thought possible for the system.

Six years after the Neo Geo's initial launch, Nazca Corporation surprised the video game industry with *Metal Slug*. A take from the *Contra series*, *Metal Slug* is a run and gun game that featured cartoonish, hyper-active graphics and gameplay that also launched a very successful franchise. Since the Neo Geo was unable to produce the 3-D games that began dominating arcades in the 1990s, SNK focused on mastering the realm of 2-D. With the launch of *The Last Blade* in 1997, SNK programmers demonstrated that the Neo Geo was still capable of producing artistically rendered graphics to match the gameplay.

While the system became primarily known for its fighting games in the late-1990s, notably the *King of Fighters* series, 1998's *Blazing Star* updated the previous *Pulstar* with more detail. This trend of adding more detail to 2-D environments reached a plateau with 1999's *Garou: Mark of the Wolves*, an update of the *Fatal Fury* series, as well as 2000's *Metal Slug 3*.

See also

- List of Neo Geo games
- NeoRageX, emulator
- GnGeo, emulator for Unix
- Kawaks, CPS-1 and CPS-2 emulator

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External links

- SNK Playmore Official Web Site (http://snkplaymore.co.jp/)
- SNK Playmore USA official web site (http://www.snkplaymoreusa.com/): Though no longer producing Neo Geo consoles or games, SNK Playmore still produces newer versions of Neo Geo games for current consoles and handhelds.
- Official Neo Geo Web Site (http://game.snkplaymore.co.jp/official/online/index.php)
- www.neo-geo.com (http://www.neo-geo.com/)
- NeoGeoForLife.com (http://www.neogeoforlife.com/): Neo Geo Game review database & information on the console
- SpooNMan's Neo-Geo Archives (http://www.videogameobsession.com/neogeo/): One of the original Neo-Geo fan sites from the 90's. Includes high quality box scans, articles, as well as other media that is 100% Neo-Geo.
- NeoGeo Master List (http://www.neo-geo.com/snk/masterlist.htm): a comprehensive listing of all Neo Geo games, int'l release dates, formats, meg sizes and other information (English)
- Neo-Geo MVS list (http://www.arcade-history.com/forum/viewtopic.php?id=31): an alternate listing, classed by official SNK ID number
- Statistics on the releases and sizes of Neo Geo games (http://mortal.shang.free.fr/pages/neo-geo_jeux.htm) (French)
- A wealth of information (http://www.chronicgames.net/museum/about-neo-geo.aspx) on the various Neo Geo consoles
- Neo-Geo.us (http://www.neo-geo.us/)
- Neogeospain.com - Spanish Neo-Geo WebSite (http://www.neogeospain.com/)
- Mercafriki.com - Neo-Geo Games & Consoles for Sell (http://www.mercafriki.com/)
- Ultimate-Arcade-Station - Build a Home Neo-Geo Cabinet with a Sega Megalo and a Euro40 Gevin (http://pagesperso-orange.fr/ultimate.arcade/)

Super Nintendo Entertainment System

Top: PAL region SNES
Bottom: North American SNES (circa 1991)
Other variations are pictured under Casing below

Manufacturer	Nintendo
Type	Video game console
Generation	Fourth generation (16-bit era)
Release date	• JP November 21, 1990 • NA August 23, 1991[1] • EU April 11, 1992 • AUS July 3, 1992
Discontinued	• JP 2003[2] • NA 1999[3]
Units sold	49.10 million[4]
Media	ROM cartridge
CPU	16-bit 65c816 Ricoh 5A22 3.58 MHz
Online services	Satellaview (Japan only), XBAND
Best-selling game	*Super Mario World* (pack-in), 20 million (as of June 25, 2007)[5] *Donkey Kong Country*, 8 million (as of June 11, 2003)[6]
Predecessor	Nintendo Entertainment System
Successor	Nintendo 64

The **Super Nintendo Entertainment System** (also known as the **Super NES**, **SNES**[7] or **Super Nintendo**) is a 16-bit video game console that was released by Nintendo in North America, Europe, Australasia (Oceania), and South America between 1990 and 1993. In Japan and Southeast Asia, the system is called the **Super Famicom** (スーパーファミコン, officially adopting the abbreviated name of its predecessor, the Family Computer), or SFC for short. In South Korea, it is known as the Super Comboy (슈퍼 컴보이) and was distributed by Hyundai Electronics. Although each version is essentially the same, several forms of regional lockout prevent the different versions from being compatible with one another.

The Super Nintendo Entertainment System was Nintendo's second home console, following the Nintendo Entertainment System (NES). The console introduced advanced graphics and sound capabilities compared with other consoles at the time. Additionally, development of a variety of enhancement chips (which were integrated on game circuit boards) helped to keep it competitive in the marketplace.

The SNES was a global success, becoming the best-selling console of the 16-bit era despite its relatively late start and the fierce competition it faced in North America from Sega's Genesis console. The SNES remained popular well into the 32-bit era, and although Nintendo has dropped all support for the console, it continues to be popular among fans, collectors, retro gamers, and emulation enthusiasts, some of whom are still making homebrew ROM images.

History

To compete with the popular NES/Famicom, NEC launched the TurboGrafx-16/PC-Engine in 1987, and Sega followed suit with the Genesis/Mega Drive in 1988. Both systems were built on 16-bit architectures and offered improved graphics and sound over the 8-bit NES. However, the NES would continue to dominate the gaming market for several years before Sega's system finally became successful.[8] Nintendo executives were initially reluctant to design a new system, but they reconsidered when the NES hardware began to show its age. Seeing its dominance in the market slipping, Nintendo was compelled to create a new console to compete with its 16-bit rivals.[9]

Early concept designs for the Super NES. The one above was referred to as the "Nintendo Entertainment System 2".

Launch

Designed by Masayuki Uemura, the designer of the original Famicom, the Super Famicom was released in Japan on Wednesday, November 21, 1990 for ¥25,000 (US$210). It was an instant success: Nintendo's initial shipment of 300,000 units sold out within hours, and the resulting social disturbance led the Japanese government to ask video game manufacturers to schedule future console releases on weekends.[10] The system's release also gained the attention of the Yakuza, leading to a decision to ship the devices at night to avoid robbery.[11]

With the Super Famicom quickly outselling its chief rivals, Nintendo reasserted itself as the leader of the Japanese console market.[12] Nintendo's success was partially due to its retention of most of its key third-party developers from its earlier system, including Capcom, Konami, Tecmo, Square, Koei, and Enix.[13]

On August 23, 1991,[1] Nintendo released the Super Nintendo Entertainment System, a redesigned version of the Super Famicom, in North America for US$199. The SNES was released in the United Kingdom and Ireland in April 1992 for GB£150, with a German release following a few weeks later. The PAL region versions of the console use the Japanese Super Famicom design, except for labeling and the length of the joypad leads. Both the NES and Super NES were released in Brazil in 1993 by Playtronic, a joint venture between the toy company Estrela and Gradiente.[15]

"Nintendo's strongest selling point, however, was the game that came packed in with the Super NES console—*Super Mario World*."[14]

The Super NES and Super Famicom launched with only a few games, but these games were well-received in the marketplace. In Japan, only two games were initially available: *Super Mario World* and *F-Zero*.[16] In North America, *Super Mario World* shipped with the console, and other initial titles included *F-Zero*, *Pilotwings* (which demonstrated the console's "Mode 7" pseudo-3D rendering capability), *SimCity*, and *Gradius III*.[17]

Console wars

The rivalry between Nintendo and Sega resulted in one of the fiercest console wars in video game history,[18] in which Sega positioned the Genesis as the "cool" console, with edgy advertisements occasionally attacking the competition and more mature titles aimed at older gamers.[19] Nintendo however, scored an early PR coup by securing the first console conversion of Capcom's arcade classic Street Fighter II for Super NES, which took over a year to make the transition to Genesis. Despite the Genesis' head start, much larger library of games, and lower price point,[20] market share between the SNES and the Genesis was about even in April 1992,[21] and neither console could maintain a definitive lead for several years. The Super NES eventually prevailed in the American 16-bit console market,[22] and would even remain popular well into the 32-bit generation.[23]

Changes in policy

During the NES era, Nintendo maintained exclusive control over titles released for the system—the company had to approve every game, each third-party developer could only release up to five games per year, those games could not be released on another console within two years, and Nintendo was the exclusive manufacturer and supplier of NES cartridges. However, competition from Sega's console brought an end to this practice; in 1990, Acclaim began releasing games for both platforms, with most of Nintendo's other licensees following suit over the next several years; Capcom (which licensed some games to Sega instead of producing them directly) and Square were the most notable holdouts.[24]

Nintendo of America also maintained a strict censorship policy that, among other things, limited the amount of violence in the games on its systems. One game, *Mortal Kombat*, would challenge this policy. A surprise hit in arcades in 1992, *Mortal Kombat* features splashes of blood and finishing moves that often depict one character dismembering the other. Because the Sega Genesis version retained the gore while the SNES version did not,[25] it outsold the SNES version by a ratio of three- or four-to-one.[26] [27] [28]

Game players were not the only ones to notice the violence in this game; US Senators Herb Kohl and Joe Lieberman convened a Congressional hearing on December 9, 1993 to investigate the marketing of violent video games to children.[29] While Nintendo took the high ground with moderate success, the hearings led to the creation of the Interactive Digital Software Association and the Entertainment Software Rating Board, and the inclusion of ratings on all video games.[25] [26] With these ratings in place, Nintendo decided its censorship policies were no longer needed. Consequently, the SNES port of *Mortal Kombat II* was released uncensored, and this time Nintendo's version was the one to get.[25] [26]

32-bit era and beyond

While other companies were moving on to 32-bit systems, Rare and Nintendo proved that the Super NES was still a strong contender in the market. In November 1994, Rare released *Donkey Kong Country*, a platform game featuring 3D models and textures pre-rendered on SGI workstations. With its detailed graphics and high-quality music, *Donkey Kong Country* rivaled the aesthetic quality of games that were being released on newer 32-bit CD-based consoles. In the last 45 days of 1994, the game sold 6.1 million units, making it the fastest-selling video game in history to that date. This game sent a message that early 32-bit systems had little to offer over the Super NES, and helped make way for the more advanced consoles on the horizon.[30] [31]

In October 1997, Nintendo released a redesigned model of the SNES (the SNS-101 model) in North America for US$99, which included the pack-in game *Super Mario World 2: Yoshi's Island*.[32] Like the earlier redesign of the NES (the NES-101 model), the new model was slimmer and lighter than its predecessor, but it lacked S-Video and RGB output, and it was among the last major SNES-related releases in the region. A similarly redesigned Super Famicom Jr. was released in Japan at around the same time.[33]

Nintendo of America ceased production of the SNES in 1999,[3] about two years after releasing *Kirby's Dream Land 3* (its last first-party game for the system) on November 27, 1997. In Japan, Nintendo continued production of the Super Famicom until September 2003,[2] and new games were produced until the year 2000, ending with the release of *Metal Slader Glory Director's Cut* on December 1, 2000.[34]

Many popular SNES titles have since been ported to the Game Boy Advance, which has similar video capabilities. In 2005, Nintendo announced that SNES titles would be made available for download via the Wii's Virtual Console service.[35] In 2007, Nintendo of Japan announced that it would no longer repair Family Computer or Super Famicom systems due to an increasing shortage of the necessary parts.[36]

Emulation

Like the NES before it, the SNES has retained interest among its fans even following its decline in the marketplace. It has continued to thrive on the second-hand market and through console emulation. The SNES has taken much the same revival path as the NES (see History of the Nintendo Entertainment System).

Emulation projects began with the initial release of VSMC in 1994, and Super Pasofami became the first working SNES emulator in 1996.[37] During that time, two competing emulation projects—Snes96 and Snes97—merged to form a new initiative entitled Snes9x.[38] In 1997, SNES enthusiasts began programming an emulator named ZSNES.[39] These two have remained among the best-known SNES emulators, although development continues on others as well. In 2003, members of both the Snes9x and ZSNES teams and others began a push for exact emulation;[40] [41] this movement is now led by the development of bsnes.[42]

ZSNES v1.51 user interface

Nintendo of America took the same stance against the distribution of SNES ROM image files and the use of emulators as it did with the NES, insisting that they represented flagrant software piracy.[43] Proponents of SNES emulation cite discontinued production of the SNES, the right of the owner of the respective game to make a personal backup, space shifting for private use, the desire to develop homebrew games for the system, the frailty of SNES cartridges and consoles, and the lack of certain foreign imports.[44] Despite Nintendo's attempts to stop the proliferation of such projects, emulators and ROM files continue to be widely available on the Internet.

The SNES was one of the first systems to attract the attention of amateur fan translators: *Final Fantasy V* was the first major work of fan translation, and was completed in 1997.[37] [45]

Emulation of the SNES is now available on handheld units, such as Android devices,[46] Apple's iPhone[47] and iPad,[48] Sony's PlayStation Portable (PSP),[49] the Nintendo DS[50] and Game Boy Advance,[51] the Gizmondo,[52] and the GP2X by GamePark Holdings,[53] as well as PDAs.[54] While individual games have been included with emulators on some GameCube discs, Nintendo's Virtual Console service for the Wii marks the introduction of officially sanctioned general SNES emulation.

Technical specifications

The design of the Super NES incorporates powerful graphics and sound co-processors that allowed impressive tiling and Mode 7 effects, many times more colors, and audio quality that represented a massive leap over the competition.[55] Individual game cartridges can supply further custom chips as needed.

Central processing unit

CPU reference	
Processor	Ricoh 5A22, based on a 16-bit 65c816 core
Clock rates (NTSC)	*Input:* 21.47727 MHz *Bus:* 3.58 MHz, 2.68 MHz, or 1.79 MHz
Clock rates (PAL)	*Input:* 21.28137 MHz *Bus:* 3.55 MHz, 2.66 MHz, or 1.77 MHz
Buses	24-bit and 8-bit address buses, 8-bit data bus
Additional features	• DMA and HDMA • Timed IRQ • Parallel I/O processing • Hardware multiplication and division

The CPU is a Nintendo-custom 5A22 processor, based on a 16-bit 65c816 core. The CPU employs a variable bus speed depending on the memory region being accessed for each instruction cycle: the input clock is divided by 6, 8, or 12 to obtain the bus clock rate. Non-access cycles, most register accesses, and some general accesses use the divisor of 6. WRAM accesses and other general accesses use the divisor of 8. Only the controller port serial-access registers use the divisor of 12.[56]

The chip has an 8-bit data bus, controlled by two address buses. The 24-bit "Bus A" is used for general accesses, while the 8-bit "Bus B" is used for support chip registers (mainly the video and audio processors).[56] Normally only one bus is used at a time, however the built in direct memory access (DMA) unit places a read signal on one bus and a write signal on the other to achieve block transfer speeds of up to 2.68 MB/s[57] .[58]

The DMA unit has 8 independent channels, each of which can be used in two modes. General DMA transfers up to 64 kB[59] in one shot, while H-blank DMA (HDMA) transfers 1–4 bytes at the end of each video scanline. HDMA is typically used to change video parameters to achieve effects such as perspective, split-screen, and non-rectangular windowing without tying up the main CPU.[58]

The 5A22 also contains an 8-bit parallel I/O port (which was mostly unused in the SNES); controller port interface circuits, including both serial and parallel access to controller data; a 16-bit multiplication and division unit; and circuitry for generating non-maskable interrupts on V-blank and IRQ interrupts on calculated screen positions.[58]

Video

Video reference	
Resolutions	*Progressive:* 256 × 224, 512 × 224, 256 × 239, 512 × 239 *Interlaced:* 512 × 448, 512 × 478
Pixel depth	2, 4, 7, or 8 bpp indexed; 8 or 11 bpp direct
Total colors	32768 (15-bit)
Sprites	128, 32 max per line; up to 64 × 64 pixels
Backgrounds	Up to 4 planes; each up to 1024 × 1024 pixels
Effects	• Pixelization (mosaic) per background • Color addition and subtraction • Clipping windows (per background, affecting color, math, or both) • Scrolling per 8 × 8 tile • Mode 7 matrix operations

The picture processing unit (PPU) consists of two separate but closely tied IC packages, which may be considered as a single entity. It also contains 64 kB[59] of SRAM for storing video data (VRAM), 544 bytes of object attribute memory (OAM) for storing sprite data, and 512 bytes of color generator RAM (CGRAM) for storing palette data. The PPU is clocked by the same signal as the CPU, and generates a pixel every two or four cycles. Both NTSC and PAL systems use the same PPU chips, with one pin per chip selecting NTSC or PAL operation.[58]

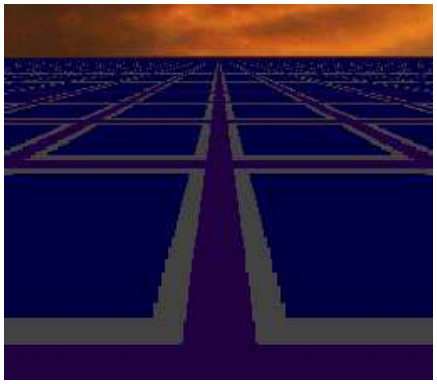
Images may be output at 256 or 512 pixels horizontal resolution and 224, 239, 448, or 478 pixels vertically. Vertical resolutions of 224 or 239 are usually output in progressive scan, while 448 and 478 resolutions are interlaced. Colors are chosen from the 15-bit RGB color space, for a total of 32,768 possible colors. Graphics consist of up to 128 sprites and up to 4 background layers, all made up of combinations of 8x8 pixel *tiles*. Most graphics use palettes stored in CGRAM, with color 0 of any palette representing transparency.[58]

Sprites can be 8 × 8, 16 × 16, 32 × 32, or 64 × 64 pixels, each using one of eight 16-color palettes and tiles from one of two blocks of 256 in VRAM. Sprites may be flipped horizontally and vertically as a whole. Up to 32 sprites and 34 8 × 8 sprite tiles may appear on any one line; exceeding these limits causes excess sprites or tiles to be dropped. Each sprite lies on one of 4 planes, however a lower-numbered sprite will always cover a higher-numbered sprite even if the latter is on a higher priority plane. This quirk is often used for complex clipping effects.[58]

Background layers in most modes range from 32 × 32 to 128 × 128 tiles, with each tile on one of two planes ("foreground" and "background") and using one of 8 palettes. Tiles are taken from a per-layer set of up to 1024 (as VRAM permits) and can be flipped horizontally and vertically. Each layer may be scrolled both horizontally and vertically. The number of background layers and the size of the palettes depends on the mode:[58]

- **Mode 0**: 4 layers, all using 4-color palettes. Each BG uses its own section of the SNES palette.
- **Mode 1**: 3 layers, two using 16-color palettes and one using 4-color palettes.
- **Mode 2**: 2 layers, both using 16-color palettes. Each tile can be individually scrolled.
- **Mode 3**: 2 layers, one using the full 256-color palette and one using 16-color palettes. The 256-color layer can also directly specify colors from an 11-bit (RGB443) colorspace.
- **Mode 4**: 2 layers, one using the full 256-color palette and one using 4-color palettes. The 256-color layer can directly specify colors, and each tile can be individually scrolled.
- **Mode 5**: 2 layers, one using 16-color palettes and one using 4-color palettes. Tile decoding is altered to facilitate use of the 512-width and interlaced resolutions.
- **Mode 6**: 1 layer, using 16-color palettes. Tile decoding is as in Mode 5, and each tile can be individually scrolled.

- **Mode 7**: 1 layer of 128x128 tiles from a set of 256, which may be interpreted as a 256-color one-plane layer or a 128-color two-plane layer. The layer may be rotated and scaled using matrix transformations. HDMA is often used to change the matrix parameters for each scanline to generate perspective effects.



A test image demonstrating the SNES's Mode 7 capability

Background layers may be individually pixelized, and layers and sprites can be individually clipped and combined by color addition or subtraction to generate more complex effects and greater color depths than can be specified directly.[58]

The PPU may be instructed to *latch* the current pixel position at any time during image output, both by game software and by the device attached to controller port 2. The game software may then read back this latched position. The PPU may also be used for fast 16-bit by 8-bit signed multiplication.[58]

Audio

Audio reference	
Processors	Sony SPC700, Sony DSP
Clock rates	*Input:* 24.576 MHz *SPC700:* 1.024 MHz
Format	16-bit ADPCM, 8 channels
Output	32 kHz 16-bit stereo
Effects	• ADSR envelope control • Frequency scaling and modulation using Gaussian interpolation • Echo: 8-tap FIR filter, with up to .24s delay • Noise generation

The audio subsystem consists of an 8-bit Sony SPC700, a 16-bit DSP, 64 kB[59] of SRAM shared by the two chips, and a 64 byte boot ROM. The audio subsystem is almost completely independent from the rest of the system: it is clocked at a nominal 24.576 MHz in both NTSC and PAL systems, and can only communicate with the CPU via 4 registers on Bus B.[60] [61]

RAM is accessed at 3.072 MHz, with accesses multiplexed between the SPC700 (⅓) and the DSP (⅔). This RAM is used to store the SPC700 program and stack, the audio sample data and pointer table, and the DSP's echo buffer.[60]

The SPC700 runs programs (uploaded using the boot ROM program) to accept instructions and data from the CPU and to manipulate the DSP registers to generate the appropriate music and sound effects. The DSP generates a 16-bit waveform at 32 kHz by mixing input from 8 independent voices and an 8-tap FIR filter typically used for reverberation. Each voice can play its PCM sample at a variable rate, with Gaussian interpolation, stereo panning, and ADSR, linear, non-linear, or direct volume envelope adjustment. The voice and FIR filter outputs are mixed both for direct output and for future input into the FIR filter. All audio samples are ADPCM compressed using Bit Rate Reduction.[60]

Hardware on the cartridge, expansion port, or both can provide stereo audio data for mixing into the DSP's analog audio output before it leaves the console.[62]

Since the audio subsystem is mostly self-contained, the state of the audio subsystem can be saved as an .SPC file, and the subsystem can be emulated in a stand-alone manner to play back all game music (except for a few games that constantly stream their samples from ROM). Custom cartridges or PC interfaces can be used to load .SPC files onto a real SNES SPC700 and DSP.

Onboard RAM

Memory reference	
Main RAM	128 kB[59]
Video RAM	64 kB main RAM 512 + 32 bytes sprite RAM 256 × 15 bits palette RAM
Audio RAM	64 kB

The console contains 128 kB[59] of DRAM. This is mapped to various segments of Bus A, and can also be accessed in a serial fashion via registers on Bus B. The video and audio subsystems contain additional RAM reserved for use by those processors.[58]

Regional lockout

Nintendo employed several types of regional lockout, including both physical and hardware incompatibilities.

On a physical level, the cartridges are shaped differently for different regions. North American cartridges have a rectangular bottom with inset grooves matching protruding tabs in the console, while other regions' cartridges are narrower with a smooth curve on the front and no grooves. The physical incompatibility can be overcome with use of various adapters, or through modification of the console.[63]

A cartridge shape comparison
Top: Japanese and PAL design
Bottom: North American designThe top image also illustrates the optional pins used by enhancement chips.

Internally, a regional lockout chip (CIC) within the console and in each cartridge prevents PAL region games from being played on Japanese or North American consoles and vice versa. The Japanese and North American machines have the same region chip. The console CIC releases the reset signal to the rest of the system only after completing a handshake with the chip in the cartridge.[63] This can be overcome through the use of adapters, typically by inserting the imported cartridge in one slot and a cartridge with the correct region chip in a second slot. Alternatively, disconnecting one pin of the console's lockout chip will prevent it from locking the console; hardware in later games can detect this situation, so it later became common to install a switch to reconnect the lockout chip as needed.[64]

PAL consoles face another incompatibility when playing out-of-region cartridges: the NTSC video standard specifies video at 60 Hz while PAL operates at 50 Hz, resulting in approximately 16.7% slower gameplay. Additionally, PAL's higher resolution results in letterboxing of the output image. Some commercial PAL region releases exhibit this same problem and therefore can be played in NTSC systems without issue, while others will face a 20% speedup if played in an NTSC console. To mostly correct this issue, a switch can be added to place the SNES PPU into a 60 Hz mode supported by most newer PAL televisions. Later games will detect this setting and refuse to run, requiring the switch to be thrown only after the check completes.[65]

Casing

			
Original Japanese version	Original North American version	Original PAL version	Super Famicom Jr.

All versions of the SNES are predominantly gray, although the exact shade may differ. The original North American version has a boxy design with purple sliding switches and a dark gray eject lever. The Japanese and European versions are more rounded, with darker gray accents and buttons. The North American SNS-101 model and the Japanese Super Famicom Jr. (the SHVC-101 model) are both smaller with a rounded contour, however the SNS-101 buttons are purple where the Super Famicom Jr. buttons are gray.

All versions incorporate a top-loading slot for game cartridges, although the shape of the slot differs between regions to match the different shapes of the cartridges. The card-edge connector has 62 pads, however many cartridges only connect to the middle 46. All versions also incorporate two 7-pin controller ports on the front of the unit, and a plug for a power supply and a Nintendo-proprietary "MULTI OUT" A/V connector on the back.[62] The MULTI OUT connector (later used on the Nintendo 64 and GameCube) can output composite video, S-Video and RGB signals, as well as RF with an external RF modulator.[63] Original versions additionally include a 28-pin expansion port under a small cover on the bottom of the unit[62] and a standard RF output with channel selection switch on the back;[66] the redesigned models output composite video only, requiring an external modulator for RF.[67]

The ABS plastic used in the casing of some older SNES consoles is particularly susceptible to oxidization on exposure to air, likely due to an incorrect mixture of the stabilizing or flame retarding additives. This, along with the particularly light color of the original plastic, causes affected consoles to quickly become yellow; if the sections of the casing came from different batches of plastic, a "two-tone" effect results.[68]

Yellowing of console plastic

Game cartridge

The cartridge media of the console is officially referred to as Game Pak in Western regions,[69] and as Cassette (カセット *Kasetto*) in Japan.[70] While the SNES can address 128 Mbit[59] , only 117.75 Mbit are actually available for cartridge use. A fairly normal mapping could easily address up to 95 Mbit of ROM data (48 Mbit at FastROM speed) with 8 Mbit of battery-backed RAM.[56] However, most available memory access controllers only support mappings of up to 32 Mbit. The largest games released (*Tales of Phantasia* and *Star Ocean*) contain 48 Mbit of ROM data,[71] [72] while the smallest games contain only 2 Mbit.

Cartridges may also contain battery-backed SRAM to save the game state, extra working RAM, custom coprocessors, or any other hardware that will not exceed the maximum current rating of the console.

Peripherals

The European and Australasian SNES controller

The SNES standard controller adds two additional face buttons to the design of the NES iteration, arranging the four in a diamond shape, and introduces two shoulder buttons. The inclusion of six active buttons was made with the popularity of the Street Fighter arcade series in mind.[73] It also features an ergonomic design later used for the NES-102 model controllers. The Japanese and PAL region versions incorporate the system's logo in the colors of the four action buttons, while the North American version colors them lavender and purple to match the redesigned console and gives the lighter two a concave rather than convex top. Several later consoles derive elements of their controller design from the SNES, including the PlayStation, Dreamcast, Xbox, and Wii Classic Controller.[74] [75] [76]

A special Wii Classic Controller using the Super Famicom controller design.

Throughout the course of its life, a number of peripherals were released which added to the functionality of the SNES. Many of these devices were modeled after earlier add-ons for the NES: the Super Scope is a light gun functionally similar to the NES Zapper (though the Super Scope features wireless capabilities) and the Super Advantage is an arcade-style joystick with adjustable turbo settings akin to the NES Advantage. Nintendo also released the SNES Mouse in conjunction with its *Mario Paint* title. Hudson Soft, under license from Nintendo, released the Super Multitap, a multiplayer adapter for use with its popular series of *Bomberman* games. Some of the more unusual controllers include the one-handed ASCII Stick L5, the BatterUP baseball bat, and the TeeV Golf golf club.[77]

While Nintendo never released an adapter for playing NES games on the SNES, the Super Game Boy adapter cartridge allows games designed for Nintendo's portable Game Boy system to be played on the SNES. The Super Game Boy touted several feature enhancements over the Game Boy, including palette substitution, custom screen borders, and (for specially enhanced games) access to the SNES console.[78] Japan also saw the release of the Super Game Boy 2, which added a communication port to enable a second Game Boy to connect for multiplayer games.

Like the NES before it, the SNES saw its fair share of unlicensed third-party peripherals, including a new version of the Game Genie cheat cartridge designed for use with SNES games. In general, Nintendo proved to be somewhat more tolerant of unlicensed SNES peripherals than they had been with NES peripherals.

Soon after the release of the SNES, companies began marketing backup devices such as the Super Wildcard, Super Pro Fighter Q, and Game Doctor.[79] These devices were sold to create a backup of a cartridge, in the event that it would break. However, they could also be used to play copied ROM images that could be downloaded from BBSes and the Internet, or to create copies of rented video games, often violating copyright laws in many jurisdictions.

Satellaview with Super Famicom.

Japan saw the release of the Satellaview, a modem which attached to the Super Famicom's expansion port and connected to the St.GIGA satellite radio station. Users of the Satellaview could download gaming news and specially designed games, which were frequently either remakes of or sequels to older Famicom titles, released in installments. Satellaview signals were broadcast from April 23, 1995 through June 30, 2000.[80] In the United States, the similar but relatively short-lived XBAND allowed users to connect to a network via a dial-up modem to compete against other players around the country.

During the SNES's life, Nintendo contracted with two different companies to develop a CD-ROM-based peripheral for the console to compete with Sega's CD-ROM based addon, Sega CD. Ultimately, negotiations with both Sony and Philips fell through, and Sony went on to develop its own console based on its initial dealings with Nintendo (the PlayStation), with Philips gaining the right to release a series of titles based on Nintendo franchises for its CD-i multimedia player.[81]

Enhancement chips

As part of the overall plan for the SNES, rather than include an expensive CPU that would still become obsolete in a few years, the hardware designers made it easy to interface special coprocessor chips to the console. This is most often characterized by 16 additional pins on the cartridge card edge.[62]

Star Fox, the first game to utilize the Super FX chip, as shown with the polygonal models that compose a large portion of the game's graphics

The Super FX is a RISC CPU designed to perform functions that the main CPU could not feasibly do. The chip was primarily used to create 3D game worlds made with polygons, texture mapping and light source shading. The chip could also be used to enhance 2D games.[38]

The Nintendo fixed-point digital signal processor (DSP) chip allowed for fast vector-based calculations, bitmap conversions, both 2D and 3D coordinate transformations, and other functions.[82] Four revisions of the chip exist, each physically identical but with different microcode. The DSP-1 version, including the later 1A and 1B bug fix revisions, was used most often; the DSP-2, DSP-3, and DSP-4 were used in only one title each.[83]

Similar to the 5A22 CPU in the console, the SA-1 chip contains a 65c816 processor core clocked at 10 MHz, a memory mapper, DMA, decompression and bitplane conversion circuitry, several programmable timers, and CIC region lockout functionality.[38]

In Japan, games could be downloaded for a fee from Nintendo Power kiosks onto special cartridges containing flash memory and a MegaChips MX15001TFC chip. The chip managed communication with the kiosks to download ROM images, and provided an initial menu to select which of the downloaded games would be played. Some titles were available both in cartridge and download form, while others were download only. The service was closed on February 8, 2007.[84]

Many cartridges contain other enhancement chips, most of which were created for use by a single company in a few titles;[83] the only limitations are the speed of the Super NES itself to transfer data from the chip and the current limit of the console.

Legacy

49.10 million Super NES units were sold worldwide, with 23.35 million of those units sold in the Americas and 17.17 million in Japan.[4] Although it could not quite repeat the success of the NES, which sold 61.91 million units worldwide,[4] the Super NES was the best-selling console of its era. The Mega Drive/Genesis came in second with 29–30 million sold worldwide,[85] [86] [87] and the TurboGrafx-16 was third with 10 million sold worldwide.[88]

The SNES has often been considered among the best video game consoles ever. In 2007, GameTrailers named the Super NES as the second-best console of all time in their list of top ten consoles that "left their mark on the history of gaming", citing its graphic, sound, and library of top-quality games.[89] Technology columnist Don Reisinger proclaimed "The SNES is the greatest console of all time" in January 2008, citing the quality of the games and the console's drastic improvement over its predecessor;[90] fellow technology columnist Will Greenwald replied with a more nuanced view, giving the SNES top marks with his heart, the NES with his head, and the PlayStation (for its controller) with his hands.[91] GamingExcellence also gave the SNES first place in 2008, declaring it "simply the most timeless system ever created" with many games that stand the test of time and citing its innovation in controller design, graphics capabilities, and game storytelling.[92] At the same time, GameDaily rated it fifth of ten for its graphics, audio, controllers, and games.[93] In 2009, IGN named the Super Nintendo Entertainment System the fourth best video game console, complimenting its audio and "concentration of AAA titles".[74]

See also

- List of SNES games
- List of Super Famicom games
- List of Player's Choice games

Content notes

[1] According to Stephen Kent's *The Ultimate History of Video Games*, the official launch date was September 9.Kent (2001), p. 434. Kent states September 1 was planned but later rescheduled to September 9. Newspaper and magazine articles from late 1991 report that the first shipments were in stores in some regions on August 23,Campbell, Ron (1991-08-27). "Super Nintendo sells quickly at OC outlets". *The Orange County Register*. "Last weekend, months after video-game addicts started calling, Dave Adams finally was able to sell them what they craved: Super Nintendo. Adams, manager of Babbages in South Coast Plaza, got 32 of the $199.95 systems Friday." Based on the publication date, the "Friday" mentioned would be August 23, 1991."Super Nintendo It's Here!!!". *Electronic Gaming Monthly* (Sendai Publishing Group) (28): 162. November 1991. "The Long awaited Super NES is finally available to the U.S. gaming public. The first few pieces of this fantastic unit hit the store shelves on August 23rd, 1991. Nintendo, however, released the first production run without any heavy fanfare or spectacular announcements.". while it arrived in other regions at a later date. "New products put more zip into the video-game market" (http://www.highbeam.com/doc/1P2-4070124.html) (abstract). *Chicago Sun-Times*. 1991-08-27. . Retrieved 2010-03-05. "On Friday, area Toys R Us stores [...] were expecting Super NES, with a suggested retail price of $199.95, any day, said Brad Grafton, assistant inventory control manager for Toys R Us." Based on the publication date, the "Friday" mentioned would be August 23, 1991. Many modern online sources (circa 2005 and later) report August 13.Ray Barnholt (2006-08-04). "Purple Reign: 15 Years of the Super NES" (http://www.1up.com/do/feature?pager.offset=1&cId=3152604). 1UP.com. pp. 2. . Retrieved 2007-06-14. "Super Nintendo Entertainment System" (http://www.n-sider.com/hardwareview.php?hardwareid=5). N-Sider.com. . Retrieved 2007-06-14.

[2] Hirohiko Niizumi (2003-05-30). "Nintendo to end Famicom and Super Famicom production" (http://www.gamespot.com/news/6029220.html). GameSpot. . Retrieved 2007-07-15.

[3] "Super Nintendo Entertainment System 2" (http://www.old-computers.com/museum/computer.asp?st=2&c=1249). *Museum*. Old-Computers.com. . Retrieved 2007-07-15.

[4] "Consolidated Sales Transition by Region" (http://www.webcitation.org/5nXieXX2B) (PDF). Nintendo. 2010-01-27. Archived from the original (http://www.nintendo.co.jp/ir/library/historical_data/pdf/consolidated_sales_e0912.pdf) on 2010-02-14. . Retrieved 2010-02-14.

[5] "1990" (http://www.edge-online.com/magazine/the-nintendo-years?page=0,1). *The Nintendo Years*. Next-Gen.biz. 2008-07-16. pp. 2. . Retrieved 2007-10-28.

[6] Frank Provo (2003-06-11). "Donkey Kong Country Review" (http://www.gamespot.com/gba/action/donkeykongcountry/review.html). GameSpot. pp. 1. . Retrieved 2008-12-28.

[7] The acronym *SNES* can be pronounced by English speakers as a single word (compare "NATO") with various pronunciations, an initialism (compare "IBM"), or as a hybrid (compare "JPEG"); some even claim *SNES* should be pronounced "Super Nintendo" or "Super NES". In

written English, the choice of indefinite article can be problematic due to these differences in pronunciation. "Do you say NES or N-E-S?" (http://www.webcitation.org/5S4MkTYj4). *Nintendo NSider Forums*. Archived from the original (http://forums.nintendo.com/nintendo/board/message?board.id=legacy&message.id=309753&view=by_date_ascending&page=1) on 2007-09-23. . Retrieved 2007-09-23. Additional archived pages: 2 (http://www.webcitation.org/5S4MlYjSy) 3 (http://www.webcitation.org/5S4Mm8Ee5) 4 (http://www.webcitation.org/5S4MmYPog) 5 (http://www.webcitation.org/5S4MnGTYh) 6 (http://www.webcitation.org/5S4Mni9y1) 7 (http://www.webcitation.org/5S4Mo7mOX) 8 (http://www.webcitation.org/5S4MoS63U) 9 (http://www.webcitation.org/5S4MoqqtM) 10 (http://www.webcitation.org/5S4MpGQEN) "Pronouncing NES & SNES" (http://uk.gamespot.com/pages/unions/forums/show_msgs.php?topic_id=25234640&union_id=177). *GameSpot forums*. . Retrieved 2007-05-16.

[8] Sheff (1993), pp. 353–356. "The Genesis continued to flounder through its first couple of years on the market, although Sega showed Sisyphean resolve.… [By mid-1991] Sega had established itself as the market leader of the next generation."

[9] Kent (2001), pp. 413–414.

[10] Kent (2001), pp. 422–431.

[11] Sheff (1993), pp. 360–361.

[12] Kent (2001), pp. 431–433. "Japan remained loyal to Nintendo, ignoring both Sega's Mega-Drive and NEC's PC Engine (the Japanese name for TurboGrafx).… Unlike the Japanese launch in which Super Famicom had outsold both competitors combined in presales alone, Super NES would debut against an established product."

[13] Kristan Reed (2007-01-19). "Virtual Console: SNES" (http://www.eurogamer.net/articles/virtual-console-snes-review). Eurogamer. . Retrieved 2009-02-12.

[14] Kent (2001), p. 432.

[15] "Nintendo Brasil" (http://web.archive.org/web/20070717104708/http://nintendoworld.ig.com.br/home/nobrasil/index.php) (in Portuguese). Nintendo. Archived from the original (http://nintendoworld.ig.com.br/home/nobrasil/index.php) on 2007-07-17. . Retrieved 2007-08-02.

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Commodore CDTV

Manufacturer	Commodore
Type	Home multimedia entertainment / Video game console / Personal computer
Generation	16-bit era
Release date	March 1991
Media	CD-ROM
Operating system	AmigaOS 1.3
CPU	Motorola 68000 @ 7 MHz
Memory	1 MB

The **CDTV** (for "**C**ommodore **D**ynamic **T**otal **V**ision") was a multimedia platform developed by Commodore International and launched in 1991. On a technological level it was essentially a Commodore Amiga home computer in a Hi-Fi style case with a single-speed CD-ROM drive. Commodore marketed the machine as an all-in-one home multimedia appliance rather than a computer. As such, it targeted the same market as the Philips CD-i. Unfortunately for both Commodore and Philips, the expected market for multimedia appliances did not materialise, and neither machine met with any real commercial success. Though the CDTV was based entirely on Amiga hardware it was marketed strictly as a CDTV, with the Amiga name omitted from product branding.

The CDTV debuted in North America in March 1991 (CES, Las Vegas) and in the UK (World of Commodore 1991 at Earls Court, London)[1] . It was advertised at £499 for the CDTV unit, remote control and two titles[2] . Commodore chose Amiga enthusiast magazines as its chief advertising channel, but the Amiga community on the whole avoided the CDTV in the expectation of an add-on CD-ROM drive for the Amiga, which eventually came in the form of the A570.

The CDTV was supplied with AmigaOS 1.3, rather than the more advanced and user-friendly 2.0 release that was launched at around the same time. Notably, the CDXL motion video format was primarily developed for the CDTV making it one of the earliest consumer systems to allow video playback from CD-ROM.

Though Commodore later developed an improved and cost-reduced CDTV-II it was never released.[3] Commodore eventually discontinued the CDTV in 1993 with the launch of the Amiga CD32, which used similar hardware but explicitly targeted the games market.

Design

The CDTV was intended as a media appliance rather than a personal computer. As such, its housing had dimensions and styling compatible with most stereo components, and it came with an infrared remote control. Similarly, it was initially sold without keyboard and mouse (which could be added separately, and were later bundled with the machine). The CDTV was based on the same technology as earlier Amiga systems, but featured a single-speed CD-ROM drive and no floppy disk drive as standard.

Commodore CDTV setup with 1084 monitor displaying the CDTV's audio CD player facility.

Technical specifications

Close-up detail of the CDTV buttons.

Attribute	Specification
Processor	Motorola 68000 at 7.16 MHz (NTSC) or 7.09 MHz (PAL)
RAM	1 MB Amiga Chip RAM (upgradable) 2 kB non-volatile RAM
ROM	256 kB Kickstart ROM 256 kB CDTV firmware ROM

Chipset	Original Chip Set (OCS) or Enhanced Chip Set (ECS)
	• Video
	  • 12-bit color palette (4,096 colors)
	  • Up to 32, 64 (EHB mode) or 4,096 (HAM mode) on-screen colors
	  • Resolutions from 320×200 to 640×512i (more with overscan)
	• Audio (Paula)
	  • 4 hardware channels (stereo)
	  • 8-bit resolution / 6-bit volume
	  • Maximum DMA sampling rate of 28 kHz

Removable storage	Single-speed CD-ROM drive (proprietary controller)
Input/output ports	Keyboard (5 pin mini-DIN) Mouse (4 pin mini-DIN) RS-232 serial port (DB-25M) Centronics style parallel port (DB-25F) Floppy disk drive port (DB-23F) MIDI (In and Out)
Audio/Video output	Audio out (2 × RCA and 6.35 mm stereo jack) Analog RGB video out (DB-23M) RF audio/video out (RCA[a] or RF loop through[b]) Composite video out (RCA)[a][b] S-Video out (4-pin mini-DIN)[a] SCART audio/video out[c]
Expansion slots	Proprietary card slot by ITT-Cannon and Fujisoku from 8 to 1024 KB non-volatile memory cards (1 MB addressing needs a hardware hack) 80-pin diagnostic slot 30-pin DMA expansion slot Video slot
Operating system	AmigaOS 1.3 (Kickstart 1.3/Workbench 1.3) and CDTV firmware
Physical dimensions	430 × 330 × 95 mm (W × D × H)
Other	Wireless infrared remote control/gamepad Front panel with display and controls for CD player

Notes

a. ^ North American model
b. ^ UK model
c. ^ European model

Official upgrades

The CDTV was compatible with many existing Amiga peripherals. In addition, official CDTV peripherals and upgrades included:

- Wireless infrared mouse
- Wireless trackball
- Black styled keyboard
- SCSI controller providing both an internal and external SCSI connector for hard disk drives and other SCSI devices
- External black styled hard disk drive[4]
- External black styled floppy disk drive
- Proprietary memory cards with a capacity of 64 or 256 kB (CD1401/CD1405) allowing storage of game scores and progress[5]
- Genlocks for NTSC or PAL (CD 1300/CD1301) to overlay video signal with a secondary video source[6]

Versions

- CDTV: CDTV unit and remote control/gamepad
- Pro pack: CDTV unit, remote control/gamepad, keyboard, mouse and floppy disk drive, along with Almathera CDPD Public Domain software compilation on CD-ROM

Market competition

High-end A/V (primary market)

(multi-purpose audio/video systems)

- Philips' CD-i
- Pioneer's LaserActive
- The 3DO Company's 3DO Interactive Multiplayer
- Tandy Video Information System

Video gaming (secondary market)

- NEC PC Engine with Super CD-ROM expansion
- Nintendo's SNES
- Sega Mega Drive with CD-ROM expansion
- The 3DO Company's 3DO Interactive Multiplayer

See also

- Amiga models and variants

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CD-i

Manufacturer	Philips Electronics Magnavox Sony
Type	Video game console Media player
Generation	Fourth generation era
Release date	December 3, 1991
Retail availability	1991[1]
Discontinued	1995
Units sold	570,000[1]
Media	CD-i, Audio CD, CD+G, Karaoke CD, VCD
CPU	Philips 68070
Best-selling game	Hotel Mario

CD-i, or **Compact Disc Interactive**, is the name of an interactive multimedia CD player developed and marketed by Royal Philips Electronics N.V. CD-i also refers to the multimedia Compact Disc standard used by the CD-i console, also known as Green Book, which was developed by Philips and Sony (not to be confused with MMCD, the pre-DVD format also co-developed by Philips and Sony). Work on the CD-i began in 1984 and it was first publicly announced in 1986.[2] The first Philips CD-i player, released in 1991 and initially priced around USD $700[3] , is capable of playing interactive CD-i discs, Audio CDs, CD+G (CD+Graphics), Karaoke CDs, and Video CDs (VCDs), though the last requires an optional "Digital Video Card" to provide MPEG-1 decoding.

Although several video game titles were released for the system that established a cult following (including the Nintendo-related games), the CD-i proved to be a commercial failure in that market segment and some of its games have been known to be among the worst games ever made.[1] Phillips ceased publishing video games for the platform in 1998.

Applications

Early software releases in the CD-i format focused heavily on educational, music, and self-improvement titles, with only a handful of video games, many of them adaptations of board games such as "Connect Four". Later attempts to develop a foothold in the games market were rendered irrelevant by the arrival of cheaper and more powerful consoles, such as the Nintendo 64 and PlayStation. CD-i is noted for the release of several spinoffs of popular Nintendo video games featuring characters typically seen only on Nintendo consoles, although those games were not developed by Nintendo. *Hotel Mario* was a puzzle game that featured Super Mario Bros. characters.

Applications were developed using authoring software produced by OptImage. This included OptImage's Balboa Runtime Libraries and MediaMogul. The second company that produced authoring software was Multimedia Technology Center; they produced CDMotion.

CD-i also released several versions of popular TV game shows, including versions of *Jeopardy!* (hosted by Alex Trebek), *Name That Tune* (hosted by Bob Goen), and two versions of *The Joker's Wild* (one for adults hosted by Wink Martindale and one for kids hosted by Marc Summers). All CD-i games in North America (with the exception of *Name That Tune*) had Charlie O'Donnell as announcer. The Netherlands also released its version of *Lingo* on the CD-i in 1994.

In 1993, American musician Todd Rundgren created the world's first music-only fully interactive CD, *No World Order*, for the CD-i. This groundbreaking application allowed the user to completely arrange the whole album in their own personal way with over 15,000 points of customization.

CD-i has a series of learning games ("edutainment") targeted at children from infancy to adolescence. Those intended for a younger audience included *Busytown*, *The Berenstain Bears*, and various others which usually had vivid cartoon-like settings accompanied by music and logic puzzles. One of the most remarkable games released on this platform is a game combining Lewis Carroll's *Alice's Adventures in Wonderland* and *Through the Looking-Glass*.

Although extensively marketed by Philips, notably via infomercial, consumer interest in CD-i titles remained low. By 1994, sales of CD-i systems had begun to slow, and in 1998 the product line was dropped.

With the home market exhausted, Philips tried with some success to position the technology as a solution for kiosk applications and industrial multimedia. The console still maintains a cult following on the Internet. Additionally, a Mario game (titled *Hotel Mario*), and three *Legend of Zelda* games were released: *Link: The Faces of Evil*, *Zelda: The Wand of Gamelon* and *Zelda's Adventure*. Nintendo and Philips had established an agreement to co-develop a CD-ROM enhancement for the Super Nintendo Entertainment System (after Nintendo and Sony scrapped a previous deal on an earlier add-on for the SNES, which would eventually result in the creation of the PlayStation), and Philips was contractually allowed to continue using Nintendo characters after the deal fell through.

Player models

Philips models

In addition to consumer models, professional and development players were sold by Philips Interactive Media Systems and their VARs. Philips marketed several CD-i player models.

- The **CD-i player 200 series**, which includes the 205, 210, and 220 models. Models in the 200 series are designed for general consumption, and were available at major home electronics outlets around the world. The Philips CD-i 910 is the American version of the CD-i 205, the most basic model in the series.
- The **CD-i player 300 series**, which includes the 310, 350, 360, and 370 models. The 300 series consists of portable players designed for the professional market and not available to home consumers. A popular use was multimedia sales presentations such as those used by pharmaceutical companies to provide product information to physicians, as the devices could be easily transported by sales representatives.
- The **CD-i player 400 series**, which includes the 450, 470, 490 models. The 400 models are slimmed-down units aimed at console and educational markets. The CD-i 450 player, for instance, is a budget model designed to compete with game consoles. In this version, an infrared remote controller is not standard but optional.
- The **CD-i player 600 series**, which includes the 601, 602, 604, 605, 615, 660, and 670 models. The 600 series is designed for professional applications and software development. Units in this line generally include support for floppy disk drives, keyboards and other computer peripherals. Some models can also be connected to an emulator and have software testing and debugging features.

There also exist a number of hard-to-categorize models, such as the FW380i, an integrated mini-stereo and CD-i player; the 21TCDi30, a television with a built-in CD-i device; and the CD-i 180/181/182 modular system, the first CD-i system produced.

Other manufacturers

Besides Philips, several other manufacturers produced CD-i players, including Magnavox, GoldStar / LG Electronics, Digital Video Systems, Memorex, Grundig, Sony ('Intelligent Discman', a portable CD-i player), Kyocera, NBS, Highscreen, and Bang & Olufsen, who produced a television with a built-in CD-i device (Beocenter AV5).

TeleCD-i and CD-MATICS

Recognizing the growing need among marketers for networked multimedia, Philips partnered in 1992 with Amsterdam based CDMATICS [4] to develop TeleCD-i (also TeleCD). In this concept, the CD-i player is connected to a network (PSTN, Internet or other) enabling data-communication and rich media presentation. Dutch grocery chain Albert Heijn and mail-order giant Neckermann Shopping [5] were early adopters and introduced award-winning TeleCD-i applications for their home-shopping and home-delivery services. CDMATICS also developed the special Philips TeleCD-i Assistant [6] and a set of software tools helping the worldwide multimedia industry to develop and implement TeleCD-i. TeleCD-i was the world's first networked multimedia application at the time of its introduction. In 1996, Philips acquired source code rights from CDMATICS.

Technical specifications

CPU

- 16-bit 68070 CISC Chip (68000 core)[4]
- Clock Speed of 15.5 MHz[1]

Display

- Graphics Chip: MCD 212[4]
- Resolution: 384×280 to 768×560
- Colors: 16.7 million w/ 32,768 on screen
- MPEG 1 Cartridge Plug-In for VideoCD and Digital Video

Audio

- Sound Chip: MCD 221[4]
- ADPCM eight channel sound
- 16-bit stereo sound

Operating System

- CD-RTOS (based on Microware's OS-9)

Other

- 1 MB of main RAM[4]
- Single speed CD-ROM drive
- Weight with DV cart 1.460 kg, without DV 1.210 kg

CD-i accessories

- CD-i mouse
- Roller controller
- CD-i trackball
- I/O port splitter

- Touchpad controller
- Gamepad controller (Gravis PC GamePad)
- IR wireless controller
- S-video cable
- RAM expansion and Video-CD (MPEG-1) support with DV Cart

Market competition

Interactive Kiosk (primary market)

- Panasonic M2 [5]

High-end A/V (secondary market)

(multi-purpose audio/video systems)

- Commodore CDTV
- Pioneer LaserActive
- 3DO Interactive Multiplayer
- Tandy Video Information System

Video game (secondary market)

- Sega Genesis with Sega CD CD-ROM expansion
- 3DO Interactive Multiplayer

Reception

The CD-i's controller was ranked the fifth worst video game controller by IGN editor Craig Harris.[6]

See also

- List of CD-i games
- CD-i games from The Legend of Zelda series
- Hotel Mario
- CD-i Ready

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[1] Blake Snow (2007-05-04). "The 10 Worst-Selling Consoles of All Time" (http://www.gamepro.com/gamepro/domestic/games/features/111823.shtml). GamePro.com. . Retrieved 2007-11-25.

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[3] "COMPANY NEWS; New Philips CD - The New York Times" (http://www.nytimes.com/1992/04/02/business/company-news-new-philips-cd.html?n=Top/Reference/Times Topics/Subjects/N/New Models, Design and Products). Nytimes.com. 1992-04-02. . Retrieved 2009-08-19.

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[6] "Top 10 Tuesday: Worst Game Controllers" (http://xbox360.ign.com/articles/690/690449p1.html). IGN. 2006-02-21. . Retrieved 2009-08-07.

External links

- CD-i (http://www.dmoz.org/Games/Video_Games/Console_Platforms/CD-i/) at the Open Directory Project
- Official Philips CD-I FAQ (http://www.consoledatabase.com/faq/philipscd-i/phillipscdifaq.txt)
- CD-i history (http://www.philipscdi.com/history.htm)
- CD-i hardware (http://www.philipscdi.com/hardware.htm)
- SNES CD-ROM at Gamers Graveyard (http://www.gamersgraveyard.com/repository/snes/history/snescdrom.html)
- Efficient Placement of Audio Data on Optical Disks for Real Time Applications (http://www.cib.espol.edu.ec/Digipath/D_Papers/36609.pdf)

Super A'Can

Manufacturer	Funtech
Type	Video game console
Generation	Fourth generation (16-bit era)
Retail availability	1995
Media	Cartridge
CPU	16-bit Motorola 68000, 8-bit MOS 6502

The **Super A'can** is a console that was released exclusively in Taiwan in 1995 by Funtech Entertainment. At first glance it appears to be a Super Nintendo clone with the case and controllers bearing a strong similarity to the Japanese version, but inside is a Motorola 68000, similar to the Sega Genesis/Mega Drive and Neo Geo. Twelve games have been confirmed to exist for the system.

Although the A'can is a powerful console that had the support of several of Taiwan's largest firms developing software for it, it ultimately failed on the market for a few reasons: its initial cost was too high for most interested parties to afford, and newer, more powerful systems with 3D technology were appearing on the market at the same time (such as the Sony PlayStation). Also, as the developers were pushed to finish their games as quickly as possible (and using a rather stubborn and poorly documented development kit to do so), the resulting A'can games were, by far, nothing special.

In fact, the A'can did so very poorly on the market during its short appearance there that it lost its company over USD$6M (6 million US dollars). In the end, the company destroyed all development and production materials related to the machine, and sold off the remaining systems to the United States as scrap parts.

Technical specifications

CPU

Hardware specifications

Processor	Motorola 68000 (or equivalent) clocked at 10.74 MHz
Secondary processor	8-bit MOS 6502, clocked at 3.58 MHz

Graphics

Palette:	32,768 colors

Input and output

Control pad inputs	Two DE-9M (9-pin male D-connectors) on front of console, identical to those of the Sega Genesis/Mega Drive (though not compatible with Genesis/Mega Drive control pads)

List of games

- F001: *Formosa Duel*
- F002: *Sango Fighter*
- F003: *The Son of Evil*
- F004: *Speedy Dragon/Sonic Dragon*
- F005: *Super Taiwanese Baseball League*
- F006: *Journey to the Laugh (aka C.U.G.)*
- F007: *Super Light Saga - Dragon Force*
- F008: *Monopoly: Adventure in Africa*
- F009: *Gambling Lord*
- F010: *Magical Pool*
- F011: *Boomzoo*
- F012: *Rebel Star*

External links

- Fan site [1] (via archive.org)
- Video Game Console Library page [2]

The Fifth Generation

History of video game consoles (fifth generation)

The **fifth-generation era** (more commonly known as the **32 bit era** and occasionally, after the release of the Nintendo 64, the **64 bit era** and more rarely the **3D era**) refers to the computer and video games, video game consoles, and video game handhelds available at stores. The fifth generation lasted approximately from 1993 to 2002 and was dominated by three consoles, the Sega Saturn (1994), the Sony PlayStation (1994), and the Nintendo 64 (1996). Demographics in console sales varied widely, but these three consoles, especially the PlayStation, defined the system wars of this era. The FM Towns Marty, Amiga CD32, 3DO, the NEC PC-FX, and Atari Jaguar were also part of this era, but their sales were poor and they failed to make a significant impact on the market, though the Amiga CD32 was selling well at the time for a Europe-only release. This era also saw three updated versions of Nintendo's Game Boy: Game Boy Light (Japan only), Game Boy Pocket, and Game Boy Color.

Bit ratings for consoles largely fell by the wayside during this era, with the notable exceptions of the Nintendo 64 and the heavy usage of references to the 64-bit processing power of the Atari Jaguar in advertisements. The number of "bits" cited in console names referred to the CPU word size and had been used by hardware marketers as a "show of power" for many years. However, there was little to be gained from increasing the word size much beyond 32 or 64 bits because once this level was reached, performance depended on more varied factors, such as processor clock speed, bandwidth, and memory size.

The fifth generation also saw the rise of emulation. During this period, commonly available personal computers became powerful enough to emulate the 8 and 16-bit systems of the previous generation. Also, the development of the Internet made it possible to store and download tape and ROM images of older games, eventually leading 7th generation consoles (such as the Xbox 360, the Wii, PlayStation 3, PlayStation Portable, and Nintendo DSi) to make many older games available for purchase or download.

Console systems

Transition to 3D

The 32-bit / 64-bit era is most noted for the rise of fully 3D games. While there were games prior that had used three dimensional environments, such as *Virtua Racing* and *Star Fox*, it was in this era that many game designers began to move traditionally 2D and pseudo-3D genres into 3D. *Super Mario 64* on the N64, *Crash Bandicoot* on the PlayStation, and *Tomb Raider* on the Saturn (later released on the PlayStation as well), are prime examples of this trend. Their 3D environments were widely marketed and they steered the industry's focus away from side-scrolling and rail-style titles, as well as opening doors to more complex games and genres. Games like GoldenEye 007 or The Legend Of Zelda: Ocarina of Time were nothing like shoot-em-ups or adventure games before them. 3D became the main focus in this era as well as a slow decline of Cartridges in favor of CD's, due to the ability to produce games cheaper. The game also included more dramatic cut scenes with symphonic music - the term 'interactive movie' became less associated with games that made heavy use of full-motion video and more with games with an action movie feel to them, such as Metal Gear Solid.

CD vs cartridge

As Nintendo prepared to launch its newest console, they decided to make the Nintendo 64 a cartridge-based system like its predecessors. Publicly, Nintendo defended this decision on the grounds that it would give games shorter load times than a compact disc (and would decrease piracy). However, it also had the dubious benefit of allowing Nintendo to charge higher licensing fees, as cartridge production was considerably more expensive than CD production. Many third-party developers viewed this as an underhanded attempt to raise more money for Nintendo and many of them became more reluctant to release games on the N64.

Nintendo's decision to use a cartridge based system sparked a small scale war amongst gamers as to which was better. The "media war" was spurred on no less by statements from top company executives themselves; one Nintendo magazine ad placed a Space Shuttle (cartridge) next to a snail (a CD) and dared consumers to decide "which one was better". At the time, CD-ROMs did suffer from long load times (some games even featured "mini" games that players could play while the real game was loading).

Despite these and other moves by Nintendo, almost every other contemporary system used the new CD-ROM technology (the Nintendo 64 was the last major home video game console to use cartridges). Also appealing to publishers was the fact that CDs could be produced at significantly less expense and with more flexibility (it was easy to change production to meet demand), and they were able to pass the lower costs onto consumers. In particular, the fifth generation marked a turning point for optical-based storage media. As games grew more complex in content, sound, and graphics, the CD proved more than capable of providing enough space for the extra data. The cartridge format, however, was pushed beyond the limits of its storage capacity. Consequently, many game developers shifted their support away from the Nintendo 64 to the PlayStation.

Console wars

The 32-bit / 64-bit era was a paramount staging ground of the continuing "console wars" between the large game hardware manufacturers. "Console wars" were a phenomenon in which people would attempt to evaluate the upcoming hardware of a system and purchase the system for that reason alone, speculating that the best games must be made for that hardware. Since the length of time systems spent in development had been steadily growing since the 8-bit era, consumers were left with a lengthy period of time in which to speculate about the strengths and weaknesses of the consoles to be released in the next generation.

Overview of the fifth generation consoles

Many events transpired to mislead gamers during this era, causing much bitterness and confusion over which console was superior to the others. Adding to the uncertainty was the fact that there were more competing consoles in this era than at any other time after the North American video game crash of 1983. In addition, video game magazines constantly performed side-by-side hardware-specification comparisons of the systems using dubious statistics. Also, console makers routinely boasted theoretical maximum limits of each system's 3D polygon rendering without accounting for real world in-game performance.

The FM Towns Marty was the world's first 32 bit console (contrary to claims from the Amiga CD32 and 3DO) and was released in 1991 by Japanese electronic company Fujitsu. Never released outside of Japan, it was largely marketed as a console version of the home computer FM Towns, since it was compatible with games developed for the FM Towns. It failed to make an impact in the marketplace because it was more expensive than other consoles and could not compete with home computers.[1]

Despite massive third party support and an unprecedented amount of hype for a first-time entrant into the industry, the 3DO Interactive Multiplayer's $700 price tag[2] hindered its success.

The Amiga CD32 was sold in Europe, Australia and Canada, but never in the US due to Commodore's bankruptcy. A large stock of NTSC CD-32s remained at the factory in the Philippines, which were sold off by creditors and appeared on the second hand market for many years.

The Sega 32X, an add-on console for the Mega Drive/Genesis and Sega Mega-CD, was released almost simultaneously with the Sega Saturn. The Sega Neptune was also announced as a standalone version of the 32X, but ultimately canceled. Sega failed to deliver a steady flow of games for the 32X platform. More importantly, with the Saturn and PlayStation already on the horizon, most gamers preferred to save up their money rather than spend it on a console that was doomed to become obsolete in just a few months.[3]

The Sega Saturn was released as Sega's shot of a 32 bit console. It was moderately successful, selling 9 million units worldwide. However, it was not the success figure that the Master System and Mega Drive were, and it lagged in third place(behind the less expensive PlayStation and N64 consoles) until it was discontinued.

The Atari Jaguar was released in 1993 as the world's first 64-bit system. However, sales at launch were well below the incumbent fourth generation consoles, and a small games library rooted in a shortage of third party support made it impossible for the Jaguar to catch up. The system's 64-bit nature was also questioned by many. The 32-bit Atari Panther was set to be released in 1991, but was canceled due to unexpectedly rapid progress in developing the Jaguar.[4]

The Atari Jaguar CD, an add-on console for the Jaguar, was released in 1995. Due to the extremely low installed base of the Jaguar itself and Atari's dire financial situation, the Jaguar CD was only produced in very limited quantities, and so had no chance to make any impact in the market.

The Sony PlayStation was the most successful console during this generation, and attention given by 1st and 3rd party developers helped the PlayStation achieve dominance in this generation and become the first console to ship 100 million units worldwide.

Because of many delays of the release of the Nintendo 64, in 1995 Nintendo released the Virtual Boy, a supposedly portable system capable of displaying true 3D graphics, albeit in monochromatic red and black. Because of its graphical capabilities, the system could cause headaches and eye strain, and was not functionally portable, though it was marketed as such. It was discontinued within a year, with less than 25 games ever released for it.

The Nintendo 64 was announced as "Ultra 64" and two arcade games (*Killer Instinct* and *Cruis'n USA*) were released claiming to use the hardware. A TV ad for the Super NES port of *Killer Instinct* showed a gamer using a chainsaw to open the arcade cabinet so he could take out the console inside. This caused many gamers to refrain from buying the 3DO, Saturn, or PlayStation because they thought the commercial showed what was in the Nintendo 64's hardware, and it appeared to be superior to any of the competing systems. The arcade system was in fact completely different from that used for those games (albeit of comparable capability), disappointing those who had expected the images from the ads.

NEC, the creator of the TurboGrafx-16, TurboDuo, Coregrafx, and SuperGrafx, also entered the market with the PC-FX in 1994. The system had a 32-bit processor, 16-bit stereo sound, a 16,777,000 color palette, and featured the highest quality full motion video (FMV) of any console on the market at the time. The PC-FX also broke away from traditional console design and included a tower system which allowed for numerous expansion points, including a connection for NEC's PC-9800 series of computers. However, despite the impressive specs, it was marked as the ultimate side scrolling console and could not match the sales of the 3D systems currently on the market.

Results of the fifth generation

After the dust settled in the fifth generation console wars, several companies saw their outlooks change drastically. Atari, which was already on shaky ground after setbacks to Nintendo in the previous generation, ended up being purchased by JT Storage and stopped making game hardware. Sega's loss of consumer confidence (coupled with its previous console failures) in North America set the company up for a similar fate in the next round of console wars.

The Sega Saturn, although the most technically advanced console of the generation, suffered from poor marketing and comparatively limited third-party support. Sega's decision to use dual processors was roundly criticized, and some believe the second CPU was added as a "panic" response to the PlayStation's specifications. Regardless of their reasons for including it, only Sega's first-party developers were ever able to use the second CPU effectively. The Saturn was far more difficult than the PlayStation to program for.

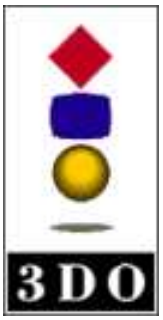
Sega was also hurt by a surprise four-month-early US launch of their console. Third party developers, who had been planning for the originally scheduled launch, could not provide launch titles and were angered by the move. Retailers were caught unprepared, resulting in distribution problems. Some retailers, such as KB Toys, were so furious that they refused to stock the Saturn thereafter.[5] Also, the fact that the Sega Saturn was US$100 more costly than the PlayStation and N64 pushed many potential buyers into purchasing the cheaper consoles.

Sony took an early advantage by tapping the mass market and positioning the PlayStation as a "lifestyle accessory" for males in their late teens to late twenties. Sega and particularly Nintendo's offerings were characterized as appealing more to children (both companies, for instance, featured mascots that appeared in Saturday morning cartoons). The securing of this new market is widely credited as the key to the system's success. Sony carried this momentum over into the release of the PlayStation 2.

Due to numerous delays, the Nintendo 64 was released one year later than its competitors. By the time it was finally launched in 1996, Sony had already established its dominance and the Sega Saturn was starting to struggle. Its use of cartridge media rather than compact discs alienated some developers and publishers due to the space limits and the relatively high cost involved, US$3.50 for an N64 cartridge versus US$0.35 for a PS disc. In addition, the initially high suggested retail price of the console may have driven potential customers away, and many early adopters of the system who had paid the initial cost were angered by Nintendo's decision to reduce the cost of the system within a few months of its release. However, the Nintendo 64 was successful and home to highly successful games including *The Legend of Zelda: Ocarina of Time*, *Super Mario 64*, *Goldeneye 007*, *Banjo-Kazooie*, and *Super Smash Bros.*. In the end, while the Nintendo 64 sold more units than the Sega Saturn, it failed to surpass the PlayStation, which dominated the market.

Comparison

Name	3DO Interactive Multiplayer	Atari Jaguar	Amiga CD32	Sega Saturn	PlayStation	Nintendo 64

Console	 	 	 	 	 	 
Launch prices (USD)	US$700[2]	US$250[6]	US$399.99	US$399[2]	US$299.99	US$249.99
Manufacturer	Panasonic, Sanyo and GoldStar	Atari	Commodore	Sega	Sony	Nintendo
Release date	• AME October 1, 1993 • WW March 20, 1994	• WW November 18, 1993	• WW September 1, 1993	• JP November 22, 1994 • AME May 11, 1995 • WW July 8, 1995	• JP December 3, 1994 • AME September 9, 1995 • EU September 29, 1995 • WW November 15, 1995	• JP June 23, 1996 • AME September 29, 1996 • WW March 1, 1997
Best-selling game	*Return Fire*, Unknown amount of units.	*Alien vs Predator*,		*Virtua Fighter 2*, 1.7 million in Japan[7]	*Gran Turismo*, 10.85 million shipped (as of April 30, 2008)[8] [9]	*Super Mario 64* , *11.62 million (as of May 21, 2003)*[10] [11]
Media	CD-ROM	Cartridge, (CD via add-on)	CD-ROM (cassette, floppy disk, hard drive (software), data card via add-ons)	CD-ROM, cartridge (limited, Japan only)	CD-ROM	Cartridge, (proprietary magnetic disk via Japan-only add-on)

Accessories (retail)	• MPEG cards • FZ-EM256 save memory backup unit • Light guns	• Team Tap (up to 8 players) • JagLink - 2 console networking • CatBox - 8 console networking, additional video output options • Memory Track, for Jaguar CD only	• Keyboard • Floppy Drive • Mouse • MPEG card	• Arcade Stick • Saturn digital gamepad • 3D controller • Light guns • Multitap (up to 12 players) • Sega NetLink - modem and keyboard • Keyboard • Mouse • 1.44 MB 3.5" disk drive • DirectLink • MPEG cards • RAM expansion cartridges	• Multitap (up to 8 players) • Fishing reel controllers (*Bass Landing* and *Reel Fishing*) • Dual Analog Controller • DualShock • GunCon • Jogcon • Konami Justifier • NeGcon • PocketStation • PlayStation Mouse • Analog Joystick • Dance pad • LCD screen (for PSOne systems only) • Memory Card • Link Cable	• Controller Pak • Memory Expansion Pak • Rumble Pak • Memory card • Fishing Reel • Transfer Pak • Nintendo 64DD (Japan only) • Microphone • TiltPak
System sales (worldwide)	2 million	250,000	100,000	9.5 million	102 million	35 million

Other consoles

Apple Bandai Pippin
1995–1997[6]

Casio Loopy
Released in 1995[12]

Neo Geo CD
Released in 1994

PC-FX
Released in 1994

Virtual Boy
1995–1996[6]

Bandai Playdia
1994–1996

Add-ons and remakes

Atari Jaguar CD
Released in 1995

Nintendo 64DD (Add On) Released only in Japan in 1999

Worldwide sales standings

Console	Units sold
PlayStation	102.49 million shipped (as of March 31, 2007)[13]
Nintendo 64	32.93 million (as of March 31, 2005)[14]
Sega Saturn	9.5 million (as of May 4, 2007)[2]
3DO	2 million (as of May 4, 2007)[2]
Virtual Boy	770,000 (as of May 4, 2007)[6]
Atari Jaguar	500,000 (as of May 15, 2007)[15]
Apple Bandai Pippin	42,000 (as of May 4, 2007)[6]

In 1996-97, when the PlayStation, N64, and Saturn were the only consoles still on the market, Sony managed a 51% market share of the worldwide market, following by Nintendo with 40%, while Sega lagged with 9%. Production of the Sega Saturn was prematurely discontinued outside of Japan in 1998, with its demise being accelerated by rumors that work on its successor was underway, which hurt sales in late 1997. The N64 was produced until 2001 when it was succeeded by the Nintendo GameCube; however, PlayStation production had not ceased as it was redesigned as the PSOne, further extending the life of the console around the release of the follow-up PlayStation 2. The PlayStation was discontinued in 2006, shortly after the Xbox 360 was released.

Handheld systems

Sega Nomad
Released in 1995

Game.com
Released in 1997

Game Boy Color
Released in 1998

Neo Geo Pocket
Released in 1998

WonderSwan
Released in 1999

Software

Milestone titles

- *Dragon Quest VII* was the number one best-selling title on the PlayStation in Japan, released in 2000. The game was the first main installment of Japan's national RPG series released in 5 years.
- *Final Fantasy VII* is one of the most critically acclaimed games of all time. It was the first game in the Final Fantasy series to make use of full motion videos (FMVs) and opened the door to the mainstream US market for Japanese-origin RPGs. *Final Fantasy* became one of the biggest franchises in video gaming, with FFVII in particular having several spin-offs known as Compilation of Final Fantasy VII, including two sequels (a movie, and an action adventure game) and a prequel.
- *Gran Turismo* broke away from the mold of traditional arcade style racing games by offering realistic physics and handling as well as a plethora of licensed vehicles. *GT* is credited as increasing popular awareness of certain Japan-only sports cars such as the Mitsubishi Evolution, Subaru Impreza WRX, and Nissan Skyline, and a UK-only sports car company named TVR and eventually paved the way for their importation into the US.
- *The Legend of Zelda: Ocarina of Time* is one of the most critically acclaimed games of all time and often listed as the greatest video game of all time.[16] [17] [18] [19] [20] [21] [22] It smoothly transferred the playing mechanics of the previous 2D Zelda adventures to 3-D with a 3rd person perspective that could switch to 1st person. It also featured mini-games such as fishing & horseback riding.
- *Metal Gear Solid* was released on the PlayStation in fall of 1998. It received critical acclaim for its involved storyline, believable voice acting, and cinematic presentation. The series remains a best seller for the PlayStation after many incarnations.
- *Nights into Dreams...* was developed by Sega's Sonic Team. The game was sold with the Saturn's analog controller, which looked similar to that of the Dreamcast. With its innovative gameplay and graphics, Nights, an exclusive title, aided in the selling of a number of Saturns.

- *Panzer Dragoon Saga* was the final game developed by Sega's Team Andromeda. Upon release, the game was met with unanimous praise from international gaming publications and has come to be considered to be among the most significant of the Saturn releases. The game was released in very low quantities in the US and Europe, which resulted in the game becoming one of the most valuable Saturn games on the collector's market.
- *PaRappa the Rapper*, although only a modest success at its time of release, was highly influential in creating the music video game genre, which would grow in popularity throughout the fifth and sixth generations, thanks in large part to the popular Dance Dance Revolution.
- Nintendo's Pokémon titles for the Game Boy led to massive success in both video game sales and licensed merchandise. This success was thanks in part to the Pokémon anime series, which was localized for North America. In addition to establishing a wildly popular franchise, Pokémon arguably helped extend the life of the handheld Game Boy system.
- *Super Mario 64* was the first game released for the Nintendo 64 and one of the most innovative games of its time. It helped prove that analog controls, as opposed to the D-pad, were almost a necessity for 3D games.
- *Resident Evil* and *Silent Hill* helped popularize the survival horror genre, which was previously confined to relatively obscure titles such as *Alone in the Dark* and *Sweet Home*. This genre continued to grow in the sixth generation of video games, and *Silent Hill* and *Resident Evil* went on to produce many successful sequels. Both have since been adapted for films.
- *Tomb Raider* popularized many elements seen in later video games and spawned several very successful sequels. The main character, Lara Croft, was named the most recognizable female video game character by Guinness World Records.[23] In 2001 a film adaptation titled *Lara Croft: Tomb Raider* was released. As of 2010, it is the highest grossing video game to film adaptation.[23]
- *Tekken 3* was released for PlayStation in 1998. The PlayStation version is still regarded as one of the greatest fighting games of all time.
- *GoldenEye 007* and *Perfect Dark* are two critically acclaimed games that helped modernize the first-person shooter genre on consoles, paving the way for future franchises such as *Halo*.
- *Return Fire* is one of the 3DO's defining titles, and sold well. It was later ported to the Sega Saturn and PlayStation. Super Street Fighter 2 Turbo and The Need for Speed are also highly rated titles for the 3DO.
- *Alien vs. Predator* was one of the Atari Jaguar's defining titles; it was well received from critics and is remembered as the Killer app for the Jaguar.

See also

- Commodore International
- The 3DO Company
- Playdia

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3DO Interactive Multiplayer

3DO Interactive Multiplayer, Panasonic model FZ-1

Manufacturer	Panasonic, Sanyo and GoldStar
Type	Video game console
Generation	Fifth generation era
Retail availability	• NA October 4, 1993 • JP March 20, 1994
Discontinued	1996[1]
Units sold	2 million[2]
Media	CD-ROM
CPU	32-bit 12.5 MHz RISC CPU ARM60
Online services	Planned but canceled
Best-selling game	Return Fire
Successor	M2 (canceled)

The **3DO Interactive Multiplayer** (often called simply **3DO**) is a video game console originally produced by Panasonic in 1993. Further renditions of the hardware were released in 1994 by Sanyo and Goldstar. The consoles were manufactured according to specifications created by The 3DO Company, and were originally designed by Dave Needle and RJ Mical of New Technology Group. The system was conceived by entrepreneur and Electronic Arts founder Trip Hawkins.[1]

Despite a highly-promoted launch (including being named *Time* magazine's "1994 Product of the Year") and a host of cutting-edge technologies, the 3DO's high price (US$699.95 at launch), limited third-party developer support, and an over-saturated console market prevented the system from achieving success comparable to competitors Sega and Nintendo.[1] This console was released in North America on October 4, 1993, and in Japan on March 20, 1994.

In 2009, video game website IGN chose the 3DO as its 22nd greatest video game console of all time, out of its list of 25.[3]

History

The 3DO Interactive Multiplayer was originally conceived by The 3DO Company, founded in 1991 by Electronic Arts co-founder Trip Hawkins. The company's objective was to create a next-generation, CD-based video game/entertainment standard which would be manufactured by various partners and licensees; 3DO would collect a royalty on each console sold and on each game manufactured. To game publishers, the low $3 royalty rate per game was a better deal than the higher royalties paid to Nintendo and Sega when making games for their consoles. The

licensing method accounts for why the 3DO was available from no less than four separate manufacturers. The launch of the platform in October, 1993 was well-promoted, with a great deal of press attention in the mass media as part of the "multimedia wave" in the computer world at the time. Even so, the 3DO was awarded Worst Console Launch of 1993 by Electronic Gaming Monthly.[4]

By the early 1990s, the video game market had become overcrowded with a plethora of consoles. Sega, Nintendo, Commodore, SNK, and Atari each had a video game system on the market. When viewed internationally, the chief competition for the 3DO during its peak had been Nintendo's SNES, the Sega Genesis and NEC's TurboGrafx-16 platforms.

The 3DO console itself was priced at $699,[5] far above competing game systems and aimed at high end users and early adopters. For a significant period of the product's life cycle, 3DO's official stance on pricing was that the 3DO was not a video game console, rather a high-end audio-visual system and was priced accordingly, so no price adjustment was needed. Despite this, the promised "early adopters" never showed up to purchase mass quantities of games.

Price drops announced in February 1996 were perceived in the industry to be an effort to improve market penetration before the release of the promised successor of 3DO, the M2. Heavy promotional efforts on the YTV variety show *It's Alive* and a stream of hinted product expandability supported that idea; however, the M2 project was eventually scrapped altogether.

The 3DO system was eventually discontinued at the end of 1996 with a complete shutdown of all internal hardware development and divestment of the M2 technology. 3DO restructured themselves around this same time, repositioning their internal software development house as a multi-platform company supporting the Sony PlayStation, Sega Saturn, and PC platforms.

The higher quality of later CD-ROM based systems that emerged in the mid-90s (primarily the Sony PlayStation), the limited library of titles, lack of third-party support, and a refusal to reduce pricing until almost the end of the product's life cycle are all considered to be among the many issues that led to the 3DO's demise.[1]

Variants

Due to the licensing method employed by 3DO a number of different manufacturers produced the 3DO system for the market. The Panasonic versions are the best known and most common.

- **Panasonic FZ-1 R.E.A.L. 3DO Interactive Multiplayer** (Japan, Asia, North America and Europe) — The first 3DO system, which was initially priced at $699.99 in the U.S. The price was later reduced to $499.99 in the fall of 1994.[6]
- **Panasonic FZ-10 R.E.A.L. 3DO Interactive Multiplayer** (Japan, North America and Europe) - Released a year or two after the FZ-1. It is a less expensive, slimmer and lighter model and replaced the FZ-1 in Panasonic's portfolio. The FZ-10 featured a top loading CD tray, an internal memory manager and repositioned the LED's and controller port. The controller is also smaller and lighter than the one included with the FZ-1, but lacks a headphones output.
- **Panasonic ROBO 3DO** (Japan only) — A FZ-1 custom console, fitted with a five disc CD drive.
- **Goldstar 3DO Interactive Multiplayer** (South Korea, North America and Europe) — The Goldstar unit, released a year after the FZ-1 is similar in physical appearance to the Panasonic FZ-1. Due to hardware differences and file processing limitations, incompatibilities with some games were reported.
- **Goldstar 3DO ALIVE II**' (South Korea only)
- **Sanyo TRY 3DO Interactive Multiplayer** (Japan only)
- **Creative 3DO Blaster —** PC ISA expansion card with a double-speed CD-ROM drive and one controller that enables a PC to play 3DO games.

However, this made the system extremely expensive. The manufacturers had to make a profit on the hardware, itself, whereas most major game console manufacturers, such as Nintendo and Sony, sold the system as a loss leader, in the hopes of making up for the loss with software sales. This caused the system to be quite unaffordable to the common consumer, one of the biggest factors in its downfall.[7]

Hardware

The original edition of the console, the FZ-1, was referred to in full as the *3DO REAL Interactive Multiplayer*. The console had advanced hardware features at the time: an ARM60 32-bit RISC CPU, two custom video coprocessors, a custom 16-bit DSP and a custom math co-processor. It also featured 2 megabytes (MB) of DRAM, 1 megabyte of VRAM, and a double speed CD-ROM drive for main CD+Gs or Photo CDs (and Video CDs with an add-on MPEG video module).[1] The 3DO included the first music visualizer in a game console, converting CD music to a mesmerizing color pattern.

The 3DO is one of few CD-based units that feature neither regional lockout nor copy protection, making it easy to use for pirated software.[8] Although there is no regional lockout present in any 3DO machine, a few Japanese games cannot be played on non-Japanese 3DO consoles due to a special kanji font which English language consoles could not read. Games that did not and still had compatibility issues include *Sword and Sorcery* (which was released in English under the title *Lucienne's Quest*), the adult video game *Twinkle Knights* and a demo version of *Alone in the Dark*.

The 3DO, just like the Amiga CD32, had standard video and audio ports that were compatible with standard off the shelf cables. In addition to standard RF modulator support and stereo, the console could also be used with composite and S-Video cables.

Technical specifications

Processor

- 32-bit 12.5 MHz RISC CPU (ARM60) made by Advanced RISC Machines (ARM) (roughly equivalent to 25 MHz Motorola 68030)
- Math co-processor
- 32kb SRAM

Display

- Max resolution 768x576 Interpolated 640x480 resolution output to screen, upsampled from 768x576 or 384x288 or Interpolated 640x480 and 320x240 internal resolution with either 16 bit palettized color (from 24 bits) or 24 bit truecolor.[9]
- Two accelerated video co-processors capable of producing 9-16 million pixels per second (36-64 megapix/s interpolated), distorted, scaled, rotated and texture mapped.

System board

- 50 MB/s bus speed (synchronous 32-bit @12.5MHz bus)
- 36 DMA channels
- 2 MB of main RAM
- 1 MB of VRAM
- 2 expansion ports

Sound

- 16-bit stereo sound
- 44.1 kHz sound sampling rate
- Supports Dolby Surround sound

- Custom 20-bit Digital signal processor (DSP) — 20 bit accumulator with 16-bit parameter registers for extended precision

Media

- Double-speed (depending on manufacturer) 300 kB/s data transfer CD-ROM drive with 32 kB RAM buffer
- Multitasking 32-bit operating system

Accessories

Among the accessories shipped standard with most 3DO systems were a standard controller and a light gun. The 3DO controllers were unique in that the system base unit contained only one controller port and the controllers could be physically daisy chained together via a port on the back of each controller. Up to eight controllers could be linked together in this fashion. All controllers for each 3DO console are compatible with one another.

In addition, standard 3DO controllers released with the Panasonic FZ-1 also contained a headphone jack and volume control for silent play. The Goldstar model also included a controller with this feature.

Third party accessories were produced by a number of companies including Logitech and included items such as joysticks, light guns and a steering wheel.

Games

Crash 'n Burn on the 3DO, the system's first bundled title.

Some of the best-received titles were ports of arcade or PC games that other cartridge-based systems of the time were not capable of playing, such as *Alone in the Dark*, *Myst* and *Star Control II*. Other popular titles included *Total Eclipse*, *Jurassic Park Interactive*, *Gex*, *Crash 'n Burn*, *Slayer*, *Killing Time*, *The Need for Speed*, and *Immercenary*. Additionally, 3DO had the most popular port of *Road Rash*, and the arcade fighting game *Samurai Shodown* was ported to the system with all original graphics intact. The first home port of *Super Street Fighter II Turbo* was also available on the system, exceeding the original with its CD-quality audio.

However, the 3DO library also exhibited less successful aspects of home gaming at the time. It was launched at the dawn of CD-ROM gaming, and early titles on 3DO (and Sega CD alike) frequently attempted to use interactive movie-style gameplay. Such titles relied entirely on full motion video with little interactive influence from the player, often patternized beyond a flexible standard. *Night Trap*, *Mad Dog McCree*, and *The Daedalus Encounter* are some of the more notorious titles from this era. Also, digital video was of very low quality at the time, especially on low-cost consumer devices. Aside from this, the most significant issue with interactive movie games was their limited level of interactivity and depth. Some games followed a single unfolding of events simply by correctly timed prompts executed by the player.

Game series that were originally launched on the 3DO by Electronic Arts, Studio 3DO and Crystal Dynamics established themselves on other 32-bit consoles. One major hit for the 3DO, *Return Fire*, an advanced tank battle game, was ported to the PlayStation and Microsoft Windows, but was met with limited success.

Aborted successor

The 3DO Company designed a next-generation console that was never released due to various business and technological issues. Called the M2, it was to use dual PowerPC 602 processors in addition to newer 3D and video rendering technologies. Late during development, the company abandoned the console hardware business and sold the M2 technology to Matsushita. While Matsushita initially claimed to be planning a game console with the technology, it was shortly thereafter re-branded for the kiosk market competing with the CD-i system.

Konami later made an M2-based arcade board.[10] Games ran straight from the CD-ROM drive causing long load times and a high failure rate due to the CD-ROM being continuously in-use.

Market competition

Video game (primary market at launch)

- NEC PC Engine with Super CD-ROM expansion
- Nintendo's SNES
- Sega Mega Drive with Mega CD expansion
- Atari Jaguar

Video game (primary market at end-of-life)

- Nintendo's N64
- Sega's Saturn
- Sony's PlayStation

High-end A/V (secondary market) (multi-purpose audio/video systems)

- Commodore's CDTV
- Philips' CD-i
- Pioneer's LaserActive
- Tandy Video Information System

Emulation

FreeDO [11] is a working 3DO emulator. While older beta builds are available on its website, it is still in development with the latest alpha build available here [12]. A 3DO BIOS file is necessary for it to run.

See also

- 3DO Rating System
- List of 3DO games
- Panasonic Jungle

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External links

- 3DO (http://www.dmoz.org/Games/Video_Games/Console_Platforms/3DO/) at the Open Directory Project

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Atari Jaguar

Manufacturer	Atari Corporation
Type	Video game console
Generation	Fifth generation
Retail availability	• NA November 18, 1993 • JP Late 1994 • EU Late 1994 • AUS Late 1994
Discontinued	1996
Units sold	250,000 or fewer[1] [2]
Media	ROM cartridge, CD-ROM
CPU	multi-processor
Predecessor	Atari XE Game System

The **Atari Jaguar** is a video game console that was released by Atari Corporation in 1993. It would be the last to be marketed under the Atari brand until the release of the Atari Flashback in 2004. It was designed to surpass the Mega Drive/Genesis, Super Nintendo Entertainment System and the Panasonic 3DO in processing power. Although launched one year earlier, it was eventually in competition with the Sega Saturn, the Sony PlayStation and other consoles that made up the Fifth generation of video game consoles. The console was first released in selected U.S. cities in November 1993, and the rest of the country in early 1994. Although it was promoted as the first 64-bit gaming system, the Jaguar proved to be a commercial failure and prompted Atari to leave the home video game console market. Despite its commercial failure, the Jaguar has a dedicated fan base that produces homebrew games for it.[3]

History

The Jaguar was developed by the members of Flare Technology, a company formed by Martin Brennan and John Mathieson. The team had stated that they could not only make a console superior to the Sega Mega Drive (also called the Sega Genesis) or the SNES, but they could also be cost-effective.

Impressed by their work on the Konix Multisystem, Atari persuaded them to close Flare and, with Atari providing the funding, to form a new company called Flare II. Flare II initially set to work designing two consoles for Atari Corp. One was a 32-bit architecture (codenamed "Panther"), and the other was a 64-bit system (codenamed "Jaguar"); however, work on the Jaguar design progressed faster than expected, so Atari Corp. canceled the Panther project to focus on the more promising Jaguar.

The Jaguar was introduced in November 1993 at a price of $249.99,[2] under a $500 million manufacturing deal with IBM. The system was initially marketed only in the New York City and the San Francisco Bay areas, under the slogan "Do the Math",[2] claiming superiority over competing 16-bit and 32-bit systems. A nationwide release followed in early 1994.

The Atari Jaguar struggled to attain a substantial user base. In 1993, Atari reported that they had shipped 17,000 units as part of the system's initial test market.[4] By the end of 1994, Atari reported that they had sold approximately 100,000 systems and had reduced the price to improve the competitive nature of the console.[5] By the end of 1995, Sony and Sega had entered the marketplace with competing consoles and Atari's sales declined rapidly. In their 1995 annual report, they noted:

"Jaguar sales were substantially below Atari's expectations, and Atari's business and financial results were materially adversely affected in 1995 as Atari continued to invest heavily in Jaguar game development, entered into arrangements to publish certain licensed titles and reduced the retail price for its Jaguar console unit. Atari attributes the poor performance of Jaguar to a number of factors including (i) extensive delays in development of software for the Jaguar which resulted in reduced orders due to consumer concern as to when titles for the platform would be released and how many titles would ultimately be available, and (ii) the introduction of competing products by Sega and Sony in May 1995 and September 1995, respectively."[6]

Jaguar did earn praise with titles such as *Tempest 2000*, *Doom*, and *Wolfenstein 3D*.[7] The most successful title was *Alien vs. Predator*[8] . Both it and *Tempest 2000* are often considered the system's defining titles.[2] With such a small library of games[9] to challenge the incumbent 16-bit game consoles, Jaguar's appeal never grew beyond a small gaming audience. Customers also complained the Jaguar controller was needlessly complex, with over 15 buttons, somewhat reminiscent of the Atari 5200 controller.[10] [11] The controller was ranked the worst video game controller ever made by IGN editor Craig Harris.[12]

Lack of titles was attributable to two main factors: the Jaguar's questionable long-term prospects among third-party game-publishers, and the problematic nature of developing games for the Jaguar. Atari had one opportunity to convince third-party developers, vital for the diversity of Jaguar's game library, with a solid retail-performance, but as things played out, post-holiday sales figures questioned the viability of Atari's business; Atari failed to attract many third-party developers already committed to other game platforms. In addition, the Jaguar's underlying hardware was crippled by a flaw in the CPU's memory controller, which prevented code-execution out of system RAM. Less severe, but still annoying defects included a buggy UART. The controller flaw could have been mitigated by a mature code-development environment, to unburden the programmer from having to micromanage small chunks of code. Jaguar's development tools left much to the programmer's imagination, as documentation was incomplete. Writing game-code was often an endurance exercise in the tedious assembler.

In a July 1995 interview with Next Generation Magazine, then-CEO Sam Tramiel declared that the Jaguar was as powerful, if not more powerful, than the Sega Saturn, and slightly weaker than the Sony PlayStation.[13]

By the end of 1995, the Jaguar's fate was all but sealed. Atari's revenues declined by more than half, from US$38.7 million in 1994 to $14.6 million in 1995.[1] In late 1995, Atari Corp. ran early-morning infomercial advertisements

with enthusiastic salesmen touting the powerful game system. The infomercials ran most of the year, but did not significantly sell the remaining stock of Jaguar systems. In its 10-K405 SEC Filing, filed April 12, 1996, Atari informed their stockholders of the truly dire nature of the Jaguar business:

> From the introduction of Jaguar in late 1993 through the end of 1995, Atari sold approximately 125,000 units of Jaguar. As of December 31, 1995, Atari had approximately 100,000 units of Jaguar in inventory.[1]

Atari had already suffered an ill-fated crash in the mid 1980s as a result of the oversaturation of the video game market by third-party developers.

Production of the Jaguar ceased after Atari Corp. merged with JT Storage in a reverse takeover.[14] In a last ditch effort to revive the Jaguar, Atari Corp. tried to play down the other two consoles by proclaiming the Jaguar was the only "64-bit" system. This claim is questioned by some,[15] because the CPU (68000) and GPU executed a 32-bit instruction-set, but sent control signals to the 64-bit graphics co-processors (or "graphics accelerators"). Atari Corp.'s position was that the mere presence of 64-bit ALUs for graphics was sufficient to validate the claim. Design specs for the console allude to the GPU or DSP being capable of acting as a CPU, leaving the Motorola 68000 to read controller inputs. In practice, however, many developers used the Motorola 68000 to drive gameplay logic.

Over the short life of the console, several add-on peripherals were announced. However, only the ProController, the Atari Jaguar CD drive and the JagLink (a simple two-console networking device) reached retail shelves. A voice modem and VR headset (with infrared head-tracking), existed in prototype form, but were never commercialized (see Loki and Konix Multisystem for early development).

After the Atari Corporation properties were bought out by Hasbro Interactive in the late 1990s, Hasbro released the rights to the Jaguar, declaring the console an open platform and opening the doors for homebrew development.[16] A few developers, including Telegames and Songbird Productions, have not only released previously unfinished materials from the Jaguar's past, but also several brand new titles to satisfy the system's cult following.

Imagin Systems, a manufacturer of dental imaging equipment, has since purchased the molding plates for the Jaguar's casing as with minor modification they were found to be the right size for housing their HotRod camera.[17] The game cartridge molds were reused to create an optional memory expansion card.[18]

Arcade games

Atari Games licensed the Atari Jaguar's chipset for use in its arcade games. The system, named **COJAG** (for "Coin-Op Jaguar"), replaced the 68000 with a 68020 or MIPS R3000-based CPU (depending on the board version), and added a hard drive and more RAM. It ran the lightgun games *Area 51* and *Maximum Force*. Other games (*3 On 3 Basketball*; *Fishin' Frenzy*; *Freeze*; *Vicious Circle*) were developed but never released.

Technical specifications

From the Jaguar Software Reference manual:[19]

"Jaguar is a custom chip set primarily intended to be the heart of a very high-performance games/leisure computer. It may also be used as a graphics accelerator in more complex systems, and applied to workstation and business uses. As well as a general purpose CPU, Jaguar contains four processing units. These are the Object Processor, Graphics Processor, Blitter, and Digital Sound Processor. Jaguar provides these blocks with a 64-bit data path to external memory devices, and is capable of a very high data transfer rate into external dynamic RAM." (page 1)

The Atari Jaguar's gamepad was criticized for complexity of design.[10] [11]

Processors

- "Tom" Chip, 26.59 MHz
  - Graphics processing unit (GPU) – 32-bit RISC architecture, 4 KB internal cache, provides wide array of graphic effects
  - Object Processor – 64-bit RISC architecture; programmable; can behave as a variety of graphic architectures
  - Blitter – 64-bit RISC architecture; high speed logic operations, z-buffering and Gouraud shading, with 64-bit internal registers.
  - DRAM controller, 8, 16, 32 and 64-bit memory management
- "Jerry" Chip, 26.59 MHz
  - Digital Signal Processor – 32-bit RISC architecture, 8 KB internal cache
    - Same RISC core as the GPU, but not limited to graphic production
  - CD-quality sound (16-bit stereo)
    - Number of sound channels limited by software
    - Two DACs (stereo) convert digital data to analog sound signals
    - Full stereo capabilities
  - Wavetable synthesis, FM synthesis, FM Sample synthesis, and AM synthesis
  - A clock control block, incorporating timers, and a UART
  - Joystick control
- Motorola 68000 "used as a manager."[20]
  - General purpose 16/32-bit control processor, 13.295 MHz

Other Jaguar features

- RAM: 2 MB on a 64-bit bus using 4 16-bit fast page mode DRAMS
- Storage: Cartridge – up to 6 MB
- Support for ComLynx I/O

Memory Track

Released in 1995, the *Memory Track* is a cartridge that contains a 128 K EEPROM, allowing Atari Jaguar CD games to save persistent data such as preferences and savegames.

Reception

The Jaguar was a commercial failure thanks to its shortage of third party support and poorly received first party titles. In September 2009, IGN ranked the Atari Jaguar as the 24th best console of all time, lower than all five of its major competitors: the SNES (4th best), the Sega Mega Drive (5th), the Sony PlayStation (7th), the Sega Saturn (18th), and even the 3DO (22nd).[21]

Emulation

See also: List of Atari emulators

See also

- List of Atari Jaguar games
- List of cancelled video games
- Contiki, portable operating system - there's a port for the Jaguar with GUI, TCP/IP and web browser support.

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External links

- Atari Jaguar (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Atari/Jaguar_64/) at the Open Directory Project

Amiga CD32

Manufacturer	Commodore
Type	Video game console
Generation	Fifth generation era
Retail availability	• UK September 1993
Discontinued	April 1994
Units sold	Approx 100,000[1]
Media	CD-ROM
Operating system	AmigaOS 3.1
CPU	Motorola 68020 clocked at 14.3MHz
Input	Gamepad
Backward compatibility	Amiga CDTV

The **Amiga CD32**, styled "CD^{32}" (code-named 'Spellbound'), was the first 32-bit CD-ROM based video game console released in western Europe, Australia and Canada. It was first announced at the Science Museum in London, United Kingdom on 16 July 1993, and was released in September of the same year. The CD32 is based on Commodore's Advanced Graphics Architecture chipset, and is of similar specification to the Amiga 1200 computer. Using 3rd-party devices, it is possible to upgrade the CD32 with keyboard, floppy drive, hard drive and mouse, turning it into a personal computer. A hardware MPEG decompression module for playing Video CD was also available. The CD32 managed to secure over 50% of the CD-ROM market in the UK in 1993 and 1994, outselling the Sega Mega-CD, the Philips CDi, and even PC CD-ROM sales.

Release

The CD32 was released in Canada and was planned for release in the United States. However, a deadline was reached for Commodore to pay a patent royalty to Cad Track for their use of their XOR patent.[2] A federal judge ordered an injunction against Commodore preventing them from importing anything into the United States. Commodore had built up CD32 inventory in their Philippine manufacturing facility for the United States launch, but, being unable to sell the consoles, they remained in the Philippines until the debts owed to the owners of the facility were settled. Commodore declared bankruptcy shortly afterwards, and the CD32 was never officially sold in the United States.[2] However, imported models did come over the border from Canada, and many stores in the United

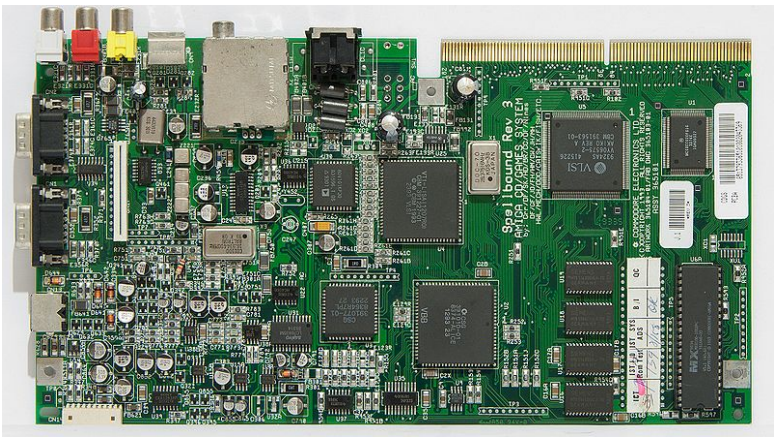
States (primarily mail-order stores) imported units for domestic sale. During the long bankruptcy proceedings, Commodore UK also provided some hardware components and software for the American market, including production of the MPEG Video Module that was not officially released by Commodore International.

On its release, the CD32 was marketed by Commodore as 'the world's first 32-bit CD games console'. Although it was indeed the first such machine released in Europe and North America, the FM Towns Marty, a console released exclusively in Japan, beat it to market by seven months. Some people still argue that the CD32 was the first true 32-bit CD game console, since its 68EC020 processor has a 32-bit data bus both internally and externally, while the 386SX in the FM Towns Marty has a 16-bit data bus externally.

Ultimately, Commodore was not able to meet demand for new units because of component supply problems. Sales of the CD32 in Europe were not enough to save Commodore, and the bankruptcy of Commodore International in April 1994 caused the CD32 to be discontinued only months after its debut. During its short life the Amiga CD32 shifted approximately 100,000 units.[1]

Technical specifications

Ports located on the back of the Amiga CD32



Amiga CD32 Mainboard

- CPU: Motorola 68EC020 at 14.3 MHz
- Memory:
  - 2 MB Amiga Chip RAM
  - 1 MB Kickstart ROM with CD32 firmware
  - 1 KB of FlashROM for game saves
- Chipset: AGA (Advanced Graphics Architecture)
  - Video:
    - 24-Bit color palette (16.7 Million colors)
    - Up to 256 on-screen colors in indexed mode
    - 262,144 on-screen colors in HAM-8 mode
    - Resolutions of up to 1280×512i (more with overscan)
  - Audio (Paula):
    - 4 voices / 2 channels (Stereo)
    - 8-bit resolution / 6-bit volume
  - With additional Akiko chip (CD-ROM controller and performs chunky to planar conversion)
- Double-speed (300 kB/s) CD-ROM drive (proprietary MKE controller)
- Input/Output connections:
  - S-Video out (4-pin mini-DIN)
  - Composite video out (RCA)

  - RF audio/video out
  - Audio out (2 × RCA and 3.5 mm stereo jack)
  - Keyboard (6-pin mini-DIN)
  - 2 × Mouse/Joypad ports (DE9)
  - RS-232 serial AUX port (6-pin mini-DIN)
- Expansion Slot: 182-pin expansion socket for official MPEG cartridge or third party devices such as the SX-1 and SX32 expansion packs
- Operating System: AmigaOS 3.1 and CD32 firmware

Accessories and third party devices

The CD32 can be enhanced using these devices: ProModule, Paravision SX-1 and DCE SX-32 (which optionally includes 68030 CPU).

Those devices extend the capability of Amiga CD32, allowing it to utilize hardware such as an external 3.5" floppy disk drive, hard disk and IBM PC keyboard. An Amiga CD32 can be turned into a *de facto* Amiga 1200 via the addition of 3rd party packages. The SX-1 appears to have been designed around Commodore's mechanical specs and not the actual production units – it did not fit very well and requires an internal 'modification' to fit properly. Consequently, the SX-1 can be jarred loose if the console is not handled gently. The upgraded SX-32 expansion pack (which included a 68030 25 MHz processor) solves these problems.

In addition to its own special controllers, the Amiga CD32 is also compatible with most 9-pin D-Sub controllers from the 80s and 90s, including the SEGA Mega Drive/Genesis controllers, SEGA Master System controllers, and all Amiga/C64 joysticks as well as Amiga mice and paddles.

CDs created for the CD32 conform to ISO 9660 level2, mode1; although the Rock Ridge and Joliet extensions are not compatible.

Software

If the system is turned on without a CD, a splash screen with scrolling colours will appear and a tune will play. After this tune ends, the user can press the blue button on the game pad to enter a language selection menu. The user can also press the red button to access a menu where they can view the contents of the internal Flash ROM. Unlike most game consoles, this menu does not allow the user to delete items. Instead, the system will automatically overwrite the oldest entries when memory runs out. The menu allows the user to "lock" files to prevent overwriting.

At launch, the CD32 was bundled with two games, *Diggers*, a new game from Millennium Interactive, and *Oscar* from Flair Software. A later pack included the one-on-one fighting game *Dangerous Streets*, a move by Commodore that was met with derision by the press. Many reviewers had given *Dangerous Streets* terrible scores (Amiga Power rating it just 3%) and were surprised that with a slew of powerful rival consoles about to hit the market, Commodore would choose to show off the abilities of its machine with a poor game.

The CD32 was capable of running most of the titles developed for the Amiga CDTV multimedia device (differences in CPU speed and Kickstart version prevented some of the earlier CDTV titles from running). Many of the games released for the CD32 were simply ports of games that were already available for Amiga computers. One benefit of this is that, when appropriate, many games retain the ability to use an Amiga mouse (in port 2) or Amiga keyboard (plugged into the AUX port).

Like all later Amiga computers, the CD32 has a hidden boot menu that can be accessed by plugging an Amiga mouse into port 2 and holding both buttons down while turning the system on. Most of the options in this menu are not useful on a CD32, but from this menu you can choose to boot in either NTSC or PAL mode. This is important, as there are some games that will refuse to work if the system is in the wrong mode, since most games don't advertise what video mode they were developed for. It should also be pointed out that despite the naming, the menu really

only allows a choice of 60 Hz or 50 Hz video output; a PAL system booted in NTSC mode will still output a video signal using PAL color encoding, which will usually result in a black and white picture when connected to an NTSC television.

While the console was fairly successful during its lifespan and managed to be the best-selling CD format console in 1993, it was not able to sustain its growth, with Commodore filing for Chapter 11 just a year after its release after not being able to secure additional CD32 shipments for the holiday season. It was speculated that the holiday season could have kept Commodore afloat for another six months. Another problem was the lack of original games, which had also plagued the CDTV before it.

The CD32 arrived at a time when new, technically demanding genres such as the first person shooter were becoming popular. While the console was capable of handling some or all of these new types of genres, games developers saw more profit in shovelware — taking an older game and either adding an FMV intro or even (in some cases) just directly transferring the floppy game onto CD. A few pieces of original software did appear and some were well received but by and large the CD32 found itself with a software library mainly containing titles that were up to five years old and which much of the machine's target audience already owned. Given that, along with the fact that 'hot' games like *Doom* and *Virtua Fighter* were planned for release on the CD32's competitors, many observers blamed shovelware for the machine's relative failure.

However, a large fan base carried over from the success of other Amiga computers, and several notable titles, such as *Microcosm*, *Liberation: Captive 2*, *Simon the Sorcerer*, *Super Stardust* and *Zool 2* prevented the console from sliding into total obscurity.

Uses of the CD32

In 1993, 109 CD32s were installed to run the interactive exhibits at the London Transport Museum, Covent Garden.[3] They provided information, animations, pictures, sound and text available in several languages, as well as a London Underground simulator. The systems were produced by the Odiham, Hampshire-based company Index Information, utilising their CD32x interface units.[4]

In 1995, an Italian company named CD Express used the CD32 as a basis for an arcade machine called "CUBO CD32".[5] Inside these machines, stock CD32s were hooked up to an external circuit board which essentially acted as a converter to route all the input and output into a standard JAMMA connector for use in an arcade cabinet. The software was provided on CD-ROM. Nine games are known to exist, all of which are original games created by CD Express.

In the mid to late 1990s, some vehicle registries in Canada utilized CD32 systems for interactive multimedia testing for drivers license applications.

In the late 1990s to early 2000s, slot machine manufacturer StarGames utilized a stripped down CD32 motherboard in many of their slot machines. Machines confirmed to be operating on CD32 hardware are Hawaiian Delight, Leprechaun Luck, and Mister Magic.

See also

- Amiga models and variants

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External links

- Project CD32: Amiga CD32 database (http://www.amigacd32.com)
- Amiga hardware database - Commodore CD32 (http://amiga.resource.cx/mod/cd32.html)
- Amiga history guide (http://www.amigau.com/aig/cd32.html)

Neo Geo CD

SNK's **Neo Geo CD** was released in 1994, four years after its cartridge-based equivalent, in an effort to reduce manufacturing costs. The system was originally priced at US$300 new. The unit's (approximately) 1X CD-ROM drive was slow, making loading times very long with the system loading up to 56 Mbit of data between loads. Neo Geo CD game prices were low at $50, in contrast to Neo Geo AES game cartridges which cost as much as $300. The system could also play Audio CDs. All three versions of the system have no region-lock.

The Neo Geo CD was bundled with a control pad instead of a joystick like the AES version. However, the original AES joystick could be used with all 3 Neo Geo CD models, instead of the included control pads.

The Neo Geo CD system, with three games.

Models

Three versions of the Neo Geo CD were released:

- A *"front-loading"* version; only distributed in Japan, 25,000 total units were built.
- A *"top-loading"* version that was marketed worldwide; it is the most common model.
- The Neo Geo CDZ; this was also in Japan only

CDZ

The CDZ was released the 29 December 1995[1] [2] as the Japanese market replacement for SNK's previous efforts (the *"front loader"* and the *"top loader"*). The Neo Geo CD had met with limited success due to it being plagued by slow loading times that could vary from 30 to 60 seconds between levels, depending on the game. Although SNK's American home entertainment division quickly acknowledged that the system simply wasn't capable of competing with 3D-capable powerhouse systems of the day like Sega's Saturn and Sony's PlayStation, SNK corporate of Japan

felt they could continue to maintain profitable sales in the Japanese home market by shortening the previous system's load-times.

Popular speculation suggests that SNK made several changes to the CD hardware to end up with the CDZ, most prominent is the rumor that they increased the CD-ROM drive speed from 1x to 2x. The truth of the matter is that the CDZ had a larger amount of cache. Though the CD-ROM motor in the CDZ may have been more efficient than the one in the original, it was still a 1x speed CD-ROM.

The console had a design flaw which sometimes caused it to overheat after certain periods of time, breaking the console in the process and making it hard to repair. This was a result of a lack of ventilation in the cramped housing of the smaller unit and the inability to dissipate heat generated by the newer drive, which could damage the circuit board.

CDZ availability

The CDZ was only officially sold in Japan during its production. However, its lack of a "region lock", and the fact that it could play older CD software, made it a popular import item for enthusiasts in Europe and North America. Today they can be found sporadically on the internet, especially through auction sites such as eBay.

Technical specifications

- Main Processor: Motorola 68000 running at 12 MHz
  - Although the 68000 CPU was designed by Motorola, there were many other clones of this CPU found in the Neo Geo hardware. The most common CPU is the TMP68HC000 manufactured by Toshiba. This is essentially a Motorola 68000 clone.
- Co-Processor: Zilog Z80 running at 4 MHz
- Colors On Screen: 4,096
- Colors Available: 65,536
- Resolution: 304 x 224
- Max Sprites: 380
- Max Sprite Size: 16 x 512
- Number of Planes: 3

The system is also capable of reading Redbook standard compact disc audio.

In addition to the multi-AV port (almost same one as used on the Sega Genesis model 1, though they are not interchangeable.) all Neo Geo CD models had composite RCA A/V and S-Video out jacks on the rear of the console.

The CD system's 58 Mbit / 7 MB of RAM was split accordingly:

- 68000 Program Memory: 2 MB
- Fix Layer Memory: 128 KB
- Graphics Memory: 4 MB
- Sound Sample Memory: 1 MB
- Z80 Program Memory: 64 kB
- VRAM: 512Kb (For graphics attributes)
- SRAM: 2 KB (For high scores / general save data)

Exclusive games

While the Neo Geo CD library consisted primarily of ports of MVS and AES titles, there were a few MVS arcade games which were not officially released for the Neo Geo AES and ported instead to the Neo Geo CD. This includes *Puzzle Bobble*, *Janshin Densetsu* (a Mahjong game also released for the PC Engine), *Power Spike II*, *Neo Drift Out* and *Futsal - 5-on-5 Mini Soccer*.

A few games which were unreleased in MVS and AES formats were also released exclusively for the Neo Geo CD. These includes *Ironclad*, *Crossed Swords 2*, *Oshidashi Zentrix*, *ADK World*, *Neo Geo CD Special*, *The King of Fighters '96 Neo Collection* and *Shinsetsu Samurai Spirits Bushidō Retsuden* (an RPG spinoff of the *Samurai Shodown* series that also released for the PlayStation and Sega Saturn). *Idol Mahjong Final Romance II*, an arcade game which was not an MVS game, was also ported to the Neo Geo CD.

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[1] http://www.neogeocdworld.info/html/fiche/fichetechniqueneogeo.htm
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See also

- Neo Geo (console)
- 3DO Interactive Multiplayer
- Turbo Duo
- Sega CD
- Sega CDX

External links

- NeoGeoCD.net (http://www.neogeocd.net) - Dedicated to the Neo Geo CD System, Games, and Accessories: Neogeocd.net

Playdia

Manufacturer	Bandai
Type	Video game console
Generation	Fifth generation
Retail availability	• JP October 23, 1994[1]
Media	CD-ROM
CPU	8-bit Toshiba TMP87C800F
Controller input	Infrared Joypad

The **Playdia** (プレイディア *Pureidia*) (developed under the codename "BA-X"[2]) was a video game console released exclusively in Japan in 1994 at the initial price of ¥24,800.[3] It was intended for a young audience with anime quiz software and edutainment making up most of the game library. The Playdia uses a single infrared joypad with simple controls. Bandai was the only software publisher to support this console.

Playdia title complete list

1994 (11 titles)

- 09/23 - *Dragon Ball Z - Shin Saiyajin Zetsumetsu Keikaku Chikyū Hen* - [BAPD-01]
- 09/23 - *Bishōjo Senshi Sailor Moon S - Quiz Taiketsu! Sailor Power Shūketsu!!* - [BAPD-02]
- 09/23 - *SD Gundam Daizukan* - [BAPD-03]
- 09/28 - *Ultraman Powered - Kaijū Gekimetsu Sakusen* - [BAPD-04]
- 09/28 - *Hello Kitty - Yume no Kuni Daibōken* - [BAPD-05]
- 11/25 - *Aqua Adventure - Blue Lilty* - [BAPD-06]
- 11/25 - *Newton museum - Kyōryū Nendaiki Zenpen* - [BAPD-07]
- 11/25 - *Newton museum - Kyōryū Nendaiki Kōhen* - [BAPD-08]
- 12/08 - *Shuppatsu! Dōbutsu Tankentai* - [BAPD-09]
- 12/16 - *Ultra Seven - Chikyū Bōei Sakusen* - [BAPD-10]
- 12/16 - *Dragon Ball Z - Shin Saiyajin Zetsumetsu Keikaku Uchū Hen* - [BAPD-11]

1995 (16 titles)

- 01/24 - *Norimono Banzai!! - Kuruma Daishūgō!!* - [BAPD-12]
- 01/24 - *Norimono Banzai!! - Densha Daishūgō!!* - [BAPD-13]
- 03/22 - *Ie Naki Ko - Suzu no Sentaku* - [VPRJ-09722]
- 03/22 - *Gamera - The Time Adventure* - [BAPD-15]
- 06/22 - *Elements Voice Series vol.1 Mika Kanai - Wind&Breeze* - [BAPD-18]
- 06/22 - *Elements Voice Series vol.2 Rika Fukami - Private Step* - [BAPD-19]
- 06/22 - *Elements Voice Series vol.3 Aya Hisakawa - Forest Sways* - [BAPD-20]
- 07/28 - *Bishōjo Senshi Sailor Moon SS - Sailor Moon to Hiragana Lesson!* - [BAPD-21]
- 07/28 - *Ultraman - Hiragana Dai Sakusen* - [BAPD-22]
- 07/28 - *Ultraman - Alphabet TV e Yōkoso* - [BAPD-23]
- 08/24 - *Bishōjo Senshi Sailor Moon SS - Sailor Moon to Hajimete no Eigo* - [BAPD-24]
- 08/24 - *Bishōjo Senshi Sailor Moon SS - Yōkoso! Sailor Yōchien* - [BAPD-25]
- 08/24 - *Ultraman - Oide yo! Ultra Yōchien* - [BAPD-26]
- 10/20 - *Chōgōkin Selections* - [BKPD-01]
- 11/16 - *Elements Voice Series vol.4 Yuri Shiratori - Rainbow Harmony* - [BKPD-02]
- 12/15 - *Soreike! Anpanman - Picnic de Obenkyō* - [BAPD-27]

1996 (6 titles)

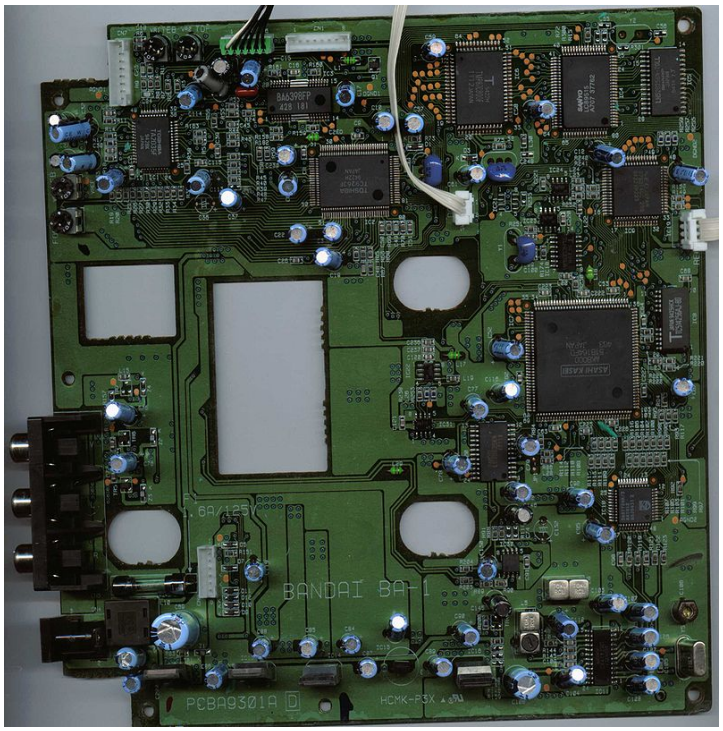
- 03/22 - *Ultraman - Sūji de Asobō Ultra Land* - [BAPD-28]
- 03/22 - *Ultraman - Ultraman Chinō UP Dai Sakusen* - [BAPD-29]
- 03/27 - *Elements Voice Series vol.5 Mariko Kōda - Welcome to the Marikotown!* - [BKPD-03]
- 04/24 - *Nintama Rantarō - Gungun Nobiru Chinō Hen* - [BKPD-04]
- 05/15 - *Nintama Rantarō - Hajimete Oboeru Chishiki Hen* - [BKPD-05]
- 06/26 - *Gekisō Sentai Carranger - Tatakae! Hiragana Racer* - [BKPD-06]

Unreleased (6 titles)

- *Yumi to Tokoton Playdia* - [BS-003]
- *Go! Go! Ackman Planet* - [BS-005]
- *Jamp Gentei Special - 4 Dai Hero Battle Taizen* - [BS-006]
- *Bandai Item Collection 70*' - [BS-007]
- *Playdia IQ Kids* - [BS-009]
- *Kero Kero Keroppi - Uki Uki Party Land* - [BS-010]

Internal details

- Sanyo Lc89515 - CD-ROM Host Interface
- Toshiba TA2035F - CD Focus tracking server
- Toshiba tc9263f - CD Single Chip processor
- Rohm 6398FP - 4 Channel BTL Driver for CD Player motor
- Toshiba TMP87C800F - 8 Bit Microcontroller (8K ROM, 16K RAM) - 8 MHz Operation, can access 64K (TLCS-870 series which is based heavily on the Z80)
- Sharp LH52B256 - 256K (32K x 8) Static RAM chip
- NEC μPD78214GC - 8 Bit Microcontroller (16K ROM, 512 byte RAM) - 12 MHz Operation, can access 1MB (NEC 78K series)
- Toshiba TC514256JAJ - 256K Word x 4 Fast Page DRAM Chip
- Asahi Kasei AK8000 - Audio / Video processor
- Philips DA8772AH - Triple 8Bit DAC converter
- Sony CX1229M - NTSC/PAL Decoder
- Rohm BA10324AF - Quad Op Amp
- Sanyo LC78835K - 18BIT DAC with filter
- Rohm BU3052BCF - Dual 4 Channel Analogue Multiplexer



PCB Scan of the Bandai Playdia.

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[2] Starr, Michael; Chapple, Craig. *VINTROPEDIA - Vintage Computer & Retro Console Price Guide 2009* (http://books.google.com/books?id=D7RS9yegrtoC&pg=PA84#v=onepage&q=&f=false). Lulu. 2008. p84.

[3] Forster, Winnie (2005). *The encyclopedia of consoles, handhelds & home computers 1972 - 2005*. GAMEPLAN. pp. 201. ISBN 3-00-015359-4.

External links

- http://www.daizex.com/general/playdia/index.shtml
- Playdia TV advert (http://www.dailymotion.com/video/xx9ms_dbz-gaiden-playdia-cm)

PC-FX

Manufacturer	NEC[1]
Type	Video game console
Generation	Fifth generation era
Retail availability	• JP December 23, 1994
Discontinued	• JP Early 1998
Media	CD-ROM
CPU	NEC V810
Predecessor	PC Engine/TurboGrafx-16

The **PC-FX** is a video game console released in Japan on December 23, 1994 by NEC Corporation. It is the 32-bit successor to NEC's PC Engine (known in the US as the TurboGrafx-16).

The PC-FX uses CD-ROMs as its storage medium, following on from the expansion released for its predecessor, which originally used HuCards. The game controller resembles that of the Sega Genesis in shape, only with more buttons and it is virtually identical to a DUO-RX controller except for the fact that the rapid fire switches have been changed into mode A/B switches.

The PC-FX's computer-like design was unusual for consoles at the time. It stands upright like a tower computer while other contemporary consoles lay flat. Another interesting feature is its three expansion ports, as expansion ports are relatively underused in consoles and therefore their inclusion increased the price without offering a great deal to the end user. However it was one of the first consoles to feature an optional mouse which made strategy games like Farland Story FX and Power Dolls FX more accessible to play on TV.

Unlike nearly any other console (except for the 3DO), the PC-FX was also available as an internal PC card in NEC PC-98 and AT/IBM PC compatible flavors. This PC card came with two CDs of software to help the user program games for the PC-FX. However, compatibility issues prevented games developed with this software from actually running on the console.

History

The PC-FX was designed based on a new 32-bit development kit by NEC called "Iron Man". Iron Man was designed in 1992, while the PC Engine was still quite popular in Japan. It was around the time of the first running demonstration units in mid 1992 that NEC started discussing an imminent release of an Iron Man based system with its many third party developers. Many PC Engine developers seemed upset and uninterested since the PC Engine market was still growing, and as a result NEC halted work on the Iron Man and continued making modifications to the PC Engine. By 1993 the 32-bit 3DO platform was released with much developer interest and Sega and Sony let it be known that the Sega Saturn and PlayStation would be ready for the Japanese marketplace in late 1994, and Bandai was also readying the release of their Playdia system. Now in a rush to keep the large development base that made the PC Engine so successful, NEC had to make a decision. Rather than spending the time to develop a new,

more powerful platform capable of standing up to their competitors, they decided to utilize the now dated 32-bit Iron Man architecture in the PC-FX. The result was that NEC wound up with a severely underpowered system that impressed neither developers nor consumers, failed to release the 3D expansion, and ultimately led to its demise.

The shining quality of the PC-FX however was the ability to decompress 30 JPEG pictures per second while playing digitally recorded audio (essentially a form of Motion JPEG). This resulted in the PC-FX having superior FMV quality over all other fifth generation consoles.

As the PC-FX struggled, NEC became far more liberal than most companies with regard to the titles that it allowed to be released for the platform in an attempt to get whatever development support they could. As a result, the PC-FX has gained quite a reputation for its abundance of gal games and dating simulation titles. It also had a handful of standard action games, RPGs, and strategy games, but most titles require a fair amount of Japanese knowledge to play.

Software

There were 62 games released for the system. The launch titles were *Graduation 2: Neo Generation FX*, *Battle Heat* and *Team Innocent* on December 23, 1994 and the final game released was *First Kiss Story* on April 24, 1998. The system and all titles were only released in Japan. A number of demo discs were also released with publications which allowed the user to play the disc in a CD equipped PC-Engine or the PC-FX.

There was no copy protection on any of the PC-FX games, because at the time the system was released the high price of CD-R burners and blank CDs made piracy expensive.

The PC-FX was discontinued in early 1998. At the time of the console's discontinuation, according to NEC the PC-FX had sold just under 100,000 units.

Emulators

Below is a list of PC-FX emulators for various platforms.

Name	License	Operating System
MagicEngine-FX[2]	Shareware	Windows only
Mednafen[3]	GNU GPL	Windows, UNIX/Linux
Xe[4]	Freeware	Windows, UNIX/Linux

Technical specifications

CPU

32-Bit NEC V810 RISC running at 21.5 MHz, 15.5 MIPS

CD-ROM Drive

2X CD-ROM, 300KB / Sec

Memory

2 MB main RAM

1 MB shared RAM (for background generators, CD-ROM DMA, motion decoder, and ADPCM)

256 KB dedicated VRAM (for HuC6270 chips)

1 MB OS ROM

256 KB CD Buffer

32 KB back-up RAM

Video

Internal color format: Digitized Y'UV (not YCbCr)

Maximum On-screen colors: 16,777,000

Resolutions: 256x240p, 341x240p, 256x480i, 341x480i

6 background layers

2 sprite layers

1 motion decoder layer generated from RLE-encoded or JPEG-like data

Video out: Composite and S-Video

Sound

16-Bit Stereo CD-DA
2 ADPCM channels at up to ~31.5 kHz with left/right panning
6 5-bit sample channels with left/right panning

Audio out: × 2 RCA

Expansion Ports

SCSI IO Expansion Slot x 1(Rear), Backup RAM - FX-BMP Card Slot x 1 (Front), 3D VPU Expansion Slot x 1 (Bottom)

Input Devices

FX-PAD - 6 Button, 2 Switch(software-handled) Gamepad Controller, FX-MOU - 2 Button Mouse

Accessories

FX-BMP - 128KB+ Backup RAM Card with x 2 AAA batteries, FX-SCSI - Adaptor allows a PC to use the PC-FX as a 2X SCSI CD-ROM

References

[1] "PC-FX System Info" (http://www.vgmuseum.com/systems/pcfx/). Vgmuseum.com. 1994-12-23. . Retrieved 2010-03-26.
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[3] "Mednafen - Multi-system Emulator" (http://mednafen.sourceforge.net/). Mednafen.sourceforge.net. . Retrieved 2010-03-26.
[4] "Xe - Multi System Emulator" (http://xe-emulator.com/). Xe-emulator.com. . Retrieved 2010-03-26.

External links

- Pcenginefx.com (http://www.pcenginefx.com/) - The NEC console resource for the PC Engine, TurboGrafx & PC-FX.

Sega Saturn

Model 2 "Round Button" console and model 2 controller

Manufacturer	Sega
Type	Video game console
Generation	Fifth generation era
Retail availability	• JP November 22, 1994 • NA May 11, 1995 • EU July 8, 1995[1] • AUS July 8, 1995
Discontinued	Late 1998[2] 2000 (Japan)
Units sold	Worldwide: 9.5 million[3]
Media	CD-ROM, CD+G
CPU	2 × Hitachi SH-2 32-bit RISC (28.6 MHz)
Storage capacity	Internal RAM, cartridge
Graphics	VDP1 & VDP2
Online services	Sega NetLink, SegaNet (XBAND spin-off)
Best-selling game	*Virtua Fighter 2* (1.7 million in Japan)[4]
Predecessor	Mega Drive/Genesis
Successor	Dreamcast

The **Sega Saturn** (セガサターン) is a 32-bit video game console that was first released on November 22, 1994 in Japan, May 11, 1995 in North America, and July 8, 1995 in Europe. The system was discontinued in North America, Europe, and Australia in 1998, and in 2000 in Japan.

While the system was popular in Japan, it failed to gain a similar market share in North America and Europe against Sony's PlayStation and the Nintendo 64, its main competitors.

According to a July 2007 GamePro article, the Saturn sold 9.5 million units worldwide.[3]

In 2009, video game website IGN chose the Saturn to be their 18th best video game console of all time, out of 25.[5]

Development

Sega's 27-member Away Team, comprising employees from hardware engineering, product development and marketing, worked for two years beginning in February 1993 to design the Sega Saturn's hardware. Since the project was top secret, Hayao Nakayama dubbed the project "Aurora". The Saturn was a powerful machine for the time, but its design, with two CPUs and six other processors, made harnessing this power extremely difficult. Also, many of the ancillary chips in the system were "off the shelf" components, increasing the complexity of the system because the components were not specifically designed to work together. Rumors suggest that the original design called for a single central processor, but upon hearing of the PlayStation's capabilities, a second processor was added late in development to increase potential performance. At the roll out of 3DO in 1993, Sega of America president Tom Kalinske boasted that "we have a more powerful machine waiting in the wings, but the time's not ready yet." However, one major design change was forced on Sega, and the culprit was the Sony PlayStation.[6]

> One very fast central processor would be preferable. I don't think all programmers have the ability to program two CPUs—most can only get about one-and-a-half times the speed you can get from one SH-2. I think that only 1 in 100 programmers are good enough to get this kind of speed [nearly double] out of the Saturn.
>
> —Yu Suzuki reflecting upon Saturn *Virtua Fighter* development.[7]

Third-party development was initially hindered by the lack of useful software libraries and development tools, requiring developers to write in assembly language to achieve good performance. At least during early Saturn development, programming in assembly could offer a two to fivefold speed increase over the C language.[7] To save development costs and time, some programmers would utilize only one CPU, such as with *Alien Trilogy*.

The implementation of dual CPUs within the Saturn was not ideal. The biggest disadvantage of the architecture was that both processors shared the same bus and had problems accessing the main system RAM at the same time. The 4 KB of cache memory in each CPU was critical to maintaining performance. In general, very careful division of processing, in addition to the already-challenging task of parallelizing the code, was required to get the most out of the Saturn. One example of how the Saturn was utilized was with *Virtua Fighter*'s use of one CPU for each character.[7]

Compared to the PlayStation, the Saturn's hardware was difficult to work with because of its more complex graphics hardware and lesser overall performance, as noted by Lobotomy Software programmer Ezra Dreisbach.[8] In order to bring *Duke Nukem 3D* and *PowerSlave/Exhumed* to the Saturn, Lobotomy Software had to almost entirely rewrite the Build engine to get adequate performance from the Saturn.[8] Also, during testing of an unreleased *Quake* port for the PlayStation, the Saturn's performance was found to be notably inferior for the game.[8]

For other side it's worth also to mention that with later programing techniques from Sega's AM2 the Saturn proved to be powerful enough for displaying 3D environments. There exists a video of the canceled version of Shenmue for the Sega Saturn.[9] This video shows that game running on stock Saturn hardware (without any kind of hardware upgrades) according to an interview with Taku Kihara and Shin Ishikawa of Sega's AM2.[10] The video speaks for itself and it's a good showcase of how powerful the Saturn could be displaying polygons if it was properly programmed. The video was included in the game Shenmue II for the Sega Dreamcast.

Unlike the PlayStation and Nintendo 64 which used triangles as its basic geometric primitive, the Saturn rendered quadrilaterals. This proved to be a hindrance because most of the industry's standard design tools were based on triangles. One of the challenges brought forth by quadrilateral-based rendering was problems with making some shapes, notably triangular objects. This can be seen in the Saturn version of *Tomb Raider*, in which triangular rocks are not rendered as well as other systems' versions of the game.[8] The hardware also lacked light sourcing and hardware video decompression support, the latter being a major disadvantage during a time when full-motion video was quite popular.

> It's fair to say there has been some criticism of the Saturn architecture recently; the apparently hap-hazard board design has been criticized, and negative comments of a similar vein have been circulating. The complex architecture has been causing problems for programmers up until now. This seems to have been most evident in arcade conversions like *Virtua Fighter*, which has been roundly castigated in areas of the videogame press for its poor, glitchy graphics.
>
> Sega has responded to these criticisms in two ways. First, it has developed a new set of graphics libraries which it claims makes the job of programming the machine much easier. In fact, Sega of Japan has presented the new graphic libraries as an entirely new operating system.
>
> Second, it has been pointing out that despite the early programming difficulties, the games are going to get much better with time, as with nearly every other console system. (Virtua Fighter 2 is only 70% done and is said to be the fastest and best looking Sega Saturn game to date)
>
> —From Next Generation Magazine "So many 32-Bit Systems To Choose From" issue: (vol 1, #12)[11]

Still, if used correctly, the quadrilateral rendering of the Saturn had advantages. It could potentially show less texture distortion than was common with PlayStation titles, as demonstrated by several cross-platform titles such as *Wipeout* and *Destruction Derby*. The quadrilateral-focused hardware and a 50% greater amount of video memory also gave the Saturn an advantage for 2D game engines and attracted many developers of RPGs, arcade games and traditional 2D fighting games. With creative programming, later games like *Burning Rangers* were able to achieve true transparency effects on hardware that used simple polygon stipples as a replacement for transparency effects in the past.

The cartridge slot was useful for adding extra RAM or storage devices for saving games to the system. Two ROM cartridges were released with Sega Saturn games. One with *King of Fighters '95* & the other with "Ultraman: Hikari no Kyojin Densetsu". The ROM cartridges contained part of the game data because not enough RAM was available. Two different RAM cartridges were released for the system; a 1 MB RAM cart by SNK for *King of Fighters '96* and a 4 MB RAM cart by Capcom for *X-Men vs. Street Fighter* and *Marvel Super Heroes vs. Street Fighter*. A RAM expansion cartridge was also required for the games, "Groove on Fight" & "Final Fight Revenge". Both companies were known for their sprite-based 2D competitive fighting games and many of their subsequent games utilized their respective cartridges. (such as "Vampire Saviour" & "Cotton 2" [by Takara]).

Performance in the marketplace

Japan

The Japanese Saturn was released in November 1994, just six weeks ahead of its rival, Sony's PlayStation.[1] Approximately 170,000 machines were sold the first day the console went on sale.

A Japanese Sega Saturn unit, with games and controllers

Many of the games that made the Saturn popular in Japan, such as the *Sakura Taisen* series and various console role-playing games, or even most North American games in general such as the *Sonic R* series and European BIOS, were never released in foreign territories as it was assumed at Sega of America and Sega of Europe that they were not appealing to a Western audience.

The last commercial licensed release in Japan and last official game for the system was *Yuukyuu Gensoukyoku Hozonban Perpetual Collection*, released by MediaWorks on December 4, 2000.

North America

By the end of 1994, the 16-bit video game era was in twilight in North America and gamers were eagerly anticipating the new 32-bit machines from Japan. In early 1995, Sega president Tom Kalinske announced that the Saturn would launch in the U.S. on "Saturnday", (Saturday) September 2, 1995. This date was greatly anticipated by gamers and the media. It also allowed Sony to announce that the PlayStation release date would be one week later on September 9, 1995.

However, at the first Electronic Entertainment Expo (E3) in May 1995, Kalinske announced that the "Saturnday" date was a ruse and that the system was being released nationwide by a few select retailers immediately (May 11, 1995). It appeared that Sega had a real opportunity to take a commanding 4-month lead in the 32-bit race by beating the PlayStation to the market.

The surprise launch backfired on Sega for several reasons. The Saturn was released at a high price point of US$399, while Sony announced a US$299 price for the PlayStation at E3 itself, as a response to the Saturn's earlier release.[12]

The early launch also meant that the Saturn had only a handful of games available at the moment, as most third party games were slated to be completed and rolled out around the original September 2 launch date, and as many successful Japanese titles were not imported. Third party publishers, particularly these based in North America, were angered as the surprise launch prevented them from capitalizing on the momentum inherent in an anticipated, planned release. Essentially the only software available on the shelves at launch was software released by Sega. Many within the gaming industry viewed the early launch as a calculated move to give Sega larger sales of Saturn software at the expense of independent developers.

In addition, the retailers who were not included in the early launch (most notably Wal-Mart and KB Toys) felt betrayed, with some retaliating by supporting Sega's rivals. This resulted in Sega having difficulties with these distributors for the Saturn (and also for its successor, the Dreamcast). For example, Sega's actions so angered KB Toys that they refused to release the Saturn at all, and actually went as far as having some retailers remove anything Sega-related in stores to provide more retail space for the Saturn's competition instead.

By the time of the PlayStation's release on September 9, 1995, the Saturn had sold approximately 80,000 systems. The PlayStation sold over 100,000 units upon release in the U.S., and Sega's dreams of early domination of the new generation of hardware were quickly forgotten.

From 1995–1997 the Saturn became the "other" system, running a distant third behind the Nintendo 64 and the PlayStation. However, it was the preferred system for many arcade and import gamers. Sales of the Saturn would generally spike as new arcade ports were released, but would die off again shortly after. By the end of 1997, Sega had announced that it would develop a successor (the Dreamcast), causing console sales and game releases to drop dramatically.

The Saturn's commercial failure caused Sega to lose US$267.9 million and lay off 30% of its workforce.[13]

Europe

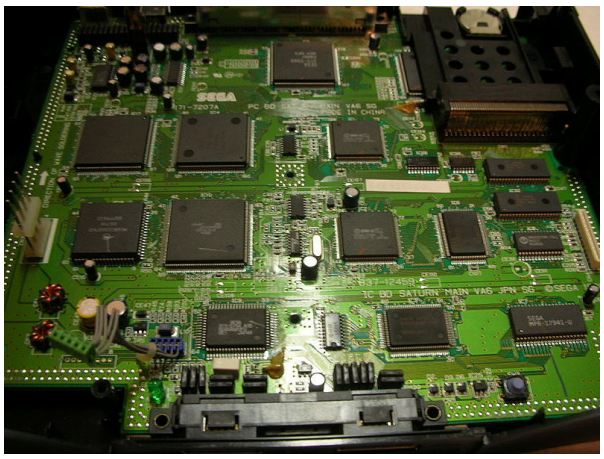
Despite the success of Sega's previous consoles in Europe and although the Sega Saturn was launched in Europe in July 1995—a few months before the newcomer PlayStation's release—the momentum for Sony's console amongst consumers began to build rapidly, stalling Saturn sales in the region. As a result, the Sega Saturn never enjoyed the success it achieved in Japan or even the post-launch hype the machine was awarded in North America, leaving the market almost solely in the competition's hands. By the time that the Nintendo 64 hit European shelves in early 1997, the Saturn's sales had long since stagnated.

The last commercial licensed release in Europe was a survival horror game called *Deep Fear*, released by Sega Europe in November 1998.

However, support for the Sega Saturn in the UK was bolstered by the successful publication of Sega Saturn Magazine.

End of an era

As price drops continued throughout the 32-bit era, the system board design of the Saturn was not as easy to condense in a cost-saving manner and Sega fell behind after price drops offered by Nintendo and Sony. As a marketing strategy, Sega bundled three of its best selling games (*Daytona USA*, *Virtua Cop*, *Virtua Fighter 2*) with the system in order to keep the more expensive Saturn competitive with its rivals. This gave the console a boost in sales, but it wasn't enough to cause any significant impact in the console race.



The Saturn's motherboard was complex and difficult to consolidate, making it expensive to produce.

By early 1997, the Saturn was trailing the Nintendo 64 and PlayStation in both North America and Europe to such an extent that senior management began planning a new platform and, by E3 in 1997, had begun talk of the system called the Katana (which would later be named the Dreamcast). Sega of America President Bernie Stolar, who was strongly in favor of the upcoming console, announced "The Saturn is not our [SEGA's] future."[14] [15]

As Sega began public discussion about their next generation system, barely two years after having launched the Saturn, it became a self-defeating prophecy, some citing it as an example of the Osborne effect. This move, combined with Sega's recent history of short-lived consoles, particularly the Sega CD and 32X which were considered ill-conceived "stopgaps" that turned off gamers and developers alike, led to a chain reaction that quickly caused the Saturn's future to collapse. Immediately following the announcement, sales of the console and software substantially tapered off in the second half of 1997, while many planned games were canceled, causing the console's life expectancy to shorten substantially. While this let Sega focus on bringing out its successor, premature demise of the Saturn caused them financial problems. Even though the Dreamcast did address many of the problems with the Saturn, Sega's damaged reputation caused customers and publishers to be skeptical and hold out to see how it would fare against Sony's PlayStation 2.

The aggressive move to replace the Saturn resulted in a rift between Sega and many of their third-party developers and publishers. North American developers were already hostile to the Saturn because it was difficult to program for, and because they were left out by its early release, so the future project alienated what remaining support Sega had in that region. However, many Japanese developers had strongly supported the Saturn in its homeland and saw little reason for Sega to rush another platform to market. The announcement caused a substantial drop in software sales, causing frustrated third parties to cancel many planned releases. The early abandonment of the Saturn hurt third party software support not only for that system, but also for Sega in general. Several major publishers such as Electronic Arts declined to support the upcoming Dreamcast, which played a part in its discontinuation as well.

Several games intended for release in North America or Europe were canceled. These titles include *Sonic X-treme*, *Policenauts* and *Lunar: Silver Star Story*, the latter two remaining as Japanese market exclusives. Further cancellations in 1998 followed cutting the western release lists down to titles such as *Steep Slope Sliders*, *Panzer Dragoon Saga*, *Burning Rangers*, *The House of the Dead*, *Shining Force III* (One part in a 3 part series), *Magic Knight Rayearth* (North America) and *Deep Fear* (Europe).

The Saturn was discontinued in 1998 in most countries, on April 3, 1999 in North America, and in 2000 in Japan.

Saturn models

Asian models

In Japan, Sega licensed the rights to produce Saturns to their hardware partners – Hitachi, who provided the CPUs and several other chips, and JVC who produced the CD drives for most models, although functionally identical Sanyo drives were sometimes used. SunSeibu released a model with a 7-CD changer for use in hotels. The concept of a multi-game player for hotel use is very common in Japan.

Manufacturer and model	Case color	Button color	Type of buttons	Notes
Sega HST-3200	Gray	Blue	Oval	The original Japanese Saturn. This model had a black cartridge flap and came in a box labeled HST-0001. The power cord is un-notched and this machine has a drive access light.
Sega HST-3210	Gray	Blue	Oval	Second model. It looks the same as the HST-3200 but the inside layout is similar to the early model HST-3220. Production was ended in favor of the White Saturn.
Sega HST-3220	White	Gray/Pink	Round	Sega switched from blue to gray & pink buttons during the production run. This controller was a matching white with multi-colored buttons similar to a Super Famicom controller with the bottom row buttons colored green, yellow, and blue. The 'white' plastic is a very light gray and shares its color with the later Dreamcast. The cartridge flap is visibly gray. Limited models of the Saturn had oval buttons. Later units have some compatibility problems.
Sega Skeleton Saturn (HST-3220)	Translucent black	Black	Round	Included a matching translucent black controller. Both controller and system had "This is cool" printed on them. Only around 50,000 were produced. Has some compatibility problems, notably with *Metal Slug*, *Out Run*, and *Space Harrier*.
Sega Derby Saturn (HST-3220)	Translucent blue	Black	Round	Released on March 25, 1999, this model was only available as part of a promotion with ASCII's popular horse racing sim, *Derby Stallion*. It came with the same translucent black controller as the Skeleton Saturn but did not have "This is cool" printed on the system. After limited supplies of the Skeleton Saturn, the Derby Saturn was quickly bought in bulk by exporters and for a time was easier to find outside Japan than inside. Shares the compatibility problems of the Skeleton Saturn. Uses BIOS 1.0.1.
Hitachi Hi-Saturn (MMP-11 and MMP-1)	Charcoal	Khaki	Round/Oval	This machine appears similar in color to the European and North American Saturn without close inspection. Hi-Saturn is printed on the CD drive lid. Controllers have the same color layout as the unit with pinkish-beige and dark bluish/gray buttons. The Hitachi logo appears on them. The machine was packaged in an almost all-black box with a light-gray/white border. Excepting some limited promotional bundles, the Hi-Saturn came packaged with an MPEG plug-in card allowing Video CD playback. The start-up screen differs slightly from other models – instead of a shower of pieces forming the Saturn logo, the word "Hi-Saturn" shoots out from the middle of the screen and then flips around until it is readable.
Hitachi Hi-Saturn Navi (MMP-1000NV)	Charcoal	Khaki	Round	This is the only consumer Saturn to differ in functionality or shape. It is much thinner, and is flat instead of curved on top, in order to accommodate a folding LCD monitor that clips to the rear. It includes GPS capability, and has a standard port on the rear for use with an included antenna. Navi-ken CDs are used for map data. Since Navi-ken was only available in Japan, only Japanese maps are available.
JVC/Victor V-Saturn RG-JX1	Gray	Blue/Gray	Oval	Resembles the first Japanese Sega Saturn with oval buttons and access light. "V-Saturn" is printed on top of the machine. Features a V-Saturn logo in place of the Sega Saturn logo at boot-up.

JVC/Victor V-Saturn RG-JX2	Light Gray/Dark Gray	Blue/Green/Pink	Round	Resembles the white Japanese Sega Saturn with round buttons. Case is light gray on top, with a darker gray base. Features a V-Saturn logo in place of the Sega Saturn logo at boot-up.
Samsung Saturn (삼성새턴)	Black	-	Oval	Intended only for South Korea, this machine combines the older style oval-button shell with the smaller and newer mainboard which normally comes with a round-button shell. The Japanese language option was removed from the setup screen on some models. These models also use the North American region code. Samsung later released a conversion kit for Japanese games.[16] [17]

North American models

All North American models are black in color and were produced by Sega.

Model	Type of Buttons	Manufacturing Period	Notes
MK-80000	Oval	6/95 – 4/96	Identical to the Grey Japanese Saturn except for color: the U.S. model is black. A few have been found with the backend molding of the MK-80000A and the notched power cord using the 1.00a BIOS version.
MK-80000A	Round	4/96 – 10/96	Features a notched power cord, no drive access light and a 1.00a BIOS. Internal jumper locations are changed.
MK-80001	Round	7/96 – 98	Similar in appearance to the MK-80000A, this machine has some changed internal jumper locations.

Early models came packaged with a redesigned controller that was slightly bigger than the Japanese variant. Eventually the Japanese controller was adopted.

European/Australian models

European and Australian Saturns are identical as both regions share the same AC voltage and TV standard. There is no internal variation between PAL and SÉCAM machines as all were shipped with SCART leads. All models are black and externally quite similar to the North American variations. PAL and SECAM machines will have "PAL" next to the BIOS revision number on the system settings screen instead of "NTSC".

Sega Saturn Start-up Screen (NA and PAL Version)

Model	Type of Buttons	Notes
MK-08200-03	Oval	Drive access LED and black buttons.
MK-80200-50	Oval	Version 1.01a BIOS.
MK-80200A-50	Round	Lacks a drive access LED. Buttons are grey.

Technical specifications

Processors

- Two Hitachi SuperH-2 7604 32-bit RISC processors at 28.63 MHz (25 MIPS)—each has 4 kB on-chip cache (4-way associative), of which 2 kB can alternatively be used as directly addressable Scratchpad RAM
- Custom VDP 1 32-bit video display processor (running at 28.63 MHz on NTSC and PAL Systems) for sprites/polygons
- Custom VDP 2 32-bit video display processor (running at 28.63 MHz on NTSC and PAL Systems) for backgrounds/video out
- Custom System Control Unit (SCU) with DSP for geometry processing and DMA controller (running at 14.3 MHz)
- Motorola 68EC000 sound controller (running at 11.3 MHz / 1.5 MIPS)
- Yamaha FH1 DSP sound processor, "Saturn Custom Sound Processor" (SCSP), running at 22.6 MHz
- SH-1 32-bit RISC microcontroller (for the CD-ROM and CD security checks; uses preprogrammed embedded ROM, not programmable by software)
- Hitachi 4-bit MCU, "System Manager & Peripheral Control" (SMPC)

Memory

- 1 MB SDRAM as work RAM for both SH-2 CPUs (faster)
- 1 MB DRAM as work RAM for both SH-2 CPUs (slower)
- 512K VDP1 SDRAM for 3D graphics (Texture data for polygon/sprites and drawing command lists)
- 2x 256K VDP1 SDRAM for 3D graphics (Two framebuffers for double-buffered polygon/sprite rendering)
- 512K VDP2 SDRAM for 2D graphics (Texture data for the background layers and display lists)
- 4 KB VDP2 SRAM for color palette data and rotation coefficient data (local, on-chip SRAM)
- 512 KB DRAM for sound. (Multiplexed as sound CPU work RAM, SCSP DSP RAM, and SCSP wavetable RAM)
- 512 KB DRAM as work RAM for the CD-ROM subsystem's SH-1 CPU
- 32 KB SRAM with battery back-up for data retention.
- 512 KB Mask ROM for the SH-2 BIOS

Audio

SCSP 1st version.

The **Saturn Custom Sound Processor** (SCSP) is manufactured by Yamaha and consists of several components.

The SCSP is a multi-function game sound generator LSI that consists of a PCM sound generator and DAC (Digital to Analog Converter). The SCSP creates and processes sound mixes. It contains a 32-slot sound generator and sound effect DSP, a 16-channel digital mixer and timer, and an interrupt controller. The Saturn's audio RAM is connected directly to the SCSP, and is used to store the sound programs (i.e. Cybersound) or raw waveform samples. The SCSP can support up to 32 channels for PCM playback, or eight channels for FM synthesis modulation. Maximum sample rate for PCM samples is 44.1 kHz (CD quality). The SCSP is MIDI compliant, and can be hooked up to external equipment (such as keyboards).

The 128 step DSP is capable of generating special effects such as reverberation and different room acoustics.

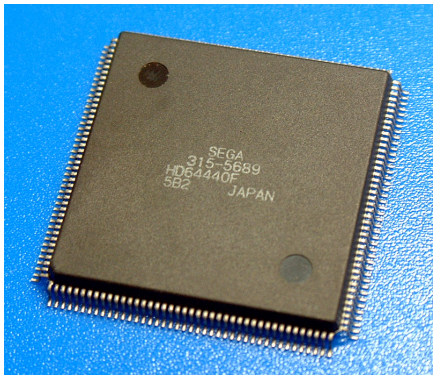
The entire SCSP is controlled by a single Motorola 68EC000 16-bit CPU running at 11.3 MHz. The MC68EC000 is essentially the same as (and compatible with) the M68000 used in the Mega Drive and several other consoles, but without the eight-bit MC6800 interface. The SCSP can be directly accessed by the MC68EC000 and both SH-2s.

The SCSP is limited by the small amount of RAM made available to it, and lack of hardware sample compression.

- 22.6 MHz Yamaha FH1 digital signal processor
- Any of 32 slots can be linked together for multiple operators per FM sound channel
- Usually four operators used per slot for eight FM channels total
- 44.1 kHz sampling rate

The SCSP was also used in some arcade video game boards, such as the Sega Model 2 and 3.

Video



VDP1 1st version

The Sega Saturn is equipped with dual custom VDP chips for graphics processing. The VDP1 chip is primarily responsible for sprite generation. Polygon generation is accomplished through manipulation of the sprite engine. Texture mapping and Gouraud shading is also handled by the VDP1.

The VDP1 renders primitives to two 256 kB frame buffers that can be configured as 512x512x8 or 512x256x16 (Virtua Fighter 2 was the first game to use high resolution, at 60 frame/s on Consoles). Having two frame buffers allows double buffering of the display and provides more time for rendering. The active framebuffer is read out to the display by the VDP2, which can apply data from a coefficient table to modify the scanning process, for effects like rotation, scaling, and general distortion of the entire frame buffer as a single entity.

The SCU (system bus control unit) provides DMA across a dedicated bus commonly labeled as the "B-bus" that the VDP2 and VDP1 are connected to, allowing transfer of data from them to and from main memory. Keep note that transferring data from and to the same bus is prohibited by all 3 SCU DMA levels.

- Rendering engine for command tables: textured and non-textured polygons, untextured "polygons," "polylines," and lines along with command tables that controls the frame buffer.
- "Sprites" are textured polygons with specific rendering modes:
- Normal sprite (one point), shrunk/scaled sprite (two points), distorted sprite (four points)
- Other rendering modes:
  - Overwrite (replace frame buffer contents)
  - Shadow (underlying frame buffer pixels rewritten with 1/2 brightness, primitive not drawn)
  - Half luminosity (primitive rendered with 1/2 brightness)
  - Half transparency (primitive and underlying framebuffer pixels averaged together)
  - Gouraud shading for RGB-format textures only
  - Dual 256KB frame buffers
  - Programmable frame buffer depth of 8 or 16 bits per pixel
  - Automatic erase feature to clear framebuffer with single color

Some commonly quoted specifications are highly dependent on the rendering modes for the polygons and other factors that burden the system load:

- 200,000 texture-mapped polygons per second
- 500,000 flat-shaded polygons per second
- 60 frames of animation per second

In order to better understand the differences between the PlayStation GPU and Saturn VDP1 rendering capabilities, here are some varying factors:

PlayStation GPU

- The GPU has a unified 1 MB block of memory for the texture data and frame buffers. This allows for complex effects where the framebuffer is in turn applied as a texture again.
- The GPU has a 2 kB texture cache.
- The framebuffer portion of the GPU RAM must be manually erased.
- Commands are sent to the GPU via DMA, buffered in a FIFO, and executed in the order of being sent.

Saturn VDP1

- VDP1 memory is split: 512 kB for texture data / command lists, 256 kB for one frame buffer and 256 kB for another. Because of the split, it is not possible to use the frame buffer as a texture.
- The VDP1 has no texture cache, but since texture memory and the frame buffer have separate buses and can be accessed simultaneously, there isn't a speed penalty.
- The two frame buffers have a high-speed auto-erase feature.
- Commands are stored in a linked list in RAM, multiple lists can be stored, the list can be processed by the VDP1 without wasting a DMA channel.

The VDP 2 serves as the Sega Saturn's background processor. Certain special effects such as texture transparency and playfield rotation and scrolling (up to five fields at any given time) are handled here.

Both the VDP2 and VDP1 32-bit video display processor have direct access to the both SH2s, as well as direct memory access (DMA) to both the main and video RAM.

VDP2 1st version.

- Background engine
- Four simultaneous scrolling backgrounds
- Uses 8x8 or 16x16 tiles or bitmap display per background
- Programmable memory access controller for VDP2 VRAM
- Two simultaneous rotating playfields
- VDP2 can rotate VDP1 framebuffer position while scanning out to display for rotation effects
- Color RAM supports 15-bit (32768 colors) and 24-bit (16.7 million colors) display modes
- Programmable priority at the per-background / per-tile / per-pixel levels
- Background color tinting/fading, and transparency effects
- Background blur effect (gradation) to simulate distance

Programmable display resolution:

- Horizontal sizes of 320, 352, 640, 704 pixels
- Vertical sizes of 224, 240, 256 scanlines, non-interlaced
- Vertical sizes of 448, 480, 512 scanlines, interlaced (only PAL consoles support 256 and 512 scanline displays)
- Hi-Vision (EDTV) and 31 kHz (VGA) display support:
- 31 kHz: 320×480 or 640×480, non-interlaced (progressive scan)
- Hi-Vision: 352×480 or 704×480, non-interlaced (progressive scan)

Storage

The **Sega Saturn** video game console features a **double speed CD-ROM drive** manufactured by JVC-Victor (some models may have been manufactured by Hitachi or Sanyo). The drive has a transfer rate of 320 KB/s, and a 512 KB data cache. Drive related functions are controlled via a single Hitachi SH1 32-bit RISC processor operating at 20 MHz.

- Audio CD compatible
- CD+G compatible
- CD+EG compatible
- CD single (8 cm CD) compatible
- Video CD (required optional MPEG add-on), Photo CD, Electronic Books, digital karaoke (optional)

Input/output

- Two 7-bit bidirectional parallel I/O ports (controller ports)
- High-speed serial communications port (Both SH2 SCI channels and SCSP MIDI, also used for the Serial port)
- Cartridge connector
- Internal expansion port for optional MPEG adapter card (different models available from Sega, JVC, and Hitachi)
- Composite video/audio (standard)
- NTSC/PAL RF (optional RF adapter required)
- S-Video compatible (optional cable required)
- RGB compatible (optional cable required)
- EDTV/Hi-Vision compatible (custom cable required, not commonly available)

While the Saturn graphics hardware is capable of VGA (progressive/non-interlaced) video, no existing retail software ever used this mode and the system cannot force any such software to run in this mode. Moreover, neither Sega nor third-party manufacturers produced or sold the cables required to support such high-resolution modes on any type of display.

Power source

- AC120 volts; 60 Hz (US)
- AC240 volts; 50 Hz (EU)
- AC100 volts; 60 Hz (JP)
- 3 volt lithium battery to power non-volatile RAM and SMPC internal real-time clock
- Power Consumption: 25 W
- Power Consumption: 12 W (JP)

Dimensions (US/European model)

- Width: 260 mm (10.2 in)
- Length: 230 mm (9.0 in)
- Height: 83 mm (3.2 in)

Errata

A VDP1 transparency rendering quirk causes strips of pixels to be rewritten to framebuffer for 2-point (scaled) and 4-point (quadrangle) "sprites", applying the transparency effect multiple times. Rarely seen in commercial games (*Robotica* explosions), later titles implemented software transparency via direct framebuffer access to correctly render polygons (Dural in *Virtua Fighter Kids*).

Another technique developed for pseudo-hardware transparency was to rasterize polygons using one or two pixel tall sprites with transparency enabled to fill in horizontal spans. Because 2 of the 4 quadrangle points were identical, there was no framebuffer rewrite during rendering.

The Linux kernel contains code specifically designed for the Saturn; it is unclear if this effort was ever completed.

Compatibility

In addition to playing games, all of the Saturn models could play music CDs, CD+G, and CD+EG discs. A software disc was sold by Sega to allow the playing of PhotoCDs ('Photo CD Operating System'). An MPEG decoding hardware module was released by Sega, JVC and Hitachi, allowing VideoCD playback. JVC later released a VideoCD module that included the software for displaying PhotoCDs, eliminating the need for a software disc. However, these modules were released in Japan only due to the popularity of the Video CD Format. In order to use one on a North American Saturn, a region converter must be used.

There were some titles that could be played on both North American and Japanese consoles. *Street Fighter Alpha 2* was one of the titles that could be played on both regions systems without a converter. *Scud: The Disposable Assassin*, which was only released in the North America, was compatible with both European and Japanese Saturns, in addition to North American Saturns. It is one of the very few region-free Sega Saturn games.[18]

Marketing techniques

In 1996, Sega started a marketing campaign that featured a naked woman with blonde hair and blue eyes. It used screenshots from the games to cover her breasts and pubic area.[19] It was very successful, and *Electronic Gaming Monthly* selected the campaign as the best ad during the 1997 Buyer's Guide.

For a time, Sega mailed out videotapes containing an infomercial advertising its system to potential customers. It ran roughly eight minutes long and featured gameplay footage and a collection of Saturn commercials. It has become somewhat infamous for its bizarre content (a bald woman with a ring around her head, a dancing slacker, etc.).[20] The launch advertising campaign in the United States, titled "The Theater of the Eye", was also in this unusual style, describing psychological effects of playing the Saturn.[21]

One marketing technique used by Sega to promote the Saturn was **Segata Sanshiro** (せがた三四郎 *Segata Sanshirō*), a parody of Sanshiro Sugata portrayed by Hiroshi Fujioka.[22] He is a Judo master who tracks down and punishes those who do not play the Sega Saturn.[23] He uses two catch phrases, "You must play the Sega Saturn!" (セガサターン、シロ! *Sega Satān, shiro!*) and "Sega Saturn, White" (セガサターン、白 *Sega Satān, Shiro*), which sound similar to his name. Sanshiro lives as a hermit high on a mountain, devoting his life to intensive Sega Saturn training. He trains physically every day by carrying around a giant Sega Saturn on his back and punching buttons on its giant controller, as well as mentally by breaking stacks of Nintendo 64 cartridges with his head. The character dies in his final commercial, where he sacrifices himself to stop a missile launched at the Tokyo headquarters of Sega. He appears in the games *Segata Sanshirō Shinken Yūgi* and *Rent-a-Hero No. 1* and was also considered for *Sonic & Sega All-Stars Racing*.[24] He was received with critical acclaim in Japan.[25] The Sanshiro character was originally planned to be in the Dreamcast title Segagaga, but licensing issues prevented this from happening.

Another notable commercial was released right after the Nintendo 64's launch. It consisted of Nintendo 64's launched into the air like clay pigeons and then shot one at a time. It was referred to as a "Pretendo" and at the end of the commercial the narrator said, "Face it Pretendo, you weren't worth waiting for."

During the first year-and-a-half of the Saturn's US life, Sega also had a marketing campaign similar to the one used for the Sega Genesis in the early 1990s, where they would directly attack the PlayStation through a series of aggressive MTV-styled ads. Typically, they would showcase a Saturn exclusive like *Nights Into Dreams...* and end with a reminder that such a game was "not on PlayStation." In some advertisements for the core Saturn system, Sega also boasted that the system had two 32-bit processors while the PlayStation only had one (ironically, the careless implementation of these "two 32-bit processors" would prove to be a key factor in the Saturn's demise).

A device resembling a Saturn appears briefly in *Neon Genesis Evangelion* episode 23, with a Sega-badged TV. Sega was a sponsor of the program and the movies. Another device resembling a Saturn also appears briefly in *You're Under Arrest* episode 48, with the case opened and being repaired by *Miyuki*. A Sega Saturn can be seen in the movies, *Mallrats*, *First Kid*, and *Dead man on Campus*. Also in the Jet Li movie *Black Mask*, Tracy Lee is playing a Sega Saturn with various games while she is being held hostage by Tsui Chik, with two of the games being *Virtua Fighter* and *Darius Gaiden*.

The Sega Saturn was also prominently featured atop Drew Carey's TV in *The Drew Carey Show* for some time, even after its discontinuation. Eventually, in Season 6, it was replaced with a Dreamcast. In *Shenmue* for the Dreamcast, a Sega Saturn can be seen in Ryo's TV Room in his house, which can be played on later in the game. In *Choukou Senshi Changerion*, the main character owned a Sega Saturn that was prominently displayed on top of his TV; this was done also because the toys and show were sponsored by Sega. In *Neon Genesis Evangelion*, Toji Suzuhara and Kensuke Aida are seen with a Sega Saturn, and Asuka Langley Soryu is seen playing a video game with a Sega Saturn-type controller.

Accessories

DirectLink

This, also known as Link Cable, is a device that enables two Sega Saturns to connect to each other for multiplayer gameplay. The device requires two televisions and two copies of the same game.

Action Replay

This can be used to change the code of certain games in order to gain access to features not meant to be accessed or to advance further into a game using cheats. Another feature of the Action Replay was the ability to back-up saved games for when the battery dies. It was also possible to play imported games from any region without any modification to the system.

Arcade Racer

This is a type of joystick designed after a steering wheel for the Sega Saturn. As the controller is an analog control mechanism instead of the digital input of the standard controller, it possesses a smoother response. It was compatible with games such as *Virtua Racing*, *Daytona USA*, *Sega Rally Championship*, and *Sega Touring Car Championship*.

Storage Cards

Utilizing the cartridge slot behind the CD tray, portable storage cards are inserted to store game information such as high scores and saved game files. This was one of the few accessories for the Sega Saturn to be available to third-party manufacturers.

NetLink

The *Sega NetLink* was a 28.8k modem that fit into the cartridge slot in the Saturn for direct dial multiplayer. In Japan a now defunct pay-to-play service was used. However, all compatible games work today with the western version because it was direct dial. It could also be used for web browsing. Only five games are compatible with the North American version: Daytona USA (CCE Netlink Edition), Duke Nukem 3D, Saturn Bomberman, Sega Rally(Plus), and Virtual On.

See also

- List of Sega Saturn games

References

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[5] http://www.ign.com/top-25-consoles/18.html

[6] Next Generation magazine vol. 1 #12 Dec 1995 page 46 paragraph 3 (Note: According to Next Generation Magazine, The Sega "Away Team" was created By Sega America for the launch of the U.S Saturn)

[7] "Sega Saturn." Next Generation magazine, February 1995: 43.

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[9] http://www.youtube.com/watch?v=jh2WtGUCQbI

[10] http://www.the-nextlevel.com/features/interviews/am2/

[11] Next generation Magazine Vol. 1#12 Dec. 1995 pg. 47-48)

[12] Rudden, Dave. "Eight Extremely Embarrassing E3 Moments" (http://www.gamepro.com/sony/ps3/games/features/199528.shtml). . Retrieved 2008-07-14. "at the same E3: Sony's keynote speaker went up on stage, said "Two hundred and Ninety-Nine Dollars" and walked

off the stage."
[13] " Sega Dreamcast (http://www.g4tv.com/gamemakers/episodes/1259/Sega_Dreamcast.html)". *Game Makers*. G4 (TV channel), Los Angeles. 2008-08-20. No. 302.
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[19] Sega Saturn Advertisement (JPEG) (http://www.gamepro.com/sony/ps2/games/features/images/53238-2.jpg)
[20] System - Infomercial (http://gameads.gamepressure.com/tv_game_commercial.asp?ID=3191)
[21] Press release (http://findarticles.com/p/articles/mi_m0EIN/is_1995_May_11/ai_16940474/)
[22] SEGATA SANSHIRO! Article (http://www.retrojunk.com/details_articles/342/)
[23] "Segata Sanshiro Commercials" (http://synbios.net/site/2010/03/07/segata-sanshiro-commercials/). . Retrieved 2009-02-17.
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External links

- SEGA Saturn UK (http://www.segasaturn.co.uk/) Sega Saturn community
- SEGA Saturn News (http://sega-saturn.dcemu.co.uk/) Sega Saturn Homebrew News Website
- SEGA Saturno (http://www.segasaturno.com/) Spanish Sega Saturn site
- Saturn (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Sega/Saturn/) at the Open Directory Project
- SEGAShiro (http://www.segashiro.com)
- Sega Saturn Database (http://www.segasaturndatabase.co.nr)

Casio Loopy

Manufacturer	Casio
Type	Video game console
Generation	Fifth generation
Retail availability	• JP October, 1995
Media	Cartridge
CPU	32-bit RISC SH-1 (SH7021)
Controller input	D-pad , Mouse

The **Casio Loopy** (ルーピー *Rūpī*), subtitled *My Seal Computer SV-100*, is a 32-bit games console sold exclusively in Japan. Released in October 1995[1] , it was unique in that the marketing for it was completely targeted to female gamers. Only 10 games were released for it, most being in the otome games and dress-up genres. An interesting feature of this machine was that it included a built-in thermal color printer that could be used to create stickers from game screenshots. An optional accessory, called Magical Shop, allowed the machine to be used with outside devices (such as VCRs and DVD players) to obtain images from them, add text, and make stickers from those as well. The machine features only one controller port.

Games

- *Anime Land* (あにめらんど *Animerando*)
- *Bow-wow Puppy Love Story* (わんわん愛情物語 *Wanwan Aijō Monogatari*)
- *Dream Change: Kogane-chan's Fashion Party* (ドリームチェンジ 小金ちゃんのファッションパーティー *Dorīmuchenji Koganechanno Fasshonpātī*)
- *HARIHARI Seal Paradise* (HARIHARIシールパラダイス *HARIHARI Shīru Paradaisu*)
- *I Want a Room in Loopy Town!* (ルーピータウンのおへやがほしい! *Rūpī Taun no O-heya ga Hoshii!*)
- *Little Romance* (リトルロマンス *Ritoru Romansu*)
- *Lupiton's Wonder Palette* (ルピトンのワンダーパレット *Rupiton no Wandāparetto*)
- *Chakra-kun's Charm Paradise* (チャクラくんのおまじないパラダイス *Chakurakun no Omajinai Paradaisu*)
- *Caricature Artist* (似□□アーティスト *Nigaoe Ātisuto*)
- *PC Collection* (パソコン・コレクション *Pasokon Korekushon*)

External links

- Casio Loopy on UltimateConsoleDatabase.com [2]
- Casio Loopy on old-computers.com [3]
- Casio Loopy on uk.playright.dk [4]
- Casio Loopy on rfgeneration.com [5]

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[1] "Play:Right Rare > Hardware > Casio Loopy" (http://www.uk.playright.dk/raretitel.php?id=29220). . Retrieved 2008-07-10.

Apple Bandai Pippin

Manufacturer	Bandai, engineered by Apple Computer, Inc. (now Apple Inc.)
Type	multimedia player
Generation	Fifth generation era
Release date	/ September 1, 1996 (@World Player) ● Limited December 1995, full March 28, 1996 (Atmark Player)
Retail availability	1995/1997
Units sold	42,000[1]
Media	CD-ROM
CPU	PowerPC 603 RISC (66 MHz)
Storage capacity	5 MB combined system and video memory,128kb Flash RAM
Graphics	"taos" (VGA/16-bit)
Controller input	"Applejack": control pad with embedded trackball
Connectivity	14.4, 28.8, 33.6 kbit/s modems
Online services	PSINet/@World

The **Pippin**, known in Japan as Pippin Atmark (ピピンアットマーク *Pipin Attomāku*), and marketed as **Pipp!n**, was a multimedia platform designed by Apple Inc. (then Apple Computer Inc.) and produced by Bandai in 1995. It was based on a 66 MHz PowerPC 603 processor, a 14.4 kbit/s modem and ran a stripped version of the System 7.5.2 operating system.

The goal was to create an inexpensive computer aimed mostly at playing CD-based multimedia titles, especially games, but also functioning as a network computer. It featured a 4x CD-ROM drive and a video output that could

connect to a standard television display.

The platform was named for the Newtown Pippin, an apple cultivar, a smaller and more tart relative of the McIntosh apple (which is the namesake of the Macintosh).

History

Apple never intended to release Pippin on its own. Instead it intended to license the technology to third parties; Bandai was looking at entering the console video game market, and chose the Pippin as its platform. Much later Katz Media also entered production, planning to use the platform as a low cost PC with web ability.

By the time the Apple Bandai Pippin was released (1995 in Japan; 1996 in the United States), the market was dominated by the Sega Saturn, PlayStation, Nintendo 64 and PC. In addition there was little ready-to-use software for Pippin, the only major publisher being Bandai itself. It cost US$599 on launch,[1] and while touted as a cheap computer, the system, in reality, was a video game console. As such, its price was considered too expensive in comparison to its contemporaries.

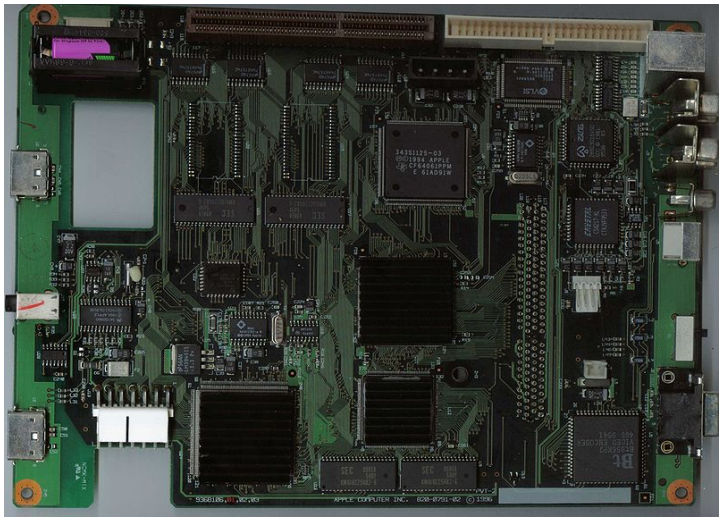
Bandai manufactured fewer than 100,000 Pippins (reported sales were 42,000) before discontinuing the system; production was so limited that there were more keyboard and modem accessories produced than actual systems.[2]

Katz Media Productions produced 5,000 units in Ireland for Europe, labeled it the KMP 2000; it is the rarest of the Pippin models. The images here are of the KMP developer unit, which include the 50-pin SCSI connector for external devices used for developing new software.

In May 2006, the Pippin placed 22nd in PC World Magazine's list of the "25 Worst Tech Products of all Time",[3] and in 2009, ScrewAttack.com ranked it #10 on their Top 10 Biggest Busts.

Technical specifications

Hardware



The Pippin AtMark PCB.

- 66 MHz PowerPC 603 RISC microprocessor[4] [5]
  - Superscalar, three instructions per clock cycle
  - 8 KB data and 8 KB instruction caches
  - IEEE standard single and double precision Floating Point Unit (FPU)
- 5 MB combined system and video memory, advanced architecture
  - Easy memory expansion cards in 2, 4, 8, and 16 MB increments.
- 128 K Flash memory accessible storage space.
- 4 x CD-ROM drive
- Two high-speed serial ports, one of which is GeoPort ready, the other is LocalTalk
- PCI-compatible expansion slot
- Two “AppleJack” ruggedized ADB inputs
  - Supports up to four simultaneous players over Apple Desktop Bus (ADB)
  - Supports standard ADB keyboards and mice with mechanical adapters

Video

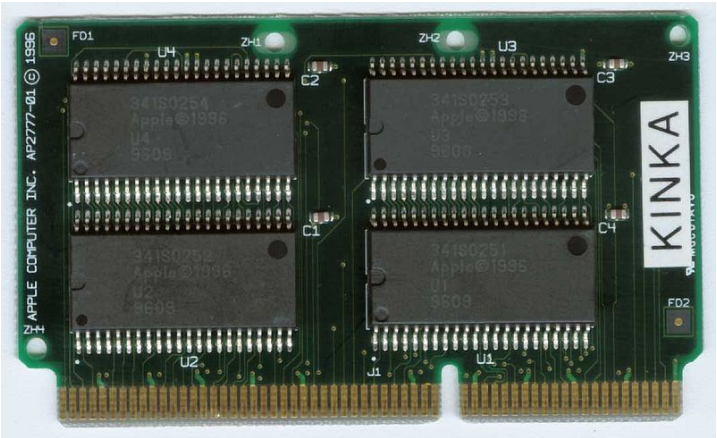
- 8-bit and 16-bit video support
- Dual frame buffers for superior frame-to-frame animation
- Support for NTSC and PAL composite, S-Video and VGA (640x480) monitors
- Horizontal and vertical video convolution

Audio

- Stereo 16-bit 44 kHz sampled output
- Stereo 16-bit 44 kHz sampled input
- Headphone output jack with individual volume control
- Audio CD player compatibility

System software

- 3 MB ROM version 7.7.D (version number on ROM boards is development 1.1, 1.2; production 1.3).
- Runtime environment derived from System 7, System 7.5.2 (if used, Enabler 1.1).
- PowerPC native version of QuickDraw.
- Reduced system memory footprint (most computer extensions features removed).
- Disk-resident System Software stamped on CD-ROM with title.
- System boots off of CD-ROM by default (but can boot off any SCSI device).
- Pippin System Software upgrades released through CD-ROM stamping operations.
- 68k emulator.
- Macintosh Toolbox intact.



The Pippin firmware board.

Software

In every way, the Pippin is a Macintosh. Most of the Pippin software will run on Classic Mac OS (few will work with Mac OS 9). A third party created a Pippin bootable CD with Netscape that had the Macintosh GUI (Enabler 1.1), but was stripped of many of the extensions and control panels found on regular Macs. At least one Japanese title (*Ultraman*) existed that could run on Pippin, Mac, and Windows.

Pippin CDs were created on a Macintosh or a Pippin with a SCSI connected external CD drive (for functionality testing). Once the final version of the software was ready, a checksum of the CD was sent to Apple and signed with Apple's private key. The signed checksum was applied to the gold master CD that was to be pressed and released to the public. The Pippin, during its boot process, would generate a checksum of the CD and compare it to the one signed with Apple's private key. Only if the checksums compared successfully would the boot process continue.[6]

Software titles: Japan

Very few titles were produced for the Japanese version on release in early 1995. While some promised titles may not have been released, the number that was released is less than 80 titles.[7]

Software titles: USA

When Bandai released the U.S. version, it had only 18 titles sold separately, and six CDs came with the Pippin itself. Upgrades to the Pippin Browser were released as a new CD over time, and so was an update to *TV Works* (a text and drawing program).

Software titles: other

As mentioned before, a third party made a custom Pippin bootable CD with the Macintosh GUI on it. There were also a few demo CDs made by Bandai and Katz Media. Others may exist that have not circulated.

Accessories

- AppleJack controller
- AppleJack Wireless (IR) controller
- Pippin keyboard with drawing tablet
- Pippin Modems (14.4, 28.8, 33.6 kbit/s)
- Pippin memory (2, 4, 8, 16 MB)
- Pippin Floppy Dock
- Pippin MO 256 MB optical disk
- Pippin ADB adapter (for connecting Macintosh devices to Pippin)
- AppleJack to Macintosh (ADB) adapter (for connecting Pippin devices to Macintosh)

An AppleJack controller

Printers

Pippin can use the Apple Color StyleWriter 2400 and 2500 series through its serial port.

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[4] http://support.apple.com/kb/TA34388?viewlocale=en_US

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[6] "Pippin Authentication" (http://www.macgeek.org/museum/pippin/downloads/Auth003.pdf). *Pippin Technical Notes*. Apple Computer. 5/10/96. . Retrieved 2010-02-01.

[7] *The most accurate list of Pippin titles* (http://web.mac.com/sebangulo/Pippin/About_the_Pippin.html). Retrieved September 14th, 2009.

External links

- Pictures of Pippin Hardware and Games (http://web.mac.com/sebangulo/Pippin/)
- Apple's original Pippin site (http://web.archive.org/web/19970129095612/http://www.pippin.apple.com/)
- Katz Media mission statement on the Pippin (http://web.archive.org/web/19970601023829/www.katzmedia.com/company.html)
- Bandai Pippin Museum & Archive, including PDF Technical Notes (http://www.macgeek.org/museum/pippin/)
- Overview (http://lowendmac.com/coventry/06/apple-pippin.html)
- Pippin screenshots (http://www.mac-collection.co.uk/)
- The Computer Chronicles' coverage of CES 1996, including Apple's demonstration of the Pippin (http://www.archive.org/details/CC1320_winter_ces_1996)

PlayStation (console)

The original model design and logo of the PlayStation.

Manufacturer	Sony Computer Entertainment
Product family	PlayStation
Type	Video game console
Generation	Fifth generation era
Retail availability	**PlayStation** • JP December 3, 1994[1] • NA September 9, 1995[2] • EU September 29, 1995[3] • AUS November 15, 1995[4] **PSone** • JP July 7, 2000 • NA September 19, 2000 • EU September 29, 2000
Discontinued	March 23, 2006
Units sold	102 million[5]
Media	CD-ROM
CPU	MIPS R3000A-family **R3051** @ 33.8688 MHz
Storage capacity	Memory card
Best-selling game	*Gran Turismo*, 10.85 million shipped (as of April 30, 2008)[6] [7]
Successor	PlayStation 2

The **PlayStation** (プレイステーション *Pureisutēshon*, Officially abbreviated as **PS**; sometimes referred to as the **PSX**[8] , **PS1**, or **PSone**[9]) is a 32-bit fifth-generation video game console first released by Sony Computer Entertainment in Japan on December 3, 1994.[1]

The PlayStation was the first of the PlayStation series of consoles and handheld game devices. Successor consoles and upgrades include the Net Yaroze, PS one, PSX, PocketStation, PlayStation 2, PlayStation Portable, and PlayStation 3.[10] The PlayStation was the first "computer entertainment platform" to ship 100 million units, which it had reached 9 years and 6 months after its initial launch.[11] Sony ceased production of the PlayStation on March 23, 2006, eleven years after it was released.

In 2009 the PlayStation was named the 7th greatest video game console of all time, out of a field of 25, by IGN.

Early development

An original PlayStation control pad. This model was later replaced by the Dual Analog, and then the DualShock.

The first conceptions of the PlayStation date back to 1986. Nintendo had been attempting to work with disc-based technology since the Famicom, but the medium had problems. The Famicom Disk System's rewritable magnetic discs could be easily erased (thus leading to a lack of durability), and they lacked any sort of copy protection, thus were vulnerable to piracy. Consequently, when details of CDROM/XA (which had neither of those problems) were released to the public, Nintendo was interested. Simultaneously developed by Sony and Philips, CD-ROM/XA was an extension of the CD-ROM format that combines compressed audio, visual, and computer data, allowing all to be accessed simultaneously. Nintendo approached Sony to develop a CD-ROM add-on, tentatively titled the "SNES-CD". A contract was signed, and work began. Nintendo's choice of Sony was due to a prior dealing: Ken Kutaragi, the person who would later be dubbed "The Father of the PlayStation", was the individual who had sold Nintendo on using the Sony SPC-700 processor for use as the eight-channel ADPCM sound set in the Super Famicom/SNES console through an impressive demonstration of the processor's capabilities.[12]

Sony also planned to develop a Super Famicom-compatible, Sony-branded console, but one which would be more of a home entertainment system playing both Super Nintendo cartridges and a new CD format which Sony would design. This was also to be the format used in SNES-CD discs, giving a large degree of control to Sony despite Nintendo's leading position in the video gaming market.

The DualShock controller.

The SNES-CD was to be announced at the May 1991 Consumer Electronics Show (CES). However, when Hiroshi Yamauchi read the original 1988 contract between Sony and Nintendo, he realized that the earlier agreement essentially handed Sony complete control over any and all titles written on the SNES CD-ROM format. Yamauchi decided that the contract was totally unacceptable and he secretly canceled all plans for the joint Nintendo-Sony SNES CD attachment. Instead of announcing a partnership between Sony and Nintendo, at 9 a.m. the day of the CES, Nintendo chairman Howard Lincoln stepped onto the stage and revealed that Nintendo was now allied with Philips, and Nintendo was planning on abandoning all the previous work Nintendo and Sony had accomplished. Lincoln and Minoru Arakawa had, unbeknownst to Sony, flown to Philips headquarters in Europe and formed an alliance of a decidedly different nature—one that would give Nintendo total control over its licenses on Philips machines.

After the collapse of the joint project, Sony considered halting their research, but ultimately the company decided to use what they had developed so far and make it into a complete, stand-alone console. As a result, Nintendo filed a lawsuit claiming breach of contract and attempted, in US federal court, to obtain an injunction against the release of the PlayStation, on the grounds that Nintendo owned the name. The federal judge presiding over the case denied the injunction and, in October 1991, the first incarnation of the new PlayStation was revealed. However, it is theorized that only 200 or so of these machines were ever produced.

By the end of 1992, Sony and Nintendo reached a deal whereby the "Play Station" would still have a port for SNES games, but Nintendo would own the rights and receive the bulk of the profits from the games, and the SNES would continue to use the Sony-designed audio chip. However, Sony decided in early 1993 to begin reworking the "Play Station" concept to target a new generation of hardware and software. As part of this process the SNES cartridge port was dropped and the space between the names "Play Station" was removed becoming "PlayStation", thereby ending Nintendo's involvement with the project.

PlayStation Memory Card.

Launch

The PlayStation was launched in Japan on December 3, 1994, North America on September 9, 1995,[2] Europe on September 29, 1995,[3] and Oceania in November 15, 1995.[4] The launch price in the American market was US$299[2] (a price point later used by its successor, the PlayStation 2),[13] and Sony enjoyed a very successful launch with titles of almost every genre, including *Battle Arena Toshinden*, *Doom*, *Warhawk*, *Air Combat*, *Philosoma* and *Ridge Racer*. Almost all of Sony's and Namco's launch titles went on to spawn numerous sequels.

Functions

In addition to playing games, the PlayStation has the ability to read and play audio CDs. The CD player has the ability to shuffle the playback order, play the songs in a programmed order, and repeat one song or the entire disk. This function, as well as a memory card manager, can be accessed by starting the console without inserting a game, thereby accessing a system menu. The original PlayStation and PSone menus differ. The PlayStation menu has a dark blue background and buttons that are designed like rainbow graffiti; the PSone has a blocked grey background with 2 icons; one for memory cards management, the other for CD player access (some versions of the original PlayStation have the blocked grey background, however, but the memory card and CD player icons are different). If a game is put in the system at any time on the menu, the game will immediately start.

Titles

As of September 30, 2007, a total of 7,918 software titles have been released worldwide (counting games released in multiple regions as separate titles).[14] As of March 31, 2007, the cumulative software shipment was at 962 million units.[15] The very last game for the system released in the United States was *FIFA Football 2005*. However, it can be noted that on 07/26/07 in Japan and 03/18/08 in the US, *Metal Gear Solid: The Essential Collection* was released which contained new printings of the PlayStation 1 game *Metal Gear Solid*. The discs were in the PlayStation format and playable on the PlayStation and PS One.[16]

The *OK* and *Cancel* buttons on most of the Japanese PlayStation games are reversed in their North American and European releases. In Japan, the ○ button (*maru*, right) is used as the OK button, while the ✕ button (*batsu*, wrong) is used as Cancel. North American and European releases have the ✕ button or the ○ buttons as the OK button, while either the □ or the △ ○ buttons are used as Cancel (some titles like *Xenogears* used the ○ button for cancelling actions and selections, along with the PlayStation 2 system browser and the XrossMedia Bar on the PlayStation 3 and the PSP). However, a few games such as Squaresoft's *Vagrant Story*, *Final Fantasy VII* (which used the ✕ button as cancel) and *Final Fantasy Tactics*, Namco's *Ridge Racer Type 4* and Konami's *Metal Gear Solid*, have the buttons remain in the same Japanese configurational layout. Some games like Japanese version of Gran Turismo had used different control similar to North American games. These Japanese button layouts still apply to other PlayStation consoles, such as the PlayStation Portable (PSP), PlayStation 2, and the PlayStation 3. This is

because in the early years Sony America (SCEA), Sony Europe (SCEE), and Sony Japan (SCEJ) had different development and testing documents (TRCs) for their respective territories

Variants

The PlayStation went through a number of variants during its production run, each accompanied by a change in the part number. From an external perspective, the most notable change was the gradual reduction in the number of external connectors on the unit. This started very early on—the original Japanese launch units (SCPH-1000) had an S-Video port, which was removed on the next release. This also led to the strange situation where the US and European launch units had the same part number series (SCPH-100x) as the Japanese launch units, but had different hardware (Rev. C silicon and no S-Video port)—they were the same as the Japanese SCPH-3000, so for consistency should have been SCPH-3001 and SCPH-3002 (this numbering was used for the Yaroze machines, which were based on the same hardware and numbered DTL-H3000, DTL-H3001, and DTL-H3002). Also, the first models (DTL-H1000, DTL-H1001, DTL-H1002) had some problems with printf function and developers had to use another function instead. This series of machines had a reputation for CD drive problems—the optical pickup sled was made of thermoplastic, and eventually developed wear spots that moved the laser into a position where it was no longer parallel with the CD surface—a modification was made that replaced the sled with a die-cast one with hard nylon inserts, which corrected the problem.

Developer's kit PlayStation (PAL)


Comparison of the rear of an original SCPH-100x model and a SCPH-900x model. The SCPH-900x revision saw the removal of the Parallel I/O port while the RCA jacks were removed in the SCPH-500x revision.

With the release of the next series (SCPH-500x), the numbers moved back into sync. A number of changes were made to the unit internally (CD drive relocated, shielding simplified, PSU wiring simplified) and the RCA jacks and RFU power connectors were removed from the rear panel. This series also contained the SCPH-550x and SCPH-555x units, but these appear to have been bundle changes rather than actual hardware revisions.

These were followed by the SCPH-700x and SCHP-750x series—they are externally identical to the SCPH-500x machines, but have internal changes made to reduce manufacturing costs (for example, the system RAM went from 4 chips to 1, and the CD controller went from 3 chips to 1).

The final revision to the original PlayStation was the SCPH-900x series—these had the same hardware as the SCPH-750x machines with the exception of the removal of the parallel port and a slight reduction in the size of the PCB. The removal of the parallel port was probably partly because no official add-on had ever been released for it, and partly because it was being used to connect cheat cartridges that could be used to defeat the copy protection.

The PS one was based on substantially the same hardware as the SCPH-750x and 900x, but had the serial port removed, the controller / memory card ports moved to the main PCB and the power supply replaced with a DC-DC converter that was also on the main PCB.

With the early units, many gamers experienced skipping full-motion video or dreaded physical "ticking" noises coming from their PlayStations. The problem appears to have come from poorly placed vents leading to overheating in some environments—the plastic moldings inside the console would warp very slightly and create knock-on effects with the laser assembly. The solution was to ensure the console was sat on a surface which dissipated heat efficiently in a well vented area, or raise the unit up slightly by propping something at its edges. A common fix for already affected consoles was to turn the PlayStation sideways or upside-down (thereby using gravity to cancel the effects of

the warped interior) although some gamers smacked the lid of the PlayStation to make a game load or work.

Earliest series had potentiometers on the board for adjusting the reading mechanism, named BIAS, GAIN and an unknown one. By connecting a voltmeter between the upper-most metering point near the BIAS potentiometer and the chassis, the resulting voltage could be read. The supposed right values are 1.70V when a CD is spinning at 1x speed and 1.85V when a CD is spinning at 2x speed. Further tuning was also possible on the unique potentiometer present on the CD drive. Later series featured an automatic laser calibration mechanism.

Sony then released a version dubbed "Dual Shock", which included a controller with two analog sticks and a built-in vibration-feedback feature.

Another version that was colored blue (as opposed to regular console units that were grey in color) was available to game developers and select press. Later versions of this were colored green—on a technical level, these units were almost identical to the retail units, but had a different CD controller in them that did not require the region code found on all pressed disks, since they were intended to be used with CD-R media for debugging. This also allowed the use of discs from different regions, but this was not officially supported; different debug stations existed for each region. The two different color cases were not cosmetic—the original blue debug station (DTL-H100x, DTL-H110x) contained "Revision B" silicon, the same as the early retail units (these units had silicon errata that needed software workarounds), the green units (DTL-H120x) had Rev. C hardware. As part of the required tests, the user had to test the title on both. Contrary to popular belief, the RAM was the same as the retail units at 2 MB. The firmware was nearly identical—the only significant change was that debug printf()s got sent to the serial port if the title didn't open it for communications—this used a DTL-H3050 serial cable (the same as the one used for the Yaroze).

"Chipped" consoles

The installation of a modchip allowed the PlayStation's capabilities to be expanded, and several options were made available. By the end of the system's life cycle almost anyone with minimal soldering experience was able to realize the modification of the console. Such a modification allowed the playing of games from other regions, such as PAL titles on an NTSC console, or allowed the ability to play copies of original games without restriction. Modchips allow the playing of games recorded on a regular CD-R. This created a wave of games developed without official approval using free, unofficial tools, as well as the reproduction of original discs. With the introduction of such devices the console was very attractive to programmers and illegal copiers alike.

A previous theory was that anyone seeking to create copies of games that would work correctly faced several issues at the time, as the discs that were produced by Sony were designed to be difficult to copy — and impossible to copy on recordable media. Discs were manufactured with a black-colored plastic (transparent only to the infrared radiation used by CD-ROM lasers), and it was theorized that the PlayStation's drive was engineered to require these tinted discs. However, this has been easily disproven, as PlayStation CD-ROMs can be read by most CD drives, and the PlayStation will read most recordable CDs. Nonetheless, the discs were mastered with a specific wobble in the lead-in area. This wobble encodes a four-character sequence which is checked by the CD-ROM drive's controller chip. The drive will only accept the disc if the code is correct. This string varies depending on the region of the disk—"SCEI" for NTSC:J machines, "SCEA" for NTSC:U/C machines, "SCEE" for PAL machines and "SCEW" for the Net Yaroze. Since the tracking pattern is pressed into the disc at the time of manufacture, this cannot be reproduced on a CD-R recorder. Some companies (notably Datel) did manage to produce discs that booted on unmodified retail units, but this required special equipment and can only be done with "pressed" discs. However, inexpensive modchips were created that simply injected the code to the appropriate connections to the controller chip, which provided an easy way of bypassing these measures. The other issue is that most PC drives used Mode 1 or Mode 2/Form 1 (2048 bytes/sector) and the PlayStation uses a mixed-mode format with most data in Mode 2/Form 1 and streaming audio/video data in Mode 2/Form 2, which most CD-R drives at the time could not handle well. Newer drives were able to correctly handle these variations.

The creation and mass-production of these inexpensive modchips, coupled with their ease of installation, marked the beginning of widespread console videogame copyright infringement. Also, CD burners were made available around this time. Prior to the PlayStation, the reproduction of copyrighted material for gaming consoles was restricted to either enthusiasts with exceptional technical ability, or others that had access to CD manufacturers. With this console, amateurs could replicate anything Sony was producing for a mere fraction of the MSRP.

Net Yaroze

A version of the PlayStation called the Net Yaroze was also produced. It was more expensive than the original PlayStation, colored black instead of the usual gray, and most importantly, came with tools and instructions that allowed a user to be able to program PlayStation games and applications without the need for a full developer suite, which cost many times the amount of a PlayStation and was only available to approved video game developers. Naturally, the Net Yaroze lacked many of the features the full developer suite provided. Programmers were also limited by the 2 MB of total game space that Net Yaroze allowed. The amount of space may seem small, but games like Ridge Racer ran entirely from the system RAM (except for the streamed music tracks). It was unique in that it was the only officially retailed PlayStation with no regional lockout; it would play games from any territory. It would not however play CD-R discs, so it was not possible to create self-booting Yaroze games without a modified PlayStation.

PS one

The **PS one** (also **PSone**), launched in 2000, is Sony's smaller, redesigned version of its PlayStation video game console. The PS one is considerably smaller than the original PlayStation (dimensions being 38 mm × 193 mm × 144 mm versus 45 mm × 260 mm × 185 mm). It was released on July 7, 2000,[17] and went on to outsell all other consoles—including Sony's own brand-new PlayStation 2—throughout the remainder of the year.[18] Sony also released a small LCD screen and an adaptor to power the unit for use in cars. The PS one is fully compatible with all PlayStation software. There were four differences between the "PS One" and the original. The first was a cosmetic change to the console. The second was the home menu's Graphical User Interface. The third was an added protection against the use of modchips (by changing the internal layout and making previous-generation modchip devices unusable). The fourth is a lack of the original PlayStation's parallel and serial ports. The serial port allowed multiple consoles to be connected for multiplayer, connecting a console to debugging software, as well as third-party game enhancement devices such as the GameShark.

The redesigned PSone with an LCD Screen and DualShock controller

Summary of PlayStation models

The last digit of the PlayStation model number denotes the region in which it was sold:

- **0** is Japan (Japanese boot ROM, NTSC:J region, NTSC Video, 100V PSU)
- **1** is USA/Canada (English boot ROM, NTSC:U/C region, NTSC Video, 110V PSU)
- **2** is Europe/PAL (English boot ROM, PAL region, PAL Video, 220V PSU)
- **3** is Asia (Japanese boot ROM, NTSC:J region, NTSC video, 220V PSU)

Consumer models

Model:	Case:	BIOS:	Hardware:	Region:	A/V Direct Out:	Parallel Port:	Serial Port:	Sound Scope:	Notes:
SCPH-1000	Original (Grey)	Unknown (09/22/94)	Rev. A	NTSC-J	Yes	Yes	Yes	No	FMV skipping issues. S-Video direct out.
SCPH-1001	Original (Grey)	2.2 (12/04/95)	Rev. B	NTSC-U/C	Yes	Yes	Yes	No	FMV skipping issues. Based on the SCPH-3000 series.
SCPH-1002	Original (Grey)	2.0 (05/10/95)	Rev. B	PAL	Yes	Yes	Yes	No	
SCPH-1002	Original (Grey)	2.1 (07/17/95)	Rev. B	PAL	Yes	Yes	Yes	No	
SCPH-1002	Original (Grey)	2.2 (12/04/95)	Rev. B	PAL	Yes	Yes	Yes	No	
SCPH-3000	Original (Grey)	1.1 (01/22/95)	Rev. B	NTSC-J	Yes	Yes	Yes	No	FMV skipping issues. Earliest units had a PU-7 board, further units featured a PU-8 board like the SCPH-1002.
SCPH-3500	Original (Grey)	2.1 (07/17/95)	Rev. B	NTSC-J	Yes	Yes	Yes	No	FMV skipping issues.

SCPH-5000	Original (Grey)	2.2 (12/04/95)	Rev. C	NTSC-J	No	Yes	Yes	No	CD-ROM drive re-located on right side of CD bay. Lens carriage reinforced and power simplified, fixing FMV skipping issues. A/V direct out and RFU power connector removed. Model numbers synchronized worldwide. Lens assembly attuned specifically to the black disks to circumvent piracy. **SCPH-5552**: A very rare Men in Black promotional model exists with a black case and the film's logo on the CD lid. **SCPH-5903**: Only model capable of playing Video CD movies. This model also has RCA plugs, like earlier PlayStation models.
SCPH-5001	Original (Grey)	Unknown (Unknown)	Rev. C	NTSC-U/C	No	Yes	Yes	No	
SCPH-5002	Original (Grey)	Unknown (Unknown)	Rev. C	PAL	No	Yes	Yes	No	
SCPH-5003	Original (Grey)	Unknown (Unknown)	Rev. C	NTSC-J	No	Yes	Yes	No	
SCPH-5500	Original (Grey)	3.0 (09/09/96)	Rev. C	NTSC-J	No	Yes	Yes	No	
SCPH-5501	Original (Grey)	3.0 (11/18/96)	Rev. C	NTSC-U/C	No	Yes	Yes	No	
SCPH-5502	Original (Grey)	3.0 (01/06/97)	Rev. C	PAL	No	Yes	Yes	No	
SCPH-5503	Original (Grey)	Unknown (Unknown)	Rev. C	NTSC-J	No	Yes	Yes	No	
SCPH-5552	Original (Grey)	3.0 (01/06/97)	Rev. C	PAL	No	Yes	Yes	No	
SCPH-5903	Original (White)	Unknown (Unknown)	Rev. C	NTSC-J	Yes	Yes	Yes	No	

SCPH-7000	Original (Grey)	4.0 (08/18/97)	Rev. C	NTSC-J	No	Yes	Yes	Yes	DualShock now standard. Introduction of Sound Scope. Major manufacturing cost reductions took place from this model onwards. The number of memory chips and CD-ROM controllers were reduced, other components were simplified. **SCPH-7000**, **SCPH-7001**, and **SCPH-7002**: Available in midnight blue as promotional item to celebrate the 10 millionth PlayStation sold.
SCPH-7001	Original (Grey)	4.1 (12/16/97)	Rev. C	NTSC-U/C	No	Yes	Yes	Yes	
SCPH-7002	Original (Grey)	4.1 (12/16/97)	Rev. C	PAL	No	Yes	Yes	Yes	
SCPH-7003	Original (Grey)	3.0 (11/18/96)	Rev. C	NTSC-J	No	Yes	Yes	Yes	
SCPH-7500	Original (Grey)	Unknown (Unknown)	Rev. C	NTSC-J	No	Yes	Yes	Yes	
SCPH-7501	Original (Grey)	4.1 (12/16/97)	Rev. C	NTSC-U/C	No	Yes	Yes	Yes	
SCPH-7502	Original (Grey)	4.1 (12/16/97)	Rev. C	PAL	No	Yes	Yes	Yes	
SCPH-7503	Original (Grey)	4.1 (12/16/97)	Rev. C	NTSC-J	No	Yes	Yes	Yes	
SCPH-9000	Original (Grey)	4.0 (08/18/97)	Rev. C	NTSC-J	No	No	Yes	Yes	Parallel port removed. Motherboard PCB reduced in size. Higher quality CD-Rom than previous models.
SCPH-9001	Original (Grey)	4.1 (12/16/97)	Rev. C	NTSC-U/C	No	No	Yes	Yes	
SCPH-9002	Original (Grey)	4.1 (12/16/97)	Rev. C	PAL	No	No	Yes	Yes	
SCPH-9003	Original (Grey)	Unknown (Unknown)	Rev. C	NTSC-J	No	No	Yes	Yes	
SCPH-100	PSone (White)	4.3 (03/11/00)	Rev. C	NTSC-J	No	No	No	Yes	Redesigned smaller case. Controller and memory card ports integrated onto motherboard. Serial port removed. Has external power supply.
SCPH-101	PSone (White)	4.5 (05/25/00)	Rev. C	NTSC-U/C	No	No	No	Yes	
SCPH-102	PSone (White)	4.4 (03/24/00)	Rev. C	PAL	No	No	No	Yes	
SCPH-102	PSone (White)	4.5 (05/25/00)	Rev. C	PAL	No	No	No	Yes	
SCPH-103	PSone (White)	Unknown (Unknown)	Rev. C	NTSC-J	No	No	No	Yes	

Specialty models

Model:	Case:	BIOS:	Hardware:	Region:	Notes*:	
DTL-H1000	Original (Blue)	Unknown (09/22/94)	Rev. A	NTSC-J	S-Video direct out.	Debugger. Can boot CD-R copies.
DTL-H1000H	Original (Grey)	1.1 (01/22/95)	Rev. B	NTSC-J		
DTL-H1001	Original (Blue)	2.0 (05/07/95)	Rev. B	NTSC-U/C		
DTL-H1001H	Original (Grey)	Unknown (Unknown)	Rev. B	NTSC-U/C		
DTL-H1002	Original (Blue)	2.0 (05/10/95)	Rev. B	PAL		
DTL-H1100	Original (Blue)	2.2 (03/06/96)	Rev. B	NTSC-J	Has external power supply.	
DTL-H1101	Original (Blue)	2.1 (07/17/95)	Rev. B	NTSC-U/C		
DTL-H1102	Original (Blue)	2.1 (07/17/95)	Rev. B	PAL		
DTL-H1200	Original (Green)	2.2 (12/04/95)	Rev. C	NTSC-J		
DTL-H1201	Original (Green)	2.2 (12/04/95)	Rev. C	NTSC-U/C		
DTL-H1202	Original (Green)	2.2 (12/04/95)	Rev. C	PAL		
DTL-H3000	Original (Black)	Unknown (Unknown)	Rev. B	NTSC-J	Net Yaroze hobbyist development system. Can not boot CD-R copies.	
DTL-H3001	Original (Black)	2.2 (12/04/95)	Rev. B	NTSC-U/C		
DTL-H3002	Original (Black)	2.2 (12/04/95)	Rev. B	PAL		

*All models feature *A/V Direct Out*, *Parallel Port* and *Serial Port*; none feature *Sound Scope*
*All models use a low-quality CD drive.
*All models can boot software with any region code.

Successors

Sony's successor to the PlayStation is the PlayStation 2, which is backwards compatible with its predecessor in that it can play almost every PlayStation game. Unlike emulators that run on a PC, the PlayStation 2 actually contains the original PlayStation processor, allowing games to run exactly as they do on the PlayStation. For PlayStation 2 games this processor, called the IOP, is used for input and output (memory cards, DVD drive, network, and hard drive). Like its predecessor, the PlayStation 2 is based on hardware developed internally by Sony.

The third generation of the PlayStation known as the PlayStation 3 (abbreviated PS3), was launched on November 11, 2006 in Japan, November 17, 2006 in North America, and March 23, 2007 in Europe. The PlayStation 3 was initially backward compatible with all games that were originally made for the PlayStation and PlayStation 2, but due to the removal of the PlayStation 2 Emotion Engine Chip after the introduction of the 40 GB version, the capability to play PlayStation 2 discs is limited now to software emulation, and the capability to play original PlayStation games is still possible. While PS3 games are not region-locked, PlayStation and PlayStation 2 games still only play on a PS3 console from the same territory. The redesigned "Slim" form factor PS3 introduced in 2009 has had the ability to play PlayStation 2 games entirely removed, though it can still play games from the original PlayStation.

The PlayStation Portable (abbreviated PSP) is a handheld game console first released in late 2004. The PSP is capable of playing PlayStation games downloaded via Sony's online store, and can also play any PlayStation game by using the PlayStation 3's remote play feature while the disc in the PlayStation 3. Sony hopes to release nearly all PlayStation games on a gradual basis.[19] It is also possible to convert original PlayStation disc images into executable binaries using freely available software. These games are then playable on PSPs that have been modified to run unsigned code.

An original PlayStation 2

An original (60 GB) PlayStation 3.

An original (1000 series) PlayStation Portable

Legacy

The success of the PlayStation is widely believed to have influenced the demise of the cartridge-based home console. While not the first system to utilize an optical disc format, it was the first success story, and ended up going head-to-head with the last major home console to rely on proprietary cartridges—the Nintendo 64.

Nintendo was very public about its skepticism toward using CDs and DVDs to store games, citing longer load times and durability issues. It was widely speculated that the company was even more concerned with copyright infringement, given its substantial reliance on licensing and exclusive titles for its revenue.

The increasing complexity of games (in content, graphics, and sound) pushed cartridges to their storage limits and this fact began to turn off third party developers. Also, CDs were appealing to publishers due to the fact that they could be produced at a significantly lower cost and offered more flexibility (it was easy to change production to meet demand).

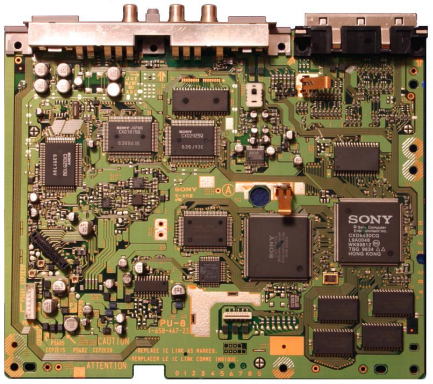
Quality of construction

The first batch of PlayStations used a KSM-440AAM laser unit whose case and all movable parts were completely made out of plastic. Over time, friction caused the plastic tray to wear out—usually unevenly. The placement of the laser unit close to the power supply accelerated wear because of the additional heat, which made the plastic even more vulnerable to friction. Eventually, the tray would become so worn that the laser no longer pointed directly at the CD and games would no longer load. Sony eventually fixed the problem by making the tray out of die-cast metal and placing the laser unit farther away from the power supply on later models of the PlayStation.

Some units, particularly the early 100x models, would be unable to play FMV or music correctly, resulting in skipping or freezing. In more extreme cases the PlayStation would only work correctly when turned onto its side or upside down.

Technical specifications

Central processing unit



An early PlayStation motherboard.

R3051

- MIPS R3000A-compatible 32-bit RISC chip running at 33.8688 MHz
- The chip is manufactured by LSI Logic Corp. with technology licensed from SGI.
- Features:
  - Operating performance of 30 MIPS
  - Bus bandwidth 132 MB/s
  - 4 kB Instruction Cache
  - 1 kB non-associative SRAM Data Cache
  - 2 MB of main RAM

Geometry transformation engine

- Resides inside the main CPU chip, giving it additional vector math instructions used for 3D graphics
- Features:
  - Operating performance of 66 MIPS
  - 360,000 flat-shaded polygons per second
  - 180,000 texture mapped and light-sourced polygons per second

Data decompression engine

- Also residing within the main CPU, it is responsible for decompressing images and video.
- Documented device mode is to read three RLE-encoded 16×16 macroblocks, run IDCT and assemble a single 16×16 RGB macroblock.
- Output data may be transferred directly to GPU via DMA.
- It is possible to overwrite IDCT matrix and some additional parameters, however MDEC internal instruction set was never documented.
- Features:
  - Compatible with MJPEG and H.261 files
  - Operating Performance of 80 MIPS
  - Directly connected to CPU Bus

Graphics processing unit

Name unknown

- Handles 2D graphics processing separate from the main 3D engine on the CPU
- Features:
  - Maximum of 16.7 million colors (24-bit color depth)
  - Resolutions from 256 × 224 to 640 × 480
  - Adjustable frame buffer
  - Unlimited color lookup tables
  - Emulation of simultaneous backgrounds (for parallax scrolling)
  - Flat or Gouraud shading and texture mapping
  - 1 MB of VRAM

Sound processing unit

Name unknown

- Supports ADPCM sources with up to 24 channels
- Sampling rate of up to 44.1 kHz
- 512 kB of memory

Other

CD-ROM drive

- 2x, with a maximum data throughput of 300 kB/s
- XA Mode 2 Compliant
- CD-DA (CD-Digital Audio)
- 32 kB buffer

Operation System

- Stored on 512 kB ROM

Memory Card

- 128 kB of space in an EEPROM

See also

- List of PlayStation 1 games
- Libcrypt
- PlayStation Demo Discs
- PlayStation Sound Format
- Runix
- PlayStation palmar hidradenitis

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- SCEA PlayStation Products Home (http://web.archive.org/web/20080113213152/http://www.playstation.com/products.html)
- PlayStation (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Sony/PlayStation/) at the Open Directory Project
- The PlayStation Museum, dedicated to preserving the history of the PlayStation, complete with retail and prototype game screenshots and information (http://www.Playstationmuseum.com/)

- The PlayStation Datacenter, a complete PlayStation 1 games database with game screenshots, controls, cheats, covers, etc. (http://psxdata.snesorama.us/)

Virtual Boy

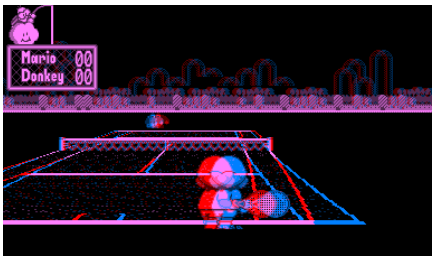
Manufacturer	Nintendo
Type	Video game console
Generation	Fifth generation era
Retail availability	• JP July 21, 1995 • NA August 14, 1995
Discontinued	• JP December 22, 1995 • NA March 2, 1996
Units sold	770,000[1]
Media	Game Pak (cartridge)
CPU	NEC V810

Nintendo's **Virtual Boy** (バーチャルボーイ *Bācharu Bōi*) (also known as the **VR-32** and **V**irtual **U**topia **E**xperience during development) was the first video game console capable of displaying "true 3D graphics" out of the box. Whereas most video games use monocular cues to achieve the illusion of three dimensions on a two-dimensional screen, the Virtual Boy creates an illusion of depth through the effect known as parallax. In a manner similar to using a head-mounted display, the user looks into an eyepiece made of neoprene on the front of the machine, and then an eyeglass-style projector allows viewing of the monochromatic (in this case, red) image.

It was released on July 21, 1995 in Japan and August 14, 1995 in North America at a price of around US$180. It met with a lukewarm reception that was unaffected by continued price drops. Nintendo discontinued it the following year.[1]

Overview

Technical information



A screenshot from *Mario's Tennis* on an emulator. The anaglyph red/blue format simulates the Virtual Boy's 3D display.
 3D red cyan glasses are recommended to view this image correctly.

The Virtual Boy system uses a pair of 1×224 linear arrays (one per eye) and rapidly scans the array across the eye's field of view using flat oscillating mirrors. These mirrors vibrate back and forth at a very high speed, thus the mechanical humming noise from inside the unit. Each Virtual Boy game cartridge has a yes/no option to automatically pause every 15–30 minutes so that the player may take a break.

Monochrome display

The Virtual Boy is iconic for its monochromatic use of red LED pixels; they were used due to being the least expensive, the lowest drain on batteries, and for being the most striking color to see. During development, a color LCD was experimented with but was found to cause users to see double instead of creating the illusion of depth. In addition, LCDs at the time had low refresh rates, and were often blurry. They also consumed more power than LEDs.

The Virtual Boy, which uses an oscillating mirror to transform a single line of pixels into a full field of pixels, requires high-performance LEDs in order to function properly. Because each pixel is only in use for a tiny fraction of a second (384 pixels wide, 50.2 Hz scan rate = approximately 52 µs per scanline), high peak brightness is needed to make the virtual display bright and comfortable for the user to view. The two-screen system demanded a fast refresh rate, unlike the original Game Boy which had blurry motion, so using an LCD was not an option.

Controller

The Virtual Boy, being a system with heavy emphasis on three-dimensional movement, needed a controller that could operate along a Z axis. The Virtual Boy's controller was an attempt to implement dual digital "D-pads" to control elements in the aforementioned 3D environment.

The Virtual Boy controller

The controller itself is shaped like an "M" (similar to a Gamecube controller). One holds onto either side of the controller and the part that dips down in the middle contains the battery pack. There are six buttons on the controller (A, B, Start, Select, L and R), the two D-pads, and the system's "on/off" switch. The two directional pads are located on either side of the controller at the top. The "A" and "B" buttons are located below the pad on the right side and the "Start" and "Select" buttons are located in the same spot on the left side. What would normally be called "shoulder buttons" ("L" and "R") are located behind the area where the pads are, on the back of the controller, functioning more as triggers.

Despite how the two D-pads were supposed to control elements in the 3D environment, both D-pads are interchangeable in most games; both do the same thing. For others with a more 3D environment, like *Red Alarm*, *3D Tetris*, or *Teleroboxer*, each pad controls a different feature. For *Red Alarm*, one directional pad controls pitch and direction of the protagonist's ship, while the other controls up, down, and strafe movement. For *Teleroboxer*, each control pad, in conjunction with the trigger/shoulder buttons, controls the position of the corresponding fist of the character. For *3D Tetris*, The D-pads flip and move the blocks. The symmetry of the controller also allows games

like *Vertical Force* to feature the option to reverse the controls for left-handed people (similar to the Atari Lynx). This kind of concession to left-handed people has been repeated with the Nintendo Wii console and to a lesser extent the Nintendo DS on some of its more touchscreen oriented games.

One of the unique features of the controller is the extendable power supply that slides onto the back. It houses the six AA batteries required to power the system. This can be substituted with a wall adapter, though a "slide on" attachment is required for the switchout. Once the slide on adapter is installed, a power adapter can be attached to provide constant power.

Extension port

The system's EXT (extension) port, located on the underside of the system below the controller port, was never officially supported since no official multiplayer games were ever published, nor was an official link cable released. (Although Waterworld and Faceball were going to use the EXT port for multiplayer play, the multiplayer features in the former were removed [2] and the latter was cancelled.) At Planet Virtual Boy, there is a tutorial [3] on how to make a multiplayer cable for the Virtual Boy by modifying a couple of standard Nintendo Composite cables. Currently, only a few games support the link cable.

Specifications

Hardware specifications

Processor	NEC V810 (P/N uPD70732) 32-bit RISC Processor @ 20 MHz (18 MIPS) 1 KB instruction cache
Memory	128 KB dual-port VRAM 128 KB of DRAM 64 KB WRAM (PSRAM)
Display (× 2)	Reflection Technologies Inc. (RTI) Scanning LED Array (SLA) P4 1 × 224 pixel resolution (when scanned; 384 x 224) 2-bit monochromatic (black + 3 shades of red) 50.2 Hz Horizontal Scan Rate
Power	6 AA Batteries or DC10V 350mA AC Adapter/Tap (third-party Performance Adaptor DC 9V 500mA)
Sound	16-bit Stereo
Controller	6 buttons and 2 D-pads uses NES controller protocol
Serial Port	8 pin cable
Hardware Part Numbers	VUE-001 Virtual Boy Unit VUE-003 Stand VUE-005 Controller VUE-006 Game Pak VUE-007 Battery Pack VUE-010 Eyeshade VUE-011 AC Adapter Tap ("Use With Super NES AC Adapter No. SNS-002 Only") VUE-012 Eyeshade Holder VUE-014 Red & Black Stereo Headphones
Weight	750 grams
Dimensions	8.5"H × 10"W × 4.3"D

Cartridge specifications

128 megabit addressable ROM space (4–16 megabit ROM used in released games)
128 megabit addressable RAM space (0–8 kilobyte Battery Backed RAM in released games)
128 megabit addressable expansion space (unused in any released games)
Expansion interrupt available to the cartridge
Left and right audio signals pass through cartridge
60-pin connector

Development

The console was designed by Gunpei Yokoi, inventor of the Game & Watch and Game Boy handhelds, as well as the *Metroid* franchise. While compact and seemingly portable, Virtual Boy was not intended to replace the Game Boy in Nintendo's product line, as use of the system requires a steady surface and completely blocks the player's peripheral vision. According to David Sheff's book *Game Over*, Yokoi never actually intended for the console to be released in its present form. However, Nintendo pushed the Virtual Boy to market so that it could focus development resources on the Nintendo 64.[2]

Reception

Hype surrounding the device included public musings by Nintendo that the device might resemble a gun set vertical, projecting a 3D image in the air. The actual device was considered a disappointment compared to this description by Nintendo of America:

> "Powered by a 32-bit processor, the Virtual Boy produced very impressive 3-D effects, although the monochromatic graphic style proved to limit the appeal of the visuals."[3]

The commercial demise of the Virtual Boy was considered to be the catalyst that led to Yokoi being driven from Nintendo,[4] yet it was maintained that Yokoi kept a close relationship with Nintendo[5] despite Yokoi having later created a rivalling handheld system for Bandai. According to *Game Over*, the company laid the blame for the machine's faults directly on the creator.[2] The Virtual Boy was discontinued in late 1995 in Japan and in early 1996 in North America.

In 2007, the system was listed as number five in PC World's "The Ugliest Products in Tech History" list.[6] TIME Magazine's website listed the Virtual Boy as one of the worst inventions of all time.[7]

Because Nintendo only shipped 800,000 Virtual Boy units worldwide, it is considered a valuable collector's item.[8]

Marketing

Voice-overs for some advertisements were done by Dylan Bruno. There were several in-store promotional videos created for various games (as well as the Virtual Boy itself), and the system was actively marketed in magazines and on TV. The marketing slogan was "A 3D Game for a 3D World".

Games

Due to the short lifespan of the system, only 22 games were released. Of them, 19 games were released in the Japanese market, while only 14 were released in North America.[9]

See also

- List of Virtual Boy demos
- Nintendo 3DS

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External links

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- List of Virtual Boy games (http://www.gamefaqs.com/search/index.html?platform=50&game=&contrib=0&genre=0&region=0&date=0&developer=&publisher=&dist=0&sort=0&link=0&res=1&title=0&adv=1) at GameFAQs
- Virtual Boy (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Nintendo/Virtual_Boy/) at the Open Directory Project
- Virtual Boy Hardware Specifications (http://www.vr32.de/modules/hardware/index.php?type=vb&sec=specs) at Planet Virtual Boy
- Virtual Boy Programmers Manual (http://www.vr32.de/content/downloads/documents/vbprog.pdf) at Planet Virtual Boy
- Performance Adapter Set (http://www.virtual-boy.org/adapterset2.htm) at virtual-boy.org

Nintendo 64

Manufacturer	Nintendo
Type	Video game console
Generation	Fifth generation
Release date	• JP June 23, 1996[1] • NA September 29, 1996[1] • PAL March 1, 1997[1]
Discontinued	• JP December 20, 2001 • PAL January 16, 2002 • NA August 20, 2002
Units sold	Worldwide: 32.9 million[2]
Media	ROM cartridge
CPU	93.75 MHz NEC VR4300
Storage capacity	Cartridge battery, Controller Pak
Graphics	62.5 MHz SGI RCP
Controller input	Nintendo 64 controllers
Online services	RANDnetDD (Japan only) Sharkwire Online (third-party)
Best-selling game	*Super Mario 64*, 11 million (as of May 21, 2003)[3]
Predecessor	Super Nintendo Entertainment System
Successor	Nintendo GameCube

The **Nintendo 64**, often known as **N64**, is Nintendo's third home video game console for the international market. Named for its 64-bit CPU, it was released in June 1996 in Japan, September 1996 in North America, March 1997 in Europe and Australia, September 1997 in France and December 1997 in Brazil. It is Nintendo's last home console to

use Game Paks to store games (Nintendo switched to a MiniDVD-based format for the Nintendo GameCube, then to standard DVD-sized discs for the Wii); handhelds in the Game Boy line, however, continued to use Game Paks. It was discontinued in 2001 in Japan, North America and PAL regions by the launch of Nintendo's GameCube.

The N64 was released with two launch games, *Super Mario 64* and *Pilotwings 64*, and a third in Japan, *Saikyō Habu Shōgi*. The N64's suggested retail price was US$199 at its launch and it was later marketed with the slogan "Get N, or get Out!". The N64 sold 32.93 million units worldwide. The console was released in at least eight variants with different colors and sizes. An assortment of limited edition controllers were sold or used as contest prizes during the N64's lifespan.

Of the consoles in the fifth generation, the Nintendo 64 was the last contender and the most technologically advanced. However, the console's storage medium had limitations which harmed the market competitiveness. A significant limitation was the small capacity and high production expense of cartridge-based media instead of the Compact Disc format used by competitors. The limited capacity forced game designers to struggle with fitting game content into a constrained space, though the faster access time of the cartridge medium offered other advantages over Compact Disc media. Another technical drawback was a limited texture cache, which could only hold textures of small dimensions and reduced color depth, which had to be stretched to cover larger in-game surfaces.

In 2009, the N64 was named the 9th greatest video game console by IGN, out of a field of 25.[4]

History

The Nintendo 64 owes its existence to Silicon Graphics (SGI) and MIPS Technologies, who were responsible for the R4300i microprocessor and the 3D graphics hardware used in the N64. SGI had recently acquired MIPS Computer Systems, and the two worked together to create a low-cost real-time 3D graphics system. The SGI project was originally offered to Thomas Kalinske, then CEO of Sega of America, by James H. Clark, founder of Silicon Graphics. Sega of Japan's evaluation of the early prototype uncovered several unresolved hardware-issues and deficiencies. They were subsequently resolved; but not before Sega had already decided against SGI's design.[5] In August 1993, Nintendo expressed interest in SGI's work, and "Project Reality" was born. An official announcement regarding their collaboration was made in October 1993.[6]

Nintendo's code name for the N64, "Project Reality",[7] stemmed from the bold belief that the hardware's advanced CGI capabilities would rival supercomputers of the era. The console's design was revealed to the public for the first time in late Spring 1994. Pictures of the console showed the Nintendo Ultra 64 logo, a ROM cartridge, but no controller. The final N64 console would retain the shape pictured by the Ultra 64.

During this timeframe, Rareware (UK) and Midway (USA) released two arcade titles, *Killer Instinct* and *Cruis'n USA*, which claimed to use the Ultra 64 hardware.[8] Although *Killer Instinct* did use the same CPU as the N64, a MIPS R4300i,[8] neither title was powered by Ultra 64 hardware. *Killer Instinct* featured pre-rendered character artwork, and CG movie backgrounds that were streamed off the hard drive[9] and animated as the characters moved horizontally.

The completed N64 was fully unveiled in a playable form to the public on November 24, 1995, at the 7th Annual Shoshinkai Software Exhibition in Japan. Nintendo's next-generation console was introduced as the "Nintendo 64", contrary to speculation that it would be called "Ultra Famicom".[10] Photos of the event were disseminated on the web by *Game Zero* magazine two days later.[11] Official coverage by Nintendo followed later via the *Nintendo Power* website and print magazine.

The console was finally released in Japan on June 23, 1996.[1] By this time Nintendo had adopted a new global branding strategy, assigning the console the same name for all markets: Nintendo 64.[12]

The North American version of the Nintendo 64 officially launched on September 29, 1996 with 500,000 units sold in the first four months.[13] The PAL introduction was released in Europe on March 1, 1997.[1] Benimaru Itō, a developer for *EarthBound 64* and friend of Shigeru Miyamoto, speculated in 1997 that the N64's lower popularity in

Japan was due to the lack of role-playing video games.[14] As of December 31, 2009, the N64 had sold 5.54 million units in Japan, 20.63 million in the Americas, and 6.75 million in other regions, for a total of 32.93 million units.[2]

The system was frequently marketed as the world's first 64-bit gaming system.[15] Atari had claimed to have made the first 64-bit game console with their Atari Jaguar,[16] but the Jaguar only used a 64-bit architecture in conjunction with two 32-bit RISC processors and a 16/32-bit Motorola 68000.[17]

Because of the cost of Nintendo 64 cartridges, and limited third-party support, the Nintendo 64 caused Nintendo to lose its leading position in its market share.[18]

Hardware

The standard Nintendo 64 controller has one analog stick, two shoulder buttons, one digital cross pad, six face buttons, a "Start" button and a digital trigger (Z).[19]

The Nintendo 64 chipset: CPU, RCP and RDRAM

Central processing unit

The Nintendo 64's central processing unit (CPU) is the NEC VR4300,[20] a cost-reduced derivative of the 64-bit MIPS Technologies R4300i. Built by NEC on a 0.35 µm process, the VR4300 is a RISC 5-stage scalar in-order execution processor, with integrated floating point unit, internal 24 KB direct-mapped[21] L1 cache (16KB for instructions, 8KB for data.) The 4.6 million transistors CPU is cooled passively by an aluminum heatspreader that makes contact with a steel heat sink above.[22]

Clocked at 93.75 MHz, the N64's VR4300 was the most powerful of the competing consoles of its generation.[23] Except for its narrower 32-bit system bus, the VR4300 retained the computational abilities of the more powerful 64-bit MIPS R4300i,[20] though software rarely took advantage of 64-bit data precision operations. N64 game-titles generally used faster (and more compact) 32-bit data-operations,[24] as these were sufficient to generate 3D-scene data for the console's RSP (Reality Signal Processor; see below) unit. Though powerful, the CPU was hindered by a 250MB/s bus to the system memory; not only that, but in order to access the RAM, the CPU had to go through the RCP (Reality Co-Processor), and could not use DMA to do so (The RCP could). This problem is further compounded by the RDRAM's very high access latency.

Emulators such as UltraHLE and Project64 benefit from the scarcity of 64-bit operations in the game's executable-code, as the emulator is generally hosted on a 32-bit machine architecture. These emulators performed most calculations at 32-bit precision, and trapped the few OS subroutines that actually made use of 64-bit instructions.[24]

Reality Co-Processor

Nintendo 64's graphics and audio duties are performed by the 64-bit SGI co-processor, named the "Reality Co-Processor". The RCP is a 62.5 MHz chip split internally into two major components, the "Reality Drawing Processor" (RDP) and the "Reality Signal Processor" (RSP). Each area communicates with the other by way of a 128-bit internal data bus that provides 1.0 GB/s bandwidth. The RSP is a MIPS R4000-based 8-bit integer vector processor. It is programmable through microcode, allowing the chip's functions to be significantly altered if necessary, to allow for different types of work, precision, and workloads.[9] The RSP performs transform, clipping and lighting calculations, triangle setup. The "Reality Display Processor" is primarily the Nintendo 64's Pixel Rasterizer, and also handles the console's Z-Buffer Compute.

The RSP was programmable through microcode (μcode).[25] By altering the microcode run on the device, it could perform different operations, create new effects, and be better tuned for speed or quality; however, Nintendo was unwilling to share the microcode tools with developers until the end of the Nintendo 64's life-cycle. Programming RSP microcode was said to be quite difficult because the Nintendo 64 μcode tools were very basic, with no debugger and poor documentation. As a result, it was very easy to make mistakes that would be hard to track down, mistakes that could cause seemingly random bugs or glitches. Some developers noted that the default SGI microcode ("Fast3D") was poorly profiled for use in games (it was too accurate), and performance suffered as a result. Several companies, such as Factor 5,[26] Boss Game Studios and Rare, were able to write custom microcode that ran their software better than SGI's standard microcode.

Two of the SGI microcodes

- *Fast3D* microcode: < ~100,000 high accuracy polygons per second.
- *Turbo3D* microcode: 500,000–600,000 normal accuracy polygons per second. However, due to the graphical degradation, Nintendo discouraged its use.

The RSP also frequently performs audio functions (although the CPU can be tasked with this as well). It can play back most types of audio (dependent on software codecs) including uncompressed PCM, MP3, MIDI, and tracker music. The RSP is capable of a maximum of 100 channels of PCM at a time, but this is with 100% system utilization for audio. It has a maximum sampling rate of 48 kHz with 16-bit audio; however, storage limitations caused by the cartridge format limited audio size (and thus quality).[27]

The RDP is the machine's rasterizer and performs the bulk of actual image creation before output to the display. The Nintendo 64 has a maximum color depth of 16.8 million colors[28] (32,768 on-screen) and can display resolutions of 256 × 224, 320 × 240 and 640 × 480 pixels.[28] The RCP also provides the CPU's access to main system memory via a 250 MB/s bus.[25] Unfortunately, this link does not allow direct memory access for the CPU. The RCP, like the CPU, is passively cooled by an aluminum heatspreader that makes contact with a steel heat sink above.

Memory

The final major component in the system is the memory, also known as RAM. The Nintendo 64 was one of the first modern consoles to implement a unified memory subsystem, instead of having separate banks of memory for CPU, audio, and video, for example. The memory itself consists of 4 megabyte of RAMBUS RDRAM (expandable to 8 MB with the Expansion Pak) with a 9-bit data bus at 500 MHz providing the system with 562.5 MB/s peak bandwidth. RAMBUS was quite new at the time and offered Nintendo a way to provide a large amount of bandwidth for a relatively low cost. The narrow bus makes board design easier and cheaper than the higher width data buses required for high bandwidth out of slower-clocked RAM types (such as VRAM or EDO DRAM); however, RDRAM, at the time, came with a very high access latency, and this caused grief for the game developers because of limited hardware performance.[29]

Video

The system provides both composite video[30] and S-Video through the "MULTI OUT" connector on the rear of the system; however, the Nintendo 64 removed certain pin connections for providing RGB video, despite the DAC chip used in early models having the capability built-in. In most countries the system came bundled with a composite cable (AKA Stereo AV cable) The composite and S-Video cables are the same as those used with the earlier SNES and later GameCube systems.

Available to buy separately was a RF modulator and switch set (for connection to older TVs) and an official S-Video cable, although the latter was not sold in stores and could only be ordered direct from Nintendo of America.[31] In the United Kingdom, the N64 was shipped with a RF modulator and switch set, but was still fully compatible with the other cables. The system supported games with a video display ratio of up to 16:9 widescreen. However, only

seven of its games used this feature. These were; Banjo-Tooie, Donkey Kong 64, Goldeneye 007, Jet Force Gemini, Perfect Dark, Starshot: Space Circus Fever, and Turok 2: Seeds of Evil.[32]

Hardware color variations

A Nintendo 64 console and controller in Fire-Orange color.

The *Hey You, Pikachu!* special edition Nintendo 64 console with controller and VRU.

The standard Nintendo 64 is dark gray, nearly black,[33] and the controller is light gray (later releases included a bonus second controller in Atomic Purple). A Jungle Green colored console was first available with the *Donkey Kong 64* bundle. The Funtastic Series used brightly-colored, translucent plastic with six colors: Fire Orange, Grape Purple, Ice Blue, Jungle Green, Smoke Gray and Watermelon Red.[33] Nintendo released a yellow banana-like Nintendo 64 controller for the debut of *Donkey Kong 64* in the United States.[34] The Millennium 2000 controller, available exclusively as part of a Nintendo Power promotional contest in the United States, was a silver controller with black buttons. A gold controller was released in a contest by *Nintendo Power* magazine as part of a raffle drawing. In late 1997 through 1998, a few gold Nintendo 64 controller packages were released worldwide;[35] in the United Kingdom there was a limited edition *GoldenEye 007* console pack which came with a standard gray console and a copy of *GoldenEye*. Also, a limited edition gold controller with a standard gray console were released in Australia and New Zealand in early 1998, endorsed by an advertising campaign which featured footage of N64 games including *Top Gear Rally* and ended with Australian swimmer Michael Klim wearing the gold controller as a medal around his neck. Nintendo released a gold controller[36] for the debut of *The Legend of Zelda: Ocarina of Time* in Japan. Soon after, bundle packs of the game, controller, and gold Nintendo 64 were released for the US and PAL markets. The *Pokémon* Edition Nintendo 64, with a *Pokémon* sticker on the left side, included the "*Pokémon: I Choose You*" video. The *Pokémon* Pikachu Nintendo 64 had a large, yellow Pikachu model on a blue Nintendo 64.[33] It has a different footprint than the standard Nintendo 64 console, and the Expansion Pak port is covered. It also shipped with a blue *Pokémon* controller; orange in Japan. A Limited Edition *Star Wars* bundle, available during the time of the release of the film *Star Wars Episode I: The Phantom Menace* came bundled with *Star Wars: Episode I Racer* and a standard gray console.

The majority of Nintendo 64 game cartridges were gray in color; however, some games were released on a colored cartridge.[37] Fourteen games had black cartridges, while other colors (such as green, blue, red, yellow and gold) were each used for six or fewer games. Several games, such as *The Legend of Zelda: Ocarina of Time* were released both in standard gray and in colored, limited edition versions.[38]

Accessories

Nintendo 64DD

Programming difficulties

The Nintendo 64 had weaknesses that were caused by a combination of oversight on the part of the hardware designers, limitations on 3D technology of the time, and manufacturing capabilities. One major flaw was the limited texture cache of 4 KB. This made it difficult to load anything but small, low color depth textures into the rendering engine. This small texture limitation caused blurring due to developers stretching small textures to cover a surface, and then the console's bilinear filtering would blur them further. To make matters worse, due to the design of the renderer, if mipmapping was used, the texture cache was effectively halved to 2 KB. Towards the end of Nintendo 64's lifetime, creative developers managed to use tricks, such as multi-layered texturing and heavily-clamped, small texture pieces, to simulate larger textures. *Perfect Dark*, *Banjo-Tooie*, and *Conker's Bad Fur Day* are possibly the best examples of this ingenuity, all of which were developed by Rare. Games often also used plain colored Gouraud shading instead of texturing on certain surfaces, especially in games with themes not targeting realism (e.g., *Super Mario 64*).[39]

There were other challenges for developers to work around. Z-buffering significantly crippled the RDP's fill rate. Thus, for maximum performance,[40] most Nintendo 64 games were actually fill-rate limited, not geometry limited, which is ironic considering the great concern for the Nintendo 64's low polygon per second rating of only about 100,000;[41] however, some of the most polygon-intense Nintendo 64 games, such as *World Driver Championship*, frequently pushed past the Sony PlayStation's typical in-game polygon counts.

The unified memory subsystem of Nintendo 64 was another critical weakness for the machine. The RDRAM had very high access latency,[42] which nearly negated its high bandwidth advantage. In addition, game developers commented that the Nintendo 64's memory controller setup was poor. The R4300 CPU was severely limited at memory access since it had to go through the RCP to access main memory,[43] and could not use DMA to do so.

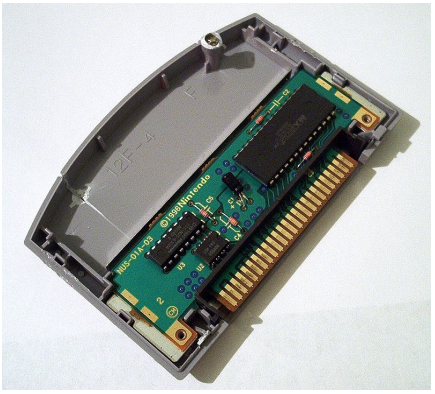
Star Wars: Battle for Naboo's draw distance

One of the best examples of custom microcode on the Nintendo 64 was Factor 5's N64 port of the *Indiana Jones and the Infernal Machine* PC game. The Factor 5 team aimed for the high resolution mode (640×480)[44] because of the crispness it added to the visuals. The machine was taxed to the limit running at 640×480, so they needed performance beyond the standard SGI microcode. The Z-buffer could not be used because it alone consumed the already-constrained texture fill-rate. To work around the 4 KB texture cache, the programmers came up with custom texture formats and tools to let the artists use the best possible textures. Each texture was analyzed and fitted to best texture format for performance and quality. They took advantage of the cartridge as a texture streaming source to squeeze as much detail as possible into each environment and work around RAM limitations. They wrote microcode for real-time lighting, since the SGI code was poor for this task and they wanted to have even more lighting than the PC version had used. Factor 5's microcode allowed almost unlimited real-time lighting and significantly boosted the polygon count. In the end, the game was more feature-filled than the

PC version, and unsurprisingly, was one of the most advanced games for Nintendo 64.[45]

Factor 5 again used custom microcode with games such as *Star Wars: Rogue Squadron* and *Star Wars: Battle for Naboo*. In *Star Wars: Rogue Squadron*, the team tweaked the microcode for a landscape engine to create the alien worlds. For *Star Wars: Battle for Naboo*, they used what they learned from *Rogue Squadron* and made the game run at 640 × 480, also implementing enhancements for particles and the landscape engine. *Battle for Naboo* had a long draw distance and large amounts of snow and rain, despite the high resolution.[46]

Cartridges



Open N64 cartridge

Nintendo 64 games were ROM cartridge based. Cartridge size varied[47] from 4 MB (32 Mbit) (e.g. *Automobili Lamborghini* and *Dr. Mario 64*) to 64 MB (512 Mbit) for *Resident Evil 2* and *Conker's Bad Fur Day*. Some of the cartridges included internal EEPROM or battery-backed-up RAM for saved game storage. Otherwise, game saves were put onto a separate memory card, marketed by Nintendo as a Controller Pak.[48]

The selection of the cartridge for the Nintendo 64 was a controversial decision and a key factor in Nintendo's being unable to retain its dominant position in the gaming market. Most of the cartridge's advantages did not manifest themselves prominently and they were nullified by the cartridge's shortcomings, which disappointed customers and developers alike. Especially for the latter, it was costly and difficult to develop for ROM cartridges, as their limited storage capacity (64 MB or a mere 10% of a Playstation CD-ROM's 640 MB capacity) constrained the game's content.[29]

Most third-party developers switched to the PlayStation, such as Square and Enix, whose *Final Fantasy VII* and *Dragon Quest VII* were initially pre-planned for the N64,[49] while some who remained released fewer games to the Nintendo 64. Konami was the biggest example of this, releasing only thirteen N64 games but over fifty on the PlayStation. New Nintendo 64 game releases were infrequent while new games were coming out rapidly for the PlayStation.[27] Most of the N64's biggest successes were developed by either Nintendo itself or by second-parties of Nintendo, such as Rareware.[50]

Despite the difficulties with third-parties, the N64 still managed to support popular games such as *GoldenEye 007* and *The Legend of Zelda: Ocarina of Time*,[51] giving it a long shelf-life. Much of this success was credited to Nintendo's strong first-party franchises,[51] such as *Mario* and *Zelda*, which had strong name brand appeal, yet appeared exclusively on Nintendo platforms. The N64 also secured its share of the mature audience, due to *GoldenEye 007*, *Nightmare Creatures*, *Perfect Dark*, *Doom 64*, *Resident Evil 2*, *Shadow Man*, *Conker's Bad Fur Day*, *Duke Nukem 64*, *Duke Nukem: Zero Hour*, *Mortal Kombat 4*, *Turok: Dinosaur Hunter*, *Turok 2: Seeds of Evil*, and *Quake II*.[52]

Nintendo cited several advantages for making the N64 cartridge-based.[53] Primarily cited was the ROM cartridges' very fast load times in comparison to disc-based games, as contemporary CD-ROM drives rarely had speeds above 4×. This can be observed from the loading screens that appear in many PlayStation games but are typically non-existent in N64 versions. ROM carts were much faster than the 2× CD-ROM drives in other consoles that developers could stream data in real-time from them. This was done in *Indiana Jones and the Infernal Machine*, for example, to make the most of the limited RAM in the N64.[45] Also, ROM cartridges are difficult and expensive to duplicate, thus resisting piracy, albeit at the expense of lowered profit margin for Nintendo. While unauthorized interface devices for the PC were later developed, these devices are rare when compared to a regular CD drive and popular mod chips used on the PlayStation. Compared to the N64, piracy was rampant on the PlayStation. The

cartridges are also far more durable than compact discs, the latter which must be carefully used and stored in protective cases. It also prevents accidental scratches and subsequent read errors.[53] It is possible to add specialized I/O hardware and support chips (such as co-processors) to ROM cartridges, as was done on some SNES games (including *Star Fox*, using the Super FX chip).[53]

ROM cartridges also have disadvantages associated with them. While game cartridges are more resistant than CDs to physical damage, they are sometimes less resistant to long-term environmental damage, particularly oxidation (Although this can be simply cleaned off) or wear of their electrical contacts causing a blank or frozen screen, or static electricity. Console cartridges are usually larger and heavier than optical discs, requiring greater storage space. They also have a more complex manufacturing processes; cartridge-based games were usually more expensive to manufacture than their optical counterparts. The cartridges held a maximum of 64 MB of data,[54] whereas CDs held over 650 MB.[55] As fifth generation games became more complex in content, sound and graphics, it pushed cartridges to the limits of their storage capacity. Games ported from other media had to use data compression or reduced content to be released on the N64. Extremely large games could be made to span across multiple discs on CD-based systems, while cartridge games had to be contained within one unit as using an additional cartridge was prohibitively expensive (and was never tried). Due to the cartridge's space limitations, full motion video was not usually feasible for use in cut scenes, with the exception of Resident Evil 2. The cut scenes of some games used graphics generated by the CPU in real-time.[56]

Games

A total of 387 games were released for the console though few were exclusively sold in Japan, in competition with around 1,100 games released for the rival PlayStation as well as both the NES and SNES having 768 and 725 US-released games respectively. However, the Nintendo 64 game library included a high number of critically acclaimed and widely sold games.[57] *Super Mario 64* was the console's best selling game (selling over eleven million copies) and also received praise from critics. *GoldenEye 007* was important in the evolution of the first person shooter, and has since been named the greatest in the genre.[58] Marc Russo quoted *The Legend of Zelda: Ocarina of Time* as one of the greatest games of all time, and, in his words, remains "to this day ... the finest game I've ever played across any platform or genre."[59]

Graphics

Graphically, results of the Nintendo cartridge system were mixed. The N64's graphics chip was capable of trilinear filtering,[60] which allowed textures to look very smooth compared to the Saturn or the PlayStation. This was due to the latter two using nearest-neighbor interpolation,[61] resulting in textures that were pixelated.

Screenshot of *Super Mario 64*, showing limited texture detail and Gouraud shading (on Mario). The trees are two-dimensional billboards and always face the camera.

However, the smaller storage size of ROM cartridges limited the number of available textures, resulting in games that had blurry graphics. This was caused by the liberal use of stretched, low-resolution textures, and was compounded by the N64's 4096-byte limit[62] on a single texture. Some games, such as *Super Mario 64*, use a large amount of Gouraud shading or very simple textures to produce a cartoon-like image. This fit the themes of many games, and allowed this style of imagery a sharp look. Cartridges for some later games, such as *Resident Evil 2* and *Sin & Punishment: Successor of the Earth*, featured more ROM space,[47] allowing for more detailed graphics.

Production

The era's competing systems from Sony and Sega (the PlayStation and Saturn, respectively) used CD-ROM discs to store their games.[63] These discs are much cheaper to manufacture[64] and distribute, resulting in lower costs to third-party game publishers. As a result, game developers who had traditionally supported Nintendo game consoles were now developing games for the competition[63] because of the higher profit margins found on CD-based platforms.

Cartridges took longer to manufacture than CDs, with each production run (from order to delivery) taking two weeks or more.[65] By contrast, extra copies of a CD based game could be ordered with a lead time of a few days. This meant that publishers of N64 titles had to attempt to predict demand for a game ahead of its release. They risked being left with a surplus of expensive cartridges for a failed game or a weeks-long shortage of product if they underestimated a game's popularity.[65]

The cost of producing an N64 cartridge was far higher than producing a CD.[66] Publishers had to pass these higher expenses to the consumer and as a result, N64 games tended to sell for higher prices than PlayStation games.[63] While most PlayStation games rarely exceeded US$50,[64] N64 games could reach US$79.99,[64] such as the first pressing of *The Legend of Zelda: Ocarina of Time*.[67] Games in Sony's line of PlayStation Greatest Hits budget line retailed for US$19.95, while Nintendo's equivalent Player's Choice line retailed for US$29.95. In the United Kingdom, N64 games were priced £54.95 at their time of release, while PlayStation games were priced at £44.95. In the United States games were priced at around roughly $49.99 at the time of their release.

Cartridge-copy counter-measures

Each Nintendo 64 cartridge contains a lockout chip (similar to the 10NES)[68] to prevent manufacturers from creating unauthorized copies of games and discourage production of unlicensed games. Unlike previous versions, the N64 lockout chip contains a seed value which is used to calculate a checksum[69] of the game's boot code. To discourage playing of copied games by piggybacking on a real cartridge, Nintendo produced five different versions of the chip. During the boot process, and occasionally while the game is running, the N64 computes the checksum of the boot code and verifies it with the lockout chip in the game cartridge, failing to boot if the check fails.[47]

Emulation

Some of Nintendo's N64 titles have been released for the Wii's Virtual Console service and are playable with either the Classic Controller or Nintendo GameCube controller. There are some differences between these versions and the original cartridge versions. For example, the games run in a higher resolution and at a more consistent framerate than their N64 counterparts. However, some features, such as Rumble Pak functionality, are not featured in the Wii versions. Some features are also altered for the Virtual Console releases. For example, the VC version of *Pokémon Snap* allows players to send photos through the Wii's message service, while *Wave Race 64's* in-game content was altered due to the expiration of the Kawasaki license. Several titles from Rare have seen release on Microsoft's Xbox Live Arcade service, including Banjo-Kazooie, Banjo-Tooie and Perfect Dark.

While the Virtual Console featured on the Wii has been a successful way to relaunch old successful titles, prior to its conception many fans have dedicated time to create emulation systems for their home computers in order to play old favorites that Nintendo has left to history. Project64, 1964, and UltraHLE are currently the top-ranked emulators at The Emulator Zone.[70]

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- Nintendo 64 Promotion Video from 1997 (http://video.google.com/videoplay?docid=-1704744068299423347&pr=goog-sl)
- Nintendo 64 (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Nintendo/Nintendo_64//) at the Open Directory Project
- US Patent for the N64 (http://www.freepatentsonline.com/y2001/0016517.html)

The Sixth Generation

History of video game consoles (sixth generation)

The **sixth-generation era** (sometimes referred to as the **128-bit era**; see "Number of bits" below) refers to the computer and video games, video game consoles, and video game handhelds available at the turn of the 21st century. Platforms of the sixth generation include the Sega Dreamcast, Sony PlayStation 2, Nintendo GameCube, and Microsoft Xbox. This era began on November 27, 1998 with the release of the Dreamcast, and it was joined by the PlayStation 2 in March 2000. The Dreamcast was discontinued in North America in November 2001 and in Europe in late 2002. The GameCube was discontinued in 2007. The Xbox was discontinued in Japan in 2005 and worldwide in 2006. The PlayStation 2 is still in production and selling steadily.

Home systems

From left: Dreamcast, PlayStation 2, Nintendo GameCube, Xbox.

Sony's PlayStation 2 achieved sales dominance in this generation, with over 140 million sold as of mid-July 2008,[1] making the PlayStation 2 the best-selling console in history.[2] [3] Microsoft's Xbox came in second with over 24 million sold and the Nintendo GameCube was third with 21.6 million sold. Sega's Dreamcast, which arrived prior to all of the others and was discontinued prematurely in 2001, came in fourth with 10.6 million sold, representing 6.5% of the sixth generation sales.

The sixth generation began to end when the Xbox was succeeded by the Xbox 360 in late 2005. GameCube hardware (Platinum color only) was still being produced when the Wii was released in late 2006, but has since been greatly reduced. PlayStation 2 sales continued to be strong into November 2007,[4] due to the system's large software library, continuing software support, and affordable price.[5]

In February 2008, the PlayStation 2 outsold both the PlayStation 3 and Xbox 360 in the United States.[6] [7] Games were still being produced for the PlayStation 2, Xbox, and Nintendo GameCube as of 2007, while Dreamcast games were officially discontinued in 2001. There were still a few games being produced for the Dreamcast in 2007, but they are essentially NAOMI arcade ports released only in Japan, with small print runs.

From left: Dreamcast, PlayStation 2, GameCube, and Xbox game controllers.

Dreamcast

Sega's Dreamcast was the first console of the generation[8] and introduced several innovations including Internet gaming as a standard feature through its built-in modem, and a web browser. It was also the first home console to always display full SD resolution.

The console helped to restore Sega's reputation, which had been damaged by the earlier failures of the Sega Saturn, Sega 32X, and Mega-CD. Despite this, the Dreamcast was discontinued prematurely due to numerous factors. The impending and much-hyped PlayStation 2 slowed Dreamcast sales, mostly due to the fact that the PlayStation 2 had a built-in DVD player and a huge number of PS1 owners looking to upgrade with the same company, Sony. In addition, Sega's short-lived support/success of its post-Sega Megadrive products the Mega-CD, 32X and Saturn had left developers and customers skeptical, with some holding out to see whether the Dreamcast or PlayStation 2 would come out on top.

Sega's decision to implement a GD-ROM (though publicly advertised as a CD-ROM) for storage medium did save costs but it did not compare well against the PS2's much touted DVD capabilities. Instead of the Dreamcast blossoming into a media home center power, it began to lose market share in early 1999 and it lost the gaming console market's #1 position by late 1999. Sega was either unable or unwilling to spend the advertising money necessary to compete with Sony, which themselves took massive losses on the PlayStation 2 to gain market-share. With the announcements of the Xbox and GameCube in late 2000, Sega's console was considered by some to be outdated only two years after its release. The previous losses from the Saturn, 32X, and Sega/Mega-CD, stagnation of sales due to the PlayStation 2, and impending competition from Microsoft and Nintendo caused Sega's revenue to shrink and announce their intention on killing the system in late 2000, dropping the system entirely and leaving the console market in late 2002. Sega also announced it would shut down SegaNet, an online gaming community that supported online-capable Dreamcast titles. Due to user outcry over the decision, Sega delayed the service's closure by an additional 6 months.

PlayStation 2

The brand Sony had established with the original PlayStation was a major factor in the PlayStation 2's dominance, both in terms of securing a consumer base and attracting third party developers; the gradual increase in one tending to reinforce the other. The PlayStation 2 was also able to play DVDs and was backwards-compatible with PlayStation games, which many say helped the former's sales. Sony Computer Entertainment secured licensing for key games such as *Final Fantasy X*, *Grand Theft Auto San Andreas*, and *Metal Gear Solid 2: Sons of Liberty*, enabling the PS2 to outperform its competitors' launches.

Xbox

Although the Xbox had the formidable financial backing of Microsoft, it was unable to significantly threaten the dominance of the PlayStation 2 as market leader; however, the Xbox attracted a large fanbase and strong third-party support in the United States and Europe and became a recognizable brand amongst the mainstream. The Xbox Live online service with its centralized model proved particularly successful, prompting Sony to boost the online capabilities of the PlayStation 2. Xbox Live also gave the Xbox an edge over the GameCube, which had a near total lack of online games. The flagship of Xbox Live was the game *Halo 2*, which was the best selling Xbox game with 8 million copies sold worldwide.[9] [10]

In Japan, Xbox sales were very poor, partly due to Microsoft's inability to attract major Japanese developers and game franchises. The console's physical size, which did not fit local aesthetic standards, and brand loyalty to Japanese companies like Sony and Nintendo were considerable factors as well.

Nintendo GameCube

Nintendo struggled with conflicting brand images, particularly the family-friendly one developed during the 1990s. Its arsenal of franchises and history in the industry, though earning it a loyal fan base, failed to give it an advantage against the Xbox and PlayStation 2 which captured audiences seeking 'Mature' titles which Nintendo had fewer of. Nintendo also made little headway into online gaming (releasing a small handful of online-capable games, the most popular of which was *Phantasy Star Online*, which was in fact a port of the Dreamcast game), instead emphasizing Game Boy Advance connectivity. As a result, the Nintendo GameCube failed to match the sales of its predecessor; the Nintendo 64.

Nintendo did however rejuvenate its relationship with many developers, often working in close collaboration with them to produce games based upon its franchises, in contrast to the past where it was frequently seen as bullying developers. As a result, the Nintendo GameCube had more first and second party releases than its competitors, whose most successful titles were mainly products of third party developers.

Number of bits and system power

Bit ratings for consoles largely fell by the wayside after the 32-bit era. The number of "bits" cited in console names referred to the CPU word size, but there was little to be gained from increasing the word size much beyond 32 bits; performance depended on other factors, such as processor speed, graphics processor speed, bandwidth, and memory size.

The importance of the number of bits in the modern console gaming market has thus decreased due to the use of components that process data in varying word sizes. Previously, console manufacturers advertised the "*n*-bit talk" to over-emphasize the hardware capabilities of their system. The Dreamcast and the PlayStation 2 were the last systems to use the term "128-bit" in their marketing to describe their capability.

It is not easy to compare the relative "power" of the different systems. Having a larger CPU word size does not necessarily make one console more powerful than another. Likewise the operating frequency (clock rate) of a system's CPU is not an accurate measure either.

The Microsoft Xbox uses a 32-bit (general purpose) CISC x86 architecture CPU, with an instruction set equal to that of the Coppermine core Mobile Celeron, though it has less cache memory (128 kB) than the PC equivalent. It has 64 MB RAM (shared) and runs at 733 MHz. Most notably, its *NV2A* GPU, which is very similar to the GeForce Ti4000 series for desktop computers, makes it the only console in its time with traditional vertex and pixel shaders.[11] Many of sixth generation's late PC ports, for example *Far Cry Instincts*, *Doom 3*, and *Half-Life 2*, which were meant to be released for all consoles managed to make it only to the Xbox due to its similarity to the PC the originals were built on.

The Nintendo GameCube is the most compact sixth generation console. Its IBM Gekko PowerPC CPU runs at 485 MHz, while its "Flipper" graphics processor is comparable to the ATI Radeon 7200, and it has 32 MB of system memory. The GameCube supports Dolby Pro Logic II.[12]

The PlayStation 2's CPU (known as the "128-bit Emotion Engine") has a 64-bit double precision core based on MIPS architecture. It includes three separate execution units inside the one processor and each one is capable of executing two instructions per cycle. The PS2's Graphics Synthesizer has fast dedicated video memory, though it is limited in the amount of data it can hold. Consequently, many of the PS2's games have reduced textures compared with versions for other consoles. It also does not have a transform and lighting unit like the ones found in the Xbox and GameCube GPUs.

The Dreamcast has a 64-bit double-precision superscalar SuperH-4 RISC MPU core with a 32-bit integer unit using 16-bit fixed-length instructions, a 64-bit data bus allowing a variable width of either 8, 16, 32 or 64-bits, and a 128-bit floating-point bus.[13] The PowerVR 2DC CLX2 chipset uses a unique method of rendering a 3D scene called Tile Based Deferred Rendering (TBDR): While storing polygons in triangle strip format in memory, the

display is split into tiles associated with a list of visibly overlapping triangles onto which, using a process similar to ray tracing, rays are cast and a pixel is rendered from the triangle closest to the camera. After calculating the depths associated with each polygon for one tile row in 1 cycle, the whole tile is flushed to video memory before passing on to render the next tile. Once all information has been collated for the current frame, the tiles are rendered in turn to produce the final image.[14]

Comparison

Name	Dreamcast	PlayStation 2	GameCube	Xbox
Console				
Launch prices	US$199.99 GB£119.99 €144.99	US$299.99 GB£299.99 €214.99	US$199.99 GB£129.99 €144.99	US$299.99 GB£299.99 €214.99
Best-selling game	*Sonic Adventure*, 2.5 million (as of June 2006)[15]	*Grand Theft Auto: San Andreas*, 19 million shipped (as of April 30, 2008)[16]	*Super Smash Bros. Melee*, 7.09 million (as of March 10, 2008)[17]	*Halo 2*, 8 million (as of May 9, 2006)[10] [18]
Release date	• JP November 27, 1998 • NA September 9, 1999 • EU October 14, 1999 • AUS November 30, 1999	• JP March 4, 2000 • NA October 26, 2000 • EU November 24, 2000 • AUS November 30, 2000	• JP September 14, 2001 • NA November 18, 2001 • EU May 3, 2002 • AUS May 17, 2002	• NA November 15, 2001 • JP February 22, 2002 • EU March 14, 2002
Discontinued	• NA February 14, 2002 • EU 2002 • AUS 2002 • JP 2007	N/A	2007[19]	• JP 2005 • NA 2006 • EU 2006

Accessories (retail)	• Visual Memory Unit • Dreamcast mouse and keyboard • Fishing Rod • Microphone • Light Gun • Dreameye camera • Samba de Amigo Maracas (controller) • More...	• PlayStation 2 HDD Internal hard drive supported by PlayStation 2 Expansion Bay (model 30000 and 50000 only) • Network adapter Built-in for slim case model (PSTwo, model 70000) • EyeToy • PlayStation 2 DVD remote control • Guitar Hero Controller • More...	• WaveBird • GameCube-GBA cable • Nintendo GameCube Broadband Adapter and Modem Adapter • Game Boy Player • DK Bongos • Dance pad • Nintendo GameCube Microphone • More...	• Xbox Live Starter Kit • Xbox Media Center Extender • DVD Playback Kit • Xbox Music Mixer • Memory Unit (8 MB) • Logitech Wireless Controller (2.4 GHz) • More...
CPU	200 MHz SuperH SH-4	294 MHz MIPS "Emotion Engine"	485 MHz PowerPC "Gekko"	733 MHz x86 Intel Celeron/PIII Custom Hybrid
GPU	100 MHz NEC/VideoLogic PowerVR CLX2	147 MHz "Graphics Synthesizer"	162 MHz ATI "Flipper"	233 MHz Custom Nvidia NV2A
RAM	Main RAM 16 MB SDRAM Video RAM 8 MB Sound RAM 2 MB	Main RAM 32 MB RDRAM Video RAM 4 MB	Main RAM 24 MB 1T-SRAM Video RAM 3 MB embedded 1T-SRAM 16 MB DRAM	64 MB unified DDR SDRAM
Online service	Dreamarena, GameSpy, SegaNet	Non-unified service	Sega, Lan play, Emulation-online adapter required	Xbox Live
Backward compatibility	None	PlayStation	GB, GBC, and GBA (using Game Boy Player)	None
System software	SegaOS, Microsoft Windows CE, KallistiOS	proprietary OS, HD Loader, Linux DVD Playback Kit	proprietary OS, startup disc for Game Boy Player	Xbox Music Mixer DVD Playback Kit, Xbox Linux
Consumer programmability	Homebrew possible via KallistiOS, Windows CE, Katana (the latter two are illegal in the homebrew community)	Yabasic software and limited Linux OS	Homebrew possible via hack	Via Softmods and/or modchips; Modified Windows XP, Windows 9x Windows CE 2.x, Windows XP MCE, Windows Server 2003, Windows Vista, Linux

Worldwide sales standings

Console	Units sold
PlayStation 2	At least 146.9 million (as of September 30, 2010) [1] [20]
Xbox	24 million (as of May 10, 2006)[21]
GameCube	21.74 million (as of September 30, 2010)[22]
Dreamcast	10.6 million (as of September 6, 2005)[23] [24]

Handheld systems

During the sixth generation era, the handheld game console market expanded with the introduction of new devices from many different manufacturers. Nintendo maintained its dominant share of the handheld market with the release in 2001 of the Game Boy Advance, which featured many upgrades and new features over the Game Boy. Two redesigns of this system followed. The first, the Game Boy Advance SP in 2003 and the second, the Game Boy Micro in 2005. Also introduced was the Neo Geo Pocket Color in 1998 and Bandai's WonderSwan Color launched in Japan in 1999. South Korean company Game Park introduced its GP32 handheld in 2001, and with it came the dawn of open source handheld consoles. The Game Boy Advance line of handhelds has sold 81.51 million units worldwide as of September 30, 2010.[22]

A major new addition to the market was the trend for corporations to include a large number of "non-gaming" features into their handheld consoles. Everything from cell phones, MP3 players, portable movie players, to PDA-like features began to appear on a regular basis during this generation. The first of these was Nokia's N-Gage, which was released in 2003 and doubled primarily as a mobile phone. It subsequently went through a redesign in 2004 and was renamed the N-Gage QD. A second handheld, the Zodiac from Tapwave was released in 2004 and was based on the Palm OS offering specialized gaming-oriented video and sound capabilities, but it had an unwieldy development kit due to the underlying PalmOS foundation.

With more and more PDAs arriving during the previous generation, the difference between consumer electronics and traditional computing began to blur and cheap console technology grew as a result. It was said of PDAs that they are "the computers of handheld gaming" because of their multi-purpose capabilities and the increasingly powerful computer hardware that resided within them. This capability existed to move gaming beyond the last generation's 16-bit limitations; however, PDAs were still geared towards the typical businessman, and lacked new, affordable software franchises to compete with dedicated handheld gaming consoles.

Console	Units sold
Game Boy Advance (figure includes GBA SP and Game Boy Micro)	81.51 million[22]
N-Gage	3 million[25]
Game Boy Micro	2.5 million[25]
Neo Geo Pocket and Neo Geo Pocket Color	2 million[25]
Tapwave Zodiac	less than 200,000 units[26]
Pokémon mini	

Neo Geo Pocket Color
Released in 1999,[25]
discontinued in 2001

SwanCrystal
Released in 2002,
discontinued in 2004

Game Boy Advance
Released in 2001

GP32
Released in 2001

Tapwave Zodiac
Released in 2003,
discontinued in 2005

Nokia N-Gage
Released in 2003[25]

Game Boy Advance
SP
Released in 2003

Nokia N-Gage QD
Released in 2004

Game Boy Micro
Released in 2005

Trends

Market convergence

Major publishers such as Activision, Electronic Arts, and Ubisoft adopted a cross-platform strategy, releasing versions of their games for PC, all major consoles, and in some cases, handhelds as well. The sixth generation was the first to help console and computer software grow closer together as well as outperform the arcade market in features, graphics and business. The Dreamcast, which had an official Windows CE Development Kit to help porting games from PC's to Dreamcast and the Xbox, which was made from off the shelf PC parts and hosted many PC ports, factored into this also.

Controversial games

This generation was noted to have extensive criticism by public figures of "objectionable" content in gaming such as sex, crime, violence, profanity, drug use, and social propaganda as well as topics of debate such as religion, politics, feminism, and economics; however, this generation was not the first to have its share of controversial games and many other examples of controversy extend much farther back into gaming history with *Wolfenstein 3D*, *Doom*, *Mortal Kombat*, and *Night Trap*. The earliest occurrences of such public outcry date as far back as the 1970s and 1980s, with perceived violent or explicit games such as *Death Race* and *Custer's Revenge*.

The sixth generation was also notable because it saw the continuation of lawmakers taking actions against the video game industry. The most famous were the *Grand Theft Auto* games with *Grand Theft Auto III* and *Grand Theft Auto: Vice City* and also another video game by Rockstar Games, Manhunt facing lawsuits over alleged racial slurs and influencing minors to commit crimes, while *Grand Theft Auto: San Andreas* was briefly given an adult rating and banned from stores over the availability of an abandoned sex mini-game using the Hot Coffee mod.

The sixth generation also coincided with September 11 attacks in New York City and The Pentagon, which had a huge impact on the entertainment industry as well as the video game industry; in the subsequent market climate many games were edited in response to the sensitivity surrounding the event. Most notable was *Metal Gear Solid 2*, which prior to its release depicted the culminating scene having a submersible mobile fortress hijacked by terrorists destroying a good portion of Manhattan in view of the twin towers themselves (this can be found in the "document of metal gear solid 2" making of). Similarly, several undisclosed modifications were made in *Grand Theft Auto III*,

most notably the change of the police cars' color scheme (the old scheme resembled that of NYPD's older blue and white design). The Dreamcast game *Propeller Arena* was never officially released, the main reason probably being that a certain level was visually very similar to the September 11 attacks.

Emulation and retro gaming

Because of the increased computing power of video game consoles and the widespread usage of emulators, the sixth generation saw the rise of console emulation and retro gaming on a vast scale. Many games for older systems were updated with superior graphics or sound and re-released for current consoles. Commonly emulated games included those released for the Nintendo Entertainment System, the Super Nintendo Entertainment System, the Mega Drive/Genesis, the PlayStation (the PS2 can play PS1 games natively), and the Nintendo 64.

Also during this generation, the computing power of hand-held consoles became capable of supporting games made for some of the earliest gaming consoles and several companies released remakes of classic games for the hand-helds. Nintendo introduced a line of NES and SNES games for its Game Boy Advance handheld, including *Final Fantasy I & II: Dawn of Souls* and Nintendo's *Metroid: Zero Mission*. Also, an increasing number of third-party developers, including Midway Games, Capcom, Namco, Atari, and Sega, released anthology collections of some of their old games. Additionally, many video games and video game series that were originally confined to Japan were released in North America and Europe for the first time.

Rise of online gaming

Online gaming, which in previous generations had been the exclusive domain of PC games, became more prominent in video game consoles during this generation. The Dreamcast initiated this change with its built in modem, internet browsing software, and ability to play certain games online. The PlayStation 2, Xbox and GameCube also offered online gaming, though their approaches and commitment to it varied greatly. The Xbox offered an integrated service called Xbox Live that cost $50 per year and was only compatible with a broadband internet connection. Its ability to connect gamers for online multi-player matches was a considerable factor in allowing the Xbox to gain a foothold in the western market, especially in the first-person shooter genre. The PlayStation 2 left its online gaming service up to each individual game publisher, and though it was free to use, it was not always an ideal experience, especially with games published by small developers. The *SOCOM* series was one of the most popular online competitive games for the PS2. The GameCube did not offer online play for any of its first-party titles, with only Sega's *Phantasy Star Online* series making use of the console's online capabilities. In addition, online capability was not out-of-the-box; an adapter was needed to hook the console to the internet.

Mergers

Many game publishing companies with a long established history merged with their competitors: Microsoft bought second-party developer Rareware in 2002; Square Soft merged with Enix to form Square Enix in 2003 and then later bought Taito; Sega merged with Sammy to form Sega Sammy Holdings in 2004; Konami bought a majority share of Hudson Soft; Namco merged with Bandai to form Namco Bandai Holdings in 2006.

Remakes

Atari Flashback (Atari)
2004

Software

Milestone titles

- *Grand Theft Auto III*, *Grand Theft Auto Vice City*, *Grand Theft Auto San Andreas* for PlayStation 2, Xbox and PC popularized "sandbox" style gameplay in an urban crime setting, which has since been widely imitated. In addition, it brought violence and other potentially objectionable content in video games back into the mainstream spotlight, thus reviving the video game controversy.
- *Resident Evil 4* revamped the franchise in a new, more action-oriented direction. The decision to port the former GameCube exclusive to the PS2 was met with some controversy. It remains one of the highest rated games of the generation. The over-the-shoulder camera view influenced some 7th generation games such as *Gears of War*.
- *Shenmue* for the Dreamcast went down in the Guinness Book of World Records as the most expensive video game produced to date (US$70,000,000).[27] Produced by Sega's AM2 division, this game helped set the graphics standards of its time. In the 7th generation, *Grand Theft Auto IV* would overtake it with a 100 million dollar budget.
- *Halo: Combat Evolved* was by far the most successful launch title for the Xbox.
- *Halo 2* set records as the fastest grossing release in entertainment history [28] and was still a very successful for the Xbox Live online gaming service until support was dropped in April 2010. *Halo 2's* sales record was broken by the next game in the series, *Halo 3*.

- *Metroid Prime* is one of the Nintendo GameCube's highest rated titles.
- *Soulcalibur* for the Dreamcast is widely considered one of the greatest fighting games of all time, and is the first game of its genre, on any platform, to have ever received a perfect 10.0 rating from IGN[29] and GameSpot[30] and also a perfect 40/40 (second of only fifteen games)[31] by Japanese gaming magazine Famitsu.

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Dreamcast

NTSC Dreamcast with PAL controller and VMU

Manufacturer	Sega
Type	Video game console
Generation	Sixth generation era
Retail availability	• JP November 27, 1998 • NA September 9, 1999 • EU October 14, 1999 • AUS October 14, 1999 • PAL December 3, 1999
Discontinued	2001
Units sold	10.6 million[1] [2]
Media	CD, 1.2 GB GD-ROM
CPU	200 MHz Hitachi SH4 RISC
Storage capacity	VMU, Nexus Memory Card, Zip Drive (unreleased)
Graphics	100 MHz PowerVR2 CLX2
Online services	SegaNet, Dreamarena
Best-selling game	*Sonic Adventure*, 2.5 million (as of June 2006)[3]
Predecessor	Sega Saturn

The **Dreamcast** (Japanese: ドリームキャスト *Dorīmukyasuto*?) is a video game console made by Sega, and is the successor to the Sega Saturn. The Dreamcast was the first entry in the sixth generation of video game consoles and

was released in late 1998, before its contemporaries — Sony's PlayStation 2, Microsoft's Xbox and the Nintendo GameCube.

Sega discontinued the Dreamcast in North America in March 2001 and withdrew entirely from the console hardware business, making it the company's final console and foray in the business. However, support of the system continued in Europe and Oceania until the end of 2002, as well as in Japan, where consoles were still sold until 2006 and new licensed games continued to be released. According to Bernie Stolar, former President and CEO of Sega of America, the Dreamcast was discontinued because the new chairman of Sega wanted the company to focus on software.[4]

Despite its short lifespan, the Dreamcast was widely hailed as ahead of its time, and is still held in high regard for pioneering online console gaming—it was the first console to include a built-in modem and Internet support for online play.[5] [6] As of 2010, the console is still supported through various homebrew video game releases.[7]

History

In 1997, the Sega Saturn was struggling in North America, and Sega of America president Bernie Stolar was pressed by Sega's Japanese headquarters to develop a new platform. Two competing teams were tasked with developing the console–a skunkworks group headed by IBM researcher Tatsuo Yamamoto and another team led by Sega hardware engineer Hideki Sato.

Sato and his group chose the Hitachi SH4 processor architecture and the VideoLogic PowerVR2 graphics processor for their prototype. Yamamoto and his Skunkworks group also opted for the SH4, but with 3dfx hardware. Initially, Sega decided to use Yamamoto's design and suggested to 3Dfx that they would be using their hardware in the upcoming console, but Sega later opted to use the PowerVR hardware of Sato's design. This was attributed to 3Dfx leaking details and technical specifications of the then-secret Dreamcast project when declaring their Initial Public Offering[8] in June 1997 a move which readers on Gamespy.com named one of the dumbest mistakes in video game history.[9] Sega's shift in design prompted a lawsuit by 3dfx that was eventually settled.[10] [11] [12] [13]

With Sega's machine, no operating system resides in the device until it is loaded in on a disc with each game. The advantage, Sega executives say, is that developers can always ship products that use the version of an operating system with the newest features and performance enhancements. The operating system used by some Dreamcast titles was developed by Microsoft after 2 years of work with Sega. It was an optimized version of Windows CE supporting DirectX. According to Richard Doherty, president of Envisioneering Group, "Microsoft had initially wanted Windows CE to be Dreamcast's main operating system. It isn't." [14] The Dreamcast's boot-up sequence was also composed by accomplished Japanese pianist, Ryuichi Sakamoto.[15]

Launch

The Dreamcast was released in November 1998 in Japan; on September 9, 1999 in North America and on October 14, 1999 in Europe. Despite problems with the Japan launch,[6] the system's launch in the United States was successful. In the United States alone, a record 300,000 units[16] had been pre-ordered[6] and Sega sold 500,000 consoles in just two weeks (including a record 225,132 sold during the first 24 hours). In fact, due to brisk sales and hardware shortages, Sega was unable to fulfill all of the advance orders. Sega confirmed that it made US$98.4 million on combined hardware and software sales with Dreamcast with its September 9, 1999 launch.[17] Four days after its launch in the US, Sega stated 372,000 units were sold bringing in US$132 million in sales.[6]

Launch titles such as *Soul Calibur*, *Sonic Adventure*, *Power Stone*, and *Hydro Thunder* helped Dreamcast succeed in the first year.[18] Sega Sports titles helped fill the void left by a lack of Electronic Arts sports games on the system.[19] Dreamcast sales grew 156.5% from July 23, 2000 to September 30, 2000 putting Sega ahead of the Nintendo 64 in that period.[20] However, Sony's launch of the much-hyped PlayStation 2 that year marked the beginning of the end for the Dreamcast.[21]

End of production

On January 31, 2001, Sega announced that it was discontinuing Dreamcast support by March of that year.[22] The last North American release was *NHL 2K2*, which was released in February 2002. With the company announcing no plans to develop a next-generation successor to Dreamcast, this was Sega's last foray into the home console business.

Sega Europe continued to support the Dreamcast until 2003, with exclusives such as Shenmue 2, Head Hunter and Rez. During the following years, unreleased games like *Propeller Arena*, *Hellgate*, *System Shock 2* and *Half-Life* were leaked to the Internet in essentially completed, playable forms.

Although production of the Dreamcast ended in 2001, Sega of Japan continued selling refurbished systems and releasing new games until 2007. Many of the games were initially developed for Sega's NAOMI arcade hardware, including Sega's final first-party Dreamcast game, Sonic Team's *Puyo Puyo Fever*, released on February 24, 2004.[23]

The last Dreamcast units were sold through the Sega Direct division of Japan in early 2006. These refurbished units were bundled with *Radilgy*,[23] and a phone card. The last Dreamcast games published by Sega of Japan were the 2007 releases *Trigger Heart Exelica* and *Karous*.[23]

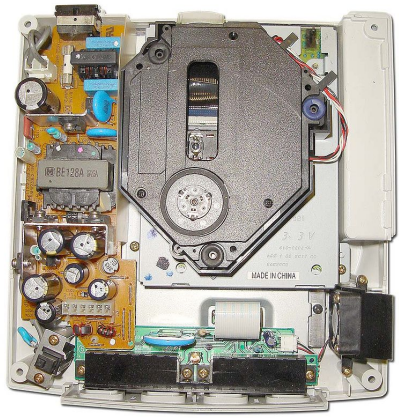
3 other NAOMI games Exzeal, Illmatic Envelope: Illvelo and Mamonoro were supposed to be ported to the Dreamcast, when Sega abruptly decided to discontinue the production of GD-ROM's.[24]

Legacy

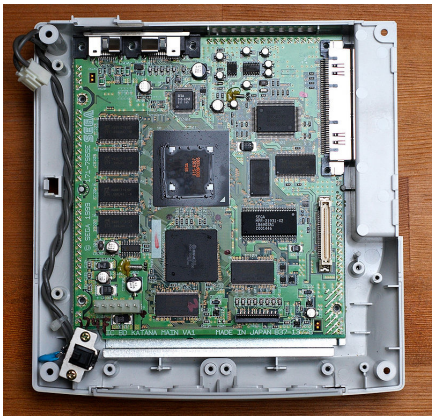
The Dreamcast introduced numerous features that would be standard to future consoles. All models were shipped with modems allowing users to browse the net and play games online via dedicated server through SegaNet (Dreamarena in Europe), a precursor to services such as Xbox Live. Alien Front Online was the first online console game to feature live in-game voice chat. It also featured such early downloadable content, such as items and missions for games such as *Phantasy Star Online* and *Skies of Arcadia*. Jet Set Radio, a Dreamcast original, popularized cell shaded graphics. *Shenmue* had introduced a game with vast scope and *Seaman* was one of the first virtual pet games for a console.[25] In 2009, IGN named the Dreamcast the 8th greatest video game console of all time, out of a field of 25.[26]

Independent commercial games such as Feet of Fury, *Last Hope* and DUX have also been released.[7] [27] And on June 10, 2010, at E3 Sega announced that Dreamcast titles would soon be available on Xbox Live Arcade and PlayStation Network. The first two titles to be released are Sonic Adventure and Crazy Taxi.[28]

Hardware



Internal view of a Dreamcast console including optical drive, power supply, controller ports, and cooling fan



Mainboard of a Dreamcast console.

The system's processor is a 200 MHz SH-4 with an on-die 128-bit vector graphics engine, 360 MIPS and 1.4 GFLOPS (single precision), using the vector graphics engine. The graphics hardware is a PowerVR2 CLX2 chipset, capable of 7.0 million polygons/second peak performance and trilinear filtering. Graphics hardware effects include gouraud shading, z-buffering, anti-aliasing, per-pixel translucency sorting (also known as order independent translucency) and bump mapping. The system supports approximately 16.78 million colors (24-bit) color output and displays interlaced or progressive scan video at 640x480 video resolution.

For sound, the system features a Yamaha AICA Sound Processor with a 32-Bit ARM7 RISC CPU operating at 45 MHz,[29] 64 channel PCM/ADPCM sampler (4:1 compression), XG MIDI support and 128 step DSP.

The Dreamcast has 16 MB 64 Bit 100 MHz main RAM, 8 MB 4x16-bit 100 MHz video RAM and 2 MB 16-bit 66 MHz sound RAM.[30] The hardware supports VQ Texture Compression at either asymptotically 2bpp or even 1bpp [31]

The system reads media using a 12x maximum speed (Constant Angular Velocity) Yamaha GD-ROM Drive.

Accessories

Among the most notable accessories are the Dreamcast VGA adapter which allowed Dreamcast games to be played on computer displays or High-definition television sets in 480p (progressive scan) and the VMU accessory - a memory card with a small screen that provided a variety of functions for various games. Also made available for specific games were the arcade stick and light gun controllers.

In most regions the Dreamcast included a removable modem. The original Asia/Japan model and all PAL models had a 33.6 kbit/s while consoles sold in Japan and US after September 9, 1999 had a 56 kbit/s modem. Brazilian models manufactured under license by Tec Toy did not include a modem, which was available separately. The regular modem could be replaced with a broadband adapter that was sold separately.

A black 56k Dreamcast modem

A special link cable was produced allowing the Dreamcast to interact with the Neo Geo Pocket Color.[32] [33] As the Neo Geo Pocket Color was unsuccessful in western regions very few games took advantage of this feature.

Games

As of November 2007, the Dreamcast has 688 official games available in its library, and unofficial, independent games continue to be released by certain companies.[34] Games were sold in jewel cases; jewel cases in Europe were twice as thick as their North American counterparts, possibly to have space for thick, multilingual instruction manuals, also to note Europe's cases had two doors instead of one like the US counterparts and could store two disks.

Among the official games are Dreamcast online games that could be played over the Internet. The online servers were run by SegaNet, Dreamarena, and GameSpy networks. Online game support was particularly popular in Japan, with releases of network compatible games such as *Tech Romancer* and *Project Justice*. Web browsers were developed by independent companies such as Planetweb to allow access to web sites and included features like Java, uploads, movies, and mouse support. Dreamarena came with games such as *Sonic Adventure* and *Chu Chu Rocket*.

There are six games that can still be played online. *Quake III Arena* and *Maximum Pool* are still accessible via various servers. *4x4 Evolution* and *Starlancer* are still online through Gamespy. *SEGA Swirl* can be also be played online with its play by e-mail game. Phantasy Star Online has private servers where people can use the PAL version with an action replay/code breaker boot disc to bypass the online check and connect to the server.

Models

Due to its short production span, only a few official Dreamcast models were released. The primary models released in 1999 had a grey tint. The later model disc drives added more protection against piracy.

The power light, like the Dreamcast logo in NTSC regions, was orange. In the PAL Regions, the logo was blue. This was changed to avoid a trademark dispute with the German video game/DVD publisher, Tivola, whom already used an orange swirl as their company logo.

Some special Dreamcast models were released in certain regions. In North America, a limited edition black Dreamcast was released with a Sega Sports logo below the Dreamcast logo on the lid with matching Sega Sports-branded black controllers. Electronics Boutique offered a blue Dreamcast through its website.

There were many Japan-only models made. Sega released *Sakura Taisen* version, and a *Hello Kitty* version released in 2000 in Japan which, due to its limited production, has become an extremely rare collector's piece. The package contains a keyboard, controller, VMU, mouse, and a Hello Kitty trivia game. Another were the two limited edition Dreamcasts based on Capcom's *Resident Evil Code: Veronica* game, one a clear pink Claire Redfield model and VMU, and the other a clear dark blue model and VMU, both including the game itself as well. The R7 model ("Regulation#7," referring to the regulation seven in the Japanese penal code pertaining to businesses affecting public morals) consisted of a special refurbished Dreamcast unit that was originally used as a network console in Japanese pachinko parlors, in a newly designed black case. The final Dreamcast models were released in gold.

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External links

- Sega Dreamcast (http://sega.jp/dc) at Sega of Japan (http://sega.jp/) (official website) (in Japanese)
- Dreamcast (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Sega/Dreamcast/) at the Open Directory Project

PlayStation 2

The original model design and logo of the PlayStation 2.

Manufacturer	Sony Computer Entertainment
Product family	PlayStation
Type	Video game console
Generation	Sixth generation
Retail availability	
Units sold	At least 146.9 million (as of September 30, 2010) [1] [2]
Media	DVD, CD
CPU	64-bit[3] [4] "Emotion Engine" clocked at 294.912 MHz (launch), 299 MHz (newer models)
Storage capacity	• PlayStation 2 memory card (8 MB officially supported) • PlayStation memory card (1 MB) • 40 GB Hard Drive (add-on)
Graphics	"Graphics Synthesizer" clocked at 147.456 MHz
Controller input	DualShock 2
Connectivity	100 Mbit Ethernet/modem (requires adapter on SCPH-10000-50000 models), 2 × USB 1.1, 1 × IEEE 1394 interface
Online services	Dynamic Network Authentication System
Best-selling game	*Grand Theft Auto: San Andreas*: 17.33 million sold (as of February, 2009)[5]
Backward compatibility	PlayStation
Predecessor	PlayStation
Successor	PlayStation 3

The **PlayStation 2** (プレイステーション2 *Pureisutēshon Tsū*, officially abbreviated **PS2**) is a sixth-generation video game console manufactured by Sony. The successor to the PlayStation, and the predecessor to the PlayStation 3, the PlayStation 2 forms part of the PlayStation series of video game consoles. Its development was announced in March 1999 and it was released a year later in Japan. Its primary competitors were Sega's Dreamcast, Microsoft's Xbox, and Nintendo's GameCube.

The PS2 is the best-selling console to date, having reached over 140 million units sold as of September 30, 2009.[1] In late 2009, with developers creating new games and the console still selling steadily a decade after its original release, Sony stated that the life cycle of the PlayStation 2 will continue until demand ceases.[6]

During 2009, IGN named the PlayStation 2 as the third best video game console of all time, out of a field of 25.[7]

History

Only a few million people had obtained consoles by the end of 2000 due to manufacturing delays.[8] Directly after its release, it was difficult to find PS2 units on retailer shelves.[9] Another option was purchasing the console online through auction websites such as eBay, where people paid over one thousand dollars for a PS2.[10] The PS2 initially sold well partly on the basis of the strength of the PlayStation brand and the console's backward compatibility, selling over 980,000 units in Japan by March 5, 2000, one day after launch.[11] This allowed the PS2 to tap the large install base established by the PlayStation — another major selling point over the competition. Later, Sony added new development kits for game developers and more PS2 units for consumers.

Many analysts predicted a close three-way matchup between the PS2 and competitors Microsoft's Xbox and the Nintendo GameCube (GameCube being the cheapest of the three consoles and had an open market of games); however, the release of several blockbuster games during the 2001 holiday season maintained sales momentum and held off the PS2's rivals.[12]

Although Sony, unlike Sega with its Dreamcast, placed little emphasis on online gaming during its first few years, that changed upon the launch of the online-capable Xbox. Sony released the PlayStation Network Adapter in late 2002 to compete with Microsoft, with several online first–party titles released alongside it, such as *SOCOM: U.S. Navy SEALs* to demonstrate its active support for Internet play. Sony also advertised heavily, and its online model had the support of Electronic Arts. Although Sony and Nintendo both started out late, and although both followed a decentralized model of online gaming where the responsibility is up to the developer to provide the servers, Sony's attempt made online gaming a major selling point of the PS2.

In September 2004, in time for the launch of *Grand Theft Auto: San Andreas*, Sony revealed a new, slimmer PS2 (see *Hardware revisions*). In preparation for the launch of the new models (SCPH-70000-90000), Sony stopped making the older models (SCPH-30000-50000) to let the distribution channel empty its stock of the units. After an apparent manufacturing issue—Sony reportedly underestimated demand—caused some initial slowdown in producing the new unit caused in part by shortages between the time the old units were cleared out and the new units were ready. The issue was compounded in Britain when a Russian oil tanker became stuck in the Suez Canal, blocking a ship from China carrying PS2s bound for the UK. During one week in November, British sales totalled 6,000 units — compared to 70,000 units a few weeks prior.[13] There were shortages in more than 1700 stores in North America on the day before Christmas.[14]

The original life span for the console was set at 10 years, but according to Sony, its lifecycle will continue as long as developers continue to make new games for the system, and as long as the console and its games continue to sell.[6]

Hardware and software compatibility

PlayStation 2 software is distributed on CD-ROM (blue/purple polycarbonate) and DVD-ROM (clear polycarbonate with four "PlayStation" logos). In addition the console can play audio CDs and DVD movies, and is backward compatible with PlayStation games. The PS2 also supports PlayStation memory cards and controllers, although the memory cards only work with PS1 games and the controllers may not support all functions (such as analog buttons) for PS2 games.

The PS2's DualShock 2 controller is essentially an upgraded PlayStation DualShock; analog face, shoulder and D-pad buttons replaced the digital buttons of the original. Like its predecessor, the DualShock 2 controller has force feedback, which is commonly called the "vibration" function.

An 8 MB PlayStation 2 memory card.

The standard PlayStation 2 memory card has an 8 MB capacity and uses Sony's MagicGate encryption. This requirement prevented the production of memory cards by third parties who did not purchase a license for the MagicGate encryption. Memory cards without encryption can be used to store PlayStation game saves, but PlayStation games would be unable to read from or write to the card - such a card could only be used as a backup. There are a variety of non-Sony manufactured memory cards available for the PlayStation 2, allowing for a larger memory capacity than the standard 8 MB. However their use is unsupported and compatibility is not guaranteed.

The console also features USB and IEEE 1394 expansion ports. Compatibility with USB and IEEE 1394 devices is dependent on the software supporting the device. For example, the PS2 BIOS will not boot an ISO image from a USB flash drive or operate a USB printer, as the machine's operating system does not include this functionality. By contrast, *Gran Turismo 4* is programmed to save screenshots to a USB mass storage device and print images on certain USB printers. A PlayStation 2 HDD can be installed in an expansion bay on the back of the console, and was required to play certain games, notably the popular Final Fantasy XI.[15] This was only available on certain models (see "Hardware Revisions" below).

Online

Some games on the PlayStation 2 support online multiplayer gaming through the use of a broadband internet connection and a PlayStation 2 Network Adapter. This is integrated into the hardware on "slimline" models, and can be bought as an add-on for the original "fat" models. Some games also allow online gameplay using a Dial-Up connection (not available on all models), or LAN play by connecting two network adapters (or slimline consoles) together directly with an Ethernet cable or through the same router network.

Instead of having a unified, subscription-based online service like Xbox Live, online multiplayer on the PS2 is the responsibility of the games publisher and is run on third-party servers. Most recent PS2 online games have been developed to exclusively support broadband internet access. Xbox Live similarly requires a broadband internet connection.

All online PS2 games released in and after 2003 are protected by the Dynamic Network Authentication System (DNAS). The purpose of this system is to prevent piracy and online cheating. DNAS will prevent games from being played online if they are determined to be pirated copies or if they have been modified. However, methods have been developed to get around this protection by modifying key files in the modified game.

Over time, many game servers have been shut-down, because of this many games can no longer be played online. However, there is a program that allows you to achieve online play for some PS2 games again. This is done by using a network configuration that simulates a world-wide LAN, because of this the game must support LAN play.

In addition to online gaming, some unofficial modifications have been made on the PS2 software allowing it to be used as a fully-functional web browser or messenger when connecting to a certain network. This can also be done through PS2 Linux.

Hardware revisions

The PS2 has undergone many revisions, some only of internal construction and others involving substantial external changes. These are colloquially known among PS2 hardware hackers as V0, V1, V2, *etc.*., up to V18[16] (as of 2010). Each revision is released in different regions with a different model number. For example, the V18 was released in NA as SCPH-90001, in AU as SCPH-90002, and in HK as SCPH-90006. The final digit is simply a region code and has no bearing on the hardware other than region lock-outs (for games and DVDs) and language options within the system software.

The PS2 is primarily differentiated between models featuring the original case design and "slimline" models, which were introduced at the end of 2004.

Original case design

Three of the original PS2 launch models (SCPH-10000, SCPH-15000, and SCPH-18000) were only sold in Japan, and lacked the expansion bay of current PS2 models. These models included a PCMCIA slot instead of the expansion bay port of newer models. SCPH-10000 and SCPH-15000 did not have a built-in DVD movie playback and instead relied on encrypted playback software that was copied to a memory card from an included CD-ROM. (Normally, the PS2 will only execute encrypted software from its memory card, but see PS2 Independence Exploit.) V3 had a substantially different internal structure from the subsequent revisions, featuring several interconnected printed circuit boards. As of V4 everything was unified into one board, except the power supply. V5 introduced minor internal changes, and the only difference between V6 (sometimes called V5.1) and V5 is the orientation of the Power/Reset switch board connector, which was reversed to prevent the use of no-solder modchips. V7 and V8 included only minor revisions to V6.

The PS2 standard color is matte black. Several different variations in color have been produced in different quantities and regions, including ceramic white, light yellow, metallic blue (aqua), metallic silver, navy (star blue), opaque blue (astral blue), opaque black (midnight black), pearl white, Sakura purple, satin gold, satin silver, snow white, super red, transparent blue (ocean blue) and also Limited Edition color Pink which was distributed in some regions such as Oceania, and parts of Asia.[17] [18] [19]

The small PlayStation logo on the front of the disc tray could be rotated ninety degrees, in order for the logo to be the right way up in both vertical and horizontal console orientations. This feature is also used in the slimlines.

Slimline

Original style PS2 slimline with a DualShock 2 controller.
This was superseded by another slimline design in 2007.

Manufacturer	Sony Computer Entertainment
Product family	PlayStation
Type	Video game console
Generation	Sixth generation era
Retail availability	October 2004 – present
CPU	300 MHz
Controller input	DualShock 2
Connectivity	2 × USB 1.1, Ethernet, IrDA, 2 × controller ports.

In September 2004, Sony unveiled its third major hardware revision (V12, model number SCPH-70000). Available in late October 2004, it is smaller, thinner, and quieter than the older versions and includes a built-in Ethernet port (in some markets it also has an integrated modem). Due to its thinner profile, it does not contain the 3.5" expansion bay and therefore does not support the internal hard disk drive. It also lacks an internal power supply, similar to the GameCube, and has a modified Multitap expansion. The removal of the expansion bay has been criticized as a limitation due to the existence of titles such as *Final Fantasy XI*, which require the use of the HDD. The official PS2 Linux also requires an expansion bay to function. Currently only the modified Multitap is sold in stores, however these are also compatible with the older versions, and also added support for multiple memory cards on some games. Third-party connectors can be soldered into the unit giving hard drive support, however IDE connections were completely removed in the V14 revision, thereby eliminating this option. Certain mod chips enable the use of a USB hard drive or other mass storage device.

There are some disputes on the numbering for this PS2 version, since there are actually two sub-versions of the SCPH-70000. One of them includes the old EE and GS chips, and the other contains the newer unified EE+GS chip, but otherwise they are identical. Since the V12 version had already been established for this model, there were some disputes regarding these sub-versions. Two propositions were to name the old model (with separate EE and GS chips) V11.5 and the newer model V12, and to name the old model V12 and the newer model V13. Currently, most people use V12 for both models, or V12 for the old model and V13 for the newer one.

The V12 model was first released in black, but a silver edition is available in the United Kingdom, Germany, Australia, United Arab Emirates and other GCC Countries, France, Italy, South Africa, and most recently, North America. It is unknown whether or not this will follow the color schemes of the older model, although a limited edition console that is pink in color has become available since March 2007.

V12 (or V13) was succeeded by V14 (SCPH-75001 and SCPH-75002), which contains integrated EE and GS chips, and different ASICs compared to previous revisions, with some chips having a copyright date of 2005, compared to 2000 or 2001 for earlier models. It also has a different lens and some compatibility issues with a different number of PlayStation games and even some PS2 games.[20]

Comparison of the slimline PlayStation 2 design with the PlayStation 2, with an Eye Toy on top.

In the beginning of 2005 it was found that some black slimline console power transformers manufactured between August and December 2004 were defective and could overheat. The units were recalled by Sony, with the company supplying a replacement model made in 2005.[21]

Later hardware revisions had better compatibility with PlayStation games (*Metal Gear Solid: VR Missions* operates on most silver models); however, the new Japanese slim models have more issues with playing PlayStation games than the first PS2 revisions.

In 2006, Sony released new hardware revisions (V15, model numbers SCPH-77001a and SCPH-77001b). It was first released in Japan on September 15, 2006, including the Silver edition. After its release in Japan, it was then released in North America, Europe, and other parts of the world. The new revision uses an integrated, unified EE+GS chip, a redesigned ASIC, a different laser lens, an updated BIOS, and updated drivers.

In July 2007, Sony started shipping a revision of the slimline PlayStation 2 (SCPH-79000) featuring a reduced weight of 600 grams compared to 900 grams of the SCPH-77001 (with Expansion Bay), achieved through a reduction in parts. The unit also uses a smaller motherboard as well as a custom ASIC which houses the Emotion Engine, Graphics Synthesizer, and the RDRAM. The AC adaptor's weight was also reduced to 250 grams from the 350 grams in the previous revision.[22]

Another refinement of the slimline PlayStation 2 (SCPH-90000) was released in Japan on November 22, 2007,[23] and in the US in late 2008, with an overhauled internal design that incorporates the power supply into the console itself, with a further reduced total weight of 720 grams. SCPH-90000 series consoles manufactured after March 2008 incorporate a revised BIOS, which disables an exploit present in all older models that allowed homebrew applications to be launched from a memory card.

PSX

Sony also manufactured a consumer device called the PSX that can be used as a digital video recorder and DVD burner in addition to playing PS2 games. The device was released in Japan on December 13, 2003, and is the first Sony product to include the XrossMediaBar interface. It did not sell well in the Japanese market and was not released anywhere else.[24]

Sales

Region	Units sold	First available
Japan	21 million (as of October 1, 2008)[25]	March 4, 2000
North America	50 million (as of December 2008)[26]	October 26, 2000
Europe	48 million (as of May 6, 2008)[27]	November 24, 2000
Worldwide	**At least 146.9 million** (as of September 30, 2010) [1] [2]	N/A

On November 29, 2005, the PlayStation 2 became the fastest game console to reach 100 million units shipped, accomplishing the feat within 5 years and 9 months from its launch. This achievement occurred faster than its predecessor, the PlayStation, which took 9 years and 6 months to reach the same benchmark.[28]

The PS2 has sold 145.4 million units worldwide as of June 30, 2010, according to Sony.[1] [2] In Europe, the PS2 has sold 48 million units as of May 6, 2008 according to Sony Computer Entertainment Europe.[27] In North America, the PS2 has sold 50 million units as of December 2008.[26] In Japan, the PS2 has sold 21,454,325 units as of October 1, 2008, according to *Famitsu*/Enterbrain.[25]

In Europe, the PS2 sold 6 million units in 2006 and 3.8 million in 2007, according to estimates by Electronic Arts.[29] [30] In 2007, the PS2 sold 3.97 million units in the US according to the NPD Group[31] [32] and 816,419 units in Japan according to Enterbrain.[33] In 2008, the PS2 sold 480,664 units in Japan, according to Enterbrain.[33] [34]

Accessories

The PlayStation 2's DualShock 2 controller is largely identical to the PlayStation's DualShock, with the same basic functionality; however, it includes analog pressure sensitivity on the face, shoulder and D-pad buttons, is lighter and includes two more levels of vibration.

The EyeToy.

The PlayStation 2 *Resident Evil 4* chainsaw controller.

Optional hardware includes DualShock or DualShock 2 controllers, a PS2 DVD remote control, an internal or external HDD, a network adapter, horizontal and vertical stands, PlayStation or PS2 memory cards, light guns (GunCon), fishing rod and reel controllers. Also available are various cables and interconnects, including the Multitap for PlayStation or PS2, S-Video, RGB, SCART, VGA (for progressive scan games and PS2 Linux only), component and composite video cables, an RF modulator, a USB camera (EyeToy), dance pads for *Dance Dance Revolution*, *In the Groove*, and *Pump It Up* titles, Konami microphones for use with the *Karaoke Revolution* games, dual microphones (sold with and used exclusively for *SingStar* games), various "guitar" controllers (for the *Guitar Freaks* series and *Guitar Hero* series), the drum set controller (sold in a box set (or by itself) with a "guitar" controller and a USB microphone (for use with *Rock Band and Guitar Hero series(World Tour and newer)*), *Onimusha 3* katana controller, *Resident Evil 4* chainsaw

controller, a USB keyboard and mouse, and a headset. Unlike the PlayStation, which required the use of an official Sony PlayStation mouse to play mouse-compatible games, the few PS2 games with mouse support work with standard PC-compatible USB mice. Early versions of the PS2 could be networked via an iLink port, though this had little game support and was dropped. The original PS2 multitap cannot be plugged into the newer slim models (as the multitap connects to the memory card slot as well as the controller slot and the memory card slot on the slimline is shallower). New slim-design multitaps are manufactured for these models, however third-party adapters also exist to permit original multitaps to be used. Some third party manufacturers have created devices that allow disabled people to access the PS2 through ordinary switches etc. One such device is the PS2-SAP from LEPMIS, another is for example the JPemulator.

Homebrew development

Sony released a Linux-based operating system for the PS2 in a package that also includes a keyboard, mouse, Ethernet adapter and HDD. Currently, Sony's online store states that the Linux kit is no longer for sale in North America. However as of July 2005, the European version was still available. The kit boots by installing a proprietary interface, the run-time environment, which is on a region-coded DVD, so the European and North America kits only work with a PS2 from their respective regions.

In Europe and Australia, the PS2 comes with a free Yabasic interpreter on the bundled demo disc. This allows simple programs to be created for the PS2 by the end-user. This was included in a failed attempt to circumvent a UK tax by defining the console as a "computer" if it contained certain software.

A port of the NetBSD project and BlackRhino GNU/Linux, an alternative Debian-based distribution, are also available for the PS2.

Using homebrew programs (e.g. 'SMS Media Player'[35]) it is possible to listen to various audio file formats (MP3, OMA, Ogg Vorbis, AAC, FLAC, AC3), and watch various video formats (DivX/XviD, MPEG1, MPEG2, MPEG4-ASP in AVI Container) using the console. Media can be played from any device connected to the console i.e. external USB/Firewire thumb drive/hard disk (FAT32 only), the internal hard disk on early revision consoles, optical CD-R(W)/DVD±R(W) disks (modded systems or patched disks), or network shares (Windows Network or PS2 host: protocol).

Homebrew programs can be launched directly from a memory card on unmodified consoles by using certain software that takes advantage of a long known and used exploit, dealing with the boot part of the EE/IOP process (Independence).

A recent development (May 2008) called **Free McBoot** allows homebrew programs to be launched without a trigger disc required by the older exploit. This also allows use of homebrew on unmodded systems without a functional disc drive. However, installation of the exploit to each individual memory card requires an already exploited/modded system in order to launch the installer. Copying from one memory card to another will not work. This newer exploit will not work on the very newest PS2s (SCPH-9000x model with BIOS 2.30 and up) but will work on ALL models prior to that, including slimlines.

Homebrew programs can be used to play patched backups of original PS2 DVD games on unmodified consoles, and to install retail discs to an installed hard drive on older models (ESR, HDLoader, USBAdvance). This is illegal in many countries.

Homebrew emulators of older computer and gaming systems have been developed for the PS2.[36] Using these homebrew programs the PS2 can emulate the following:

- Atari 2600
- Atari 5200
- BBC Micro
- Commodore 64

- Game Boy
- Mega Drive/Genesis
- Sega Master System
- MSX
- Neo Geo
- Nintendo Entertainment System
- TurboGrafx-16
- Super Nintendo Entertainment System

Technical specifications

The specifications of the PlayStation 2 console are as follows, with hardware revisions:

- CPU: 64-bit[3] [4] "Emotion Engine" clocked at 294.912 MHz (299 MHz on newer versions), 10.5 million transistors
  - System Memory: 32 MB Direct Rambus or RDRAM
  - Memory bus Bandwidth: 3.2 gigabytes per second
  - Main processor: MIPS R5900 CPU core, 64 bit, little endian (mipsel).
  - Coprocessor: FPU (Floating Point Multiply Accumulator × 1, Floating Point Divider × 1)
  - Vector Units: VU0 and VU1 (Floating Point Multiply Accumulator × 9, Floating Point Divider × 1), 32-bit, at 150 MHz.
    - VU0 typically used for polygon transformations optionally (under parallel or serial connection), physics and other gameplay based things
      - Parallel performs transformations in parallel in the same moment
      - Serial (series) performs transformations in a series of steps or stages coherent to the design of each VU
        - Stage 1: VU0 does perspective and cam, boning, animations and movement laws per triangle
        - Stage 2: VU1 does colors, lights and effects per triangle)
    - VU1 typically used for polygon transformations, lighting and other visual based calculations
      - Texture matrix able for 2 units (UV/ST)[37]

Emotion Engine CPU

Graphics Synthesizer GPU

- Floating Point Performance: 6.2 gigaFLOPS (single precision 32-bit floating point)
  - FPU 0.64 gigaFLOPS
  - VU0 2.44 gigaFLOPS
  - VU1 3.08 gigaFLOPS (with Internal 0.64 gigaFLOPS EFU)
- 3D CG Geometric transformation(VU0+VU1 parallel): 66 million polygons per second
  - 3D CG Geometric transformations under curved surfaces: 16 million polygons per second

    - 3D CG Geometric transformations at peak bones/movements/effects(textures)/lights(VU0+VU1): 15-20 million polygons per second (dependent on if series or parallel T&L)
    - Actual real-world polygons (per frame):500-650k at 30fps, 250-325k at 60fps
  - Compressed Image Decoder: MPEG-2
  - I/O Processor interconnection: Remote Procedure Call over a serial link, DMA controller for bulk transfer
  - Cache memory: Instruction: 16 KB, Data: 8 KB + 16 KB (ScrP)
- Graphics processing unit: "Graphics Synthesizer" clocked at 147 MHz
  - Pixel pipelines: 16
  - Video output resolution: variable from 256x224 to 1280x1024 pixels
  - 4 MB Embedded DRAM video memory bandwidth at 48 gigabytes per second (main system 32 MB can be dedicated into VRAM for off-screen materials)
    - Texture buffer bandwidth: 9.6 GB/s
    - Frame buffer bandwidth: 38.4 GB/s
  - DRAM Bus width: 2560-bit (composed of three independent buses: 1024-bit write, 1024-bit read, 512-bit read/write)
  - Pixel Configuration: RGB: Alpha:Z Buffer (24:8, 15:1 for RGB, 16, 24, or 32-bit Z buffer)
  - Dedicated connection to: Main CPU and VU1
  - Overall Pixel fillrate: 16x147 = 2.352 Gpixel/s (rounded to 2.4 Gpixel/s)
    - Pixel fillrate: with no texture, flat shaded 2.4(75,000,000 32pixel raster triangles)
    - Pixel fillrate: with 1 full texture(Diffuse Map), Gouraud shaded 1.2 (37,750,000 32-bit pixel raster triangles)
    - Pixel fillrate: with 2 full textures(Diffuse map + specular or alpha or other), Gouraud shaded 0.6 (18,750,000 32-bit pixel raster triangles)
  - GS effects: AAx2 (poly sorting required),[38] Bilinear, Trilinear, Multi-pass, Palletizing (4-bit = 6:1 ratio, 8-bit = 4:1)
  - Multi-pass rendering ability
    - Four passes = 300 Mpixel/s (300 Mpixels/s divided by 32 pixels = 9,375,000 triangles/s lost every four passes)[39]
- Audio: "SPU1+SPU2" (SPU1 is actually the CPU clocked at 8 MHz)
  - Sound Memory: 2 MB
  - Number of voices: 48 hardware channels of ADPCM on SPU2 plus software-mixed channels
  - Sampling Frequency: 44.1 kHz or 48 kHz (selectable)
  - Output: Dolby Digital 5.1 Surround sound, DTS (Full motion video only), later games achieved analog 5.1 surround during gameplay through Dolby Pro Logic II

Graphics Synthesizer as on SCPH39000.

Older EE+GS that does not incorporate system memory (Found in Older Charcoal Black Slim PS2s. (SCPH-70001).


ASIC that incorporates the EE, GS, and system memory (found in silver slim PS2s. Model SCPH-7900x and later).

- I/O Processor
  - I/O Memory: 2 MB
  - CPU Core: Original PlayStation CPU (MIPS R3000A clocked at 33.8688 MHz or 37.5 MHz)
  - Automatically underclocked to 33.8688 MHz to achieve hardware backwards compatibility with original PlayStation format games.
  - Sub Bus: 32-bit
  - Connection to: SPU and CD/DVD controller.
- Interfaces:
  - 2 proprietary PlayStation controller ports (250 kHz clock for PS1 and 500 kHz for PS2 controllers)
  - 2 proprietary Memory Card slots using MagicGate encryption (250 kHz for PS1 cards, up to 2 MHz for PS2 cards)
  - Expansion Bay (PCMCIA on early models for PCMCIA Network Adaptor and External Hard Disk Drive) DEV9 port for Network Adaptor
  - Modem, Ethernet and Internal Hard Disk Drive (single IDE/ATA channel, possible to hook 2 devices to.)
  - FireWire (only in SCPH 10xxx – 3xxxx)
  - Infrared remote control port (SCPH 5000x and newer) — *IEEE 1394 port removed and Infrared port added in SCPH-50000 and later hardware versions.*
  - 2 USB 1.1 ports with an OHCI-compatible controller.
- Disc Drive type: proprietary interface through a custom micro-controller + DSP chip. 24x speed (PlayStation 2 format CD-ROM, PlayStation format CD-ROM), 4x (Supported DVD formats) — Region-locked with anti-copy protection. Can't read Gold Discs.
- Supported Disc Media: PlayStation 2 format CD-ROM, PlayStation format CD-ROM, Compact Disc Audio, PlayStation 2 format DVD-ROM (4.7 GB)(some games on DVD9 8.5 GB), DVD Video (4.7 GB), DVD-9 (8.5 GB Double-Layer). Later models (starting with SCPH-50000) are DVD+RW, and DVD-RW compatible.

Disc Read Error (DRE) Lawsuit

A class action lawsuit was filed against Sony Computer Entertainment America Inc. on July 16, 2002, in the Superior Court of California, County of San Mateo. The lawsuit addresses consumer reports of inappropriate "no disc error" (disc read error) messages and other problems associated with playing DVDs and CDs on the PlayStation 2.

Sony settled its “disc read error” lawsuit by compensating the affected gamers with USD $25, a free game from a specified list, and the reduced cost repair or replacement (at SCEA’s discretion) of the damaged system. This settlement was subject to the courts’ approval, and hearings began in the US and Canada on April 28, 2006, and May 11, 2006, respectively.[40]

See also

- HDD Utility Disc
- PlayStation Broadband Navigator
- PCSX2 - a PlayStation 2 (PS2) emulator for the Microsoft Windows and Linux operating systems

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External links

- Official PlayStation website (http://www.playstation.com/)
- PlayStation 2 (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Sony/PlayStation_2/) at the Open Directory Project

Nintendo GameCube

Indigo GameCube and controller

Manufacturer	Nintendo
Type	Video game console
Generation	Sixth generation
Retail availability	• JP September 14, 2001 • NA November 18, 2001 • EU May 3, 2002 • AUS May 17, 2002
Discontinued	2007[1]
Units sold	Worldwide: 21.74 million Japan: 4.04 million North America: 12.94 million Europe & Australia: 4.77 million[2]
Media	Nintendo GameCube Game Disc
CPU	IBM PowerPC "Gekko", 486 MHz
Storage capacity	Nintendo GameCube Memory Card (16 MB max. capacity)
Display	• Composite video • S-video (NTSC consoles only) • RGB SCART (PAL consoles only) • Component video (YPbPr) (DOL-001 models only)* • D-Terminal (DOL-001 models only)* *Requires the use of the Digital AV port, which was removed from later models
Graphics	ATI "Flipper", 162 MHz
Sound	Analog stereo (support for Dolby Pro Logic II)
Input	Nintendo GameCube controller, WaveBird, Game Boy Advance, numerous other input devices
Connectivity	Nintendo GameCube Broadband Adapter and Modem Adapter
Dimensions	4.3" height, 5.9" width, 6.3" depth 112mm height, 149mm width, 193mm depth
Best-selling game	*Super Smash Bros. Melee*, 7.09 million (as of March 10, 2008)[3]
Predecessor	Nintendo 64

Successor	Wii

The **Nintendo GameCube** (ニンテンドーゲームキューブ *Nintendō Gēmu Kyūbu*), officially abbreviated as **GCN** in Western regions and as NGC in Japan,[4] [5] was Nintendo's fourth home video game console and was part of the sixth generation console era. It was the successor to the Nintendo 64 and predecessor to the Wii.

The Nintendo GameCube was the first Nintendo console to use optical discs as its primary storage medium, after several aborted projects from Nintendo and its partners to utilize optical-based storage media. In contrast with the GameCube's contemporary competitors, the PlayStation 2 and Xbox, the GameCube uses miniDVD-based discs instead of full-size DVDs. Partially as a result of this, it does not have the DVD-Video playback functionality of these systems, nor the audio CD playback ability of other consoles that use full-size optical discs.

In addition, the GameCube introduced a variety of connectivity options to Nintendo consoles, and was the third Nintendo console, after the Nintendo 64DD, to support online play officially, via the Nintendo GameCube Broadband Adapter and Modem Adapter. It also enabled connectivity to the Game Boy Advance to access exclusive features of certain games or to use the portable system as a controller for the Game Boy Player.

The console was released on September 14, 2001 in Japan, November 18, 2001 in North America, May 3, 2002 in Europe, and May 17, 2002 in Australia. The GameCube sold 21.74 million units worldwide.[2]

Marketing

Nintendo used several advertising strategies and techniques for the GameCube. Around the time of release, the GameCube was advertised with the slogan "Born to Play."[6] The earliest commercials displayed a rotating cube animation, which would morph into the GameCube logo as a female voice whispers, "GameCube." This was usually displayed at the end of GameCube game commercials.[7]

A subsequent ad campaign featured the "Who Are You?" slogan across Nintendo's entire product line, to market the wide range of games Nintendo offers. The idea behind the "Who Are You?" campaign was that "you are what you play"; the kind of game a person enjoys playing suggests something about that gamer's personality. The "Who Are You?" logo was designed in graffiti-style lettering. Most of the "Who Are You?" commercials advertised games developed or published by Nintendo, but some developers paid Nintendo to promote their games, using Nintendo's marketing and advertising resources.

Hardware

Platinum GameCube with controller

Like its predecessor, the Nintendo 64, the Nintendo GameCube was available in many colors. The two most common, released during the console's launch, were "Indigo" (the standard color used in most early advertising) and "Jet Black." "Spice" (orange) GameCubes were also offered as standard models, but only in Japan. However, the standard controller was widely available in this color outside of Japan as well. Later, Nintendo released GameCubes with a "Platinum" (silver) color scheme, initially marketed as a limited edition product. Other limited edition colors and styles were also only released in Japan.

Following Nintendo tradition, the GameCube's model numbers, DOL-001 and 101, are a reference to its codename, "Dolphin."[8] The official accessories and peripherals have model numbers beginning with DOL as well. Another

Dolphin reference, "Flipper" was the name of the GPU for the GameCube.[9] Panasonic made a licensed version of the GameCube with DVD playback, called the Panasonic Q.

Benchmarks provided by third-party testing facilities indicate that Nintendo's official specifications, especially those relating to performance, may be conservative. One of Nintendo's primary objectives in designing the GameCube hardware was to overcome the perceived limitations and difficulties of programming for the Nintendo 64 architecture, thus creating an affordable, well-balanced, developer-friendly console that still performed competitively against its rivals.[10]

The development hardware kit was called the GameCube NR Reader. Model numbers for these units begin with DOT. These units allow developers to debug beta versions of games and hardware. These units were sold to developers by Nintendo at a premium price and many developers modified regular GameCubes for game beta testing because of this. The NR reader will not play regular GameCube games, only special NR discs burned by a Nintendo NR writer.

Technical specifications

The Nintendo GameCube Game Disc was the software storage medium for the Nintendo GameCube, created by Matsushita. Chosen to prevent unauthorized copying and to avoid licensing fees to the DVD Consortium, it was Nintendo's first non-cartridge storage method for consoles released outside of Japan (the Famicom Disk System and Nintendo 64DD were exclusive to Japan). Some games which contain large amounts of voice acting or pre-rendered video (for example, *Tales of Symphonia* and *Resident Evil 4*) have been released on two discs; however, only twenty-five titles have been released on two discs, and no games require more than two discs.

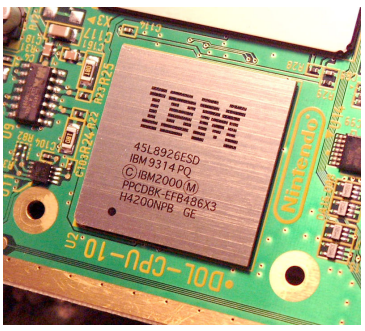
The MultiAV port was identical to the one used in Nintendo's earlier Super Nintendo Entertainment System and Nintendo 64 consoles, allowing most cables from these systems to be used interchangeably.

Nintendo found that the digital AV port was used by less than one percent of users, leading to the removal of the port from consoles with model number DOL-101 manufactured after May 2004.[11]

Serial Port 2 was also removed from models manufactured after the first product revision.

Central processing unit:

- 486 MHz IBM "Gekko" PowerPC CPU
- PowerPC 750CXe-based core[12]
- 180 nm IBM copper-wire process, 43 mm² die, 4.9 W dissipation[12]
- Roughly fifty new vector instructions[12]
- 32-bit ALU
- 64-bit FPU (1.9 GFLOPS, usable as 2×32-bit SIMD)[12]
- 64-bit enhanced PowerPC 60x front side bus to GPU/chipset, 162 MHz clock, 1.3 GB/s peak bandwidth[12]
- 64 KB (32 KB I/32 KB D) L1 cache (8-way associative), 256 KB on-die L2 cache (2-way associative)[12]
- 1125 DMIPS (dhrystone 2.1)



IBM PowerPC "Gekko" processor

System memory:

- 43 MB total non-unified RAM
  - 24 MB MoSys 1T-SRAM (codenamed "Splash") main system RAM, 324 MHz, 64-bit bus, 2.7 GB/s bandwidth[12]
  - 3 MB embedded 1T-SRAM within "Flipper"[13]
    - Split into 1 MB texture buffer and 2 MB framebuffer[13]
    - 10.4 GB/s texture peak bandwidth, 7.6 GB/s framebuffer peak bandwidth, ≈6.2 ns latency[12]
  - 16 MB DRAM used as buffer for DVD drive and audio, 81 MHz, 8-bit bus, 81 MB/s bandwidth[12]

Connectivity:

- 4 controller ports, 2 memory card slots
- MultiAV analog audio/video port: interlaced composite, Y/C (S-Video) (NTSC models only), and RGB (PAL models only) video, stereophonic analog audio
- Digital audio/video port: interlaced or progressive scan YC_BC_R video (decoded to YP_BP_R), RGB video (never officially utilized), stereophonic I²S audio (never officially utilized)
- Resolutions: 480i, 576i, 480p
- High-speed serial ports: 2
  - Serial Port 1 is reserved for a broadband adapter or modem adapter
  - Serial Port 2 is unused
- High-speed parallel ports: 1 (reserved for the Game Boy Player)
- Power supply output: 12 volts DC × 3.25 amperes
- Physical Measurements: 110 mm (H) × 150 mm (W) × 161 mm (D); [4.3"(H) × 5.9"(W) × 6.3"(D)]

Graphics processing unit:

- 162 MHz "Flipper" LSI (co-developed by Nintendo and ArtX, acquired by ATI)
- 180 nm NEC eDRAM-compatible process
- 8 GFLOPS
- 4 pixel pipelines with 1 texture unit each[12]
- TEV "Texture EnVironment" engine (similar to Nvidia's GeForce-class "register combiners")
- Fixed-function hardware transform and lighting (T&L), 20+ million polygons in-game[14]
- 648 megapixels/second (162 MHz × 4 pipelines), 648 megatexels/second (648 MP × 1 texture unit) (peak)
  - Peak triangle performance: 20,250,000 32-pixel triangles/s raw and with 1 texture and lit
    - 337,500 triangles a frame at 60 FPS
    - 675,000 triangles a frame at 30 FPS
- 8 texture layers per pass, texture compression, full scene anti-aliasing[14]
- 8 simultaneous hardware light sources
- Bilinear, trilinear, and anisotropic texture filtering
- Multi-texturing, bump mapping, reflection mapping, 24-bit z-buffer
- 24-bit RGB/32-bit RGBA color depth
  - Hardware limitations sometimes require a 6r+6g+6b+6a mode (18-bit color), resulting in color banding.
- 720 × 480 interlaced (480i) or progressive scan (480p) - 60 Hz, 720 × 576 interlaced (576i) - 50 Hz
- Integrated audio processor: Custom 81 MHz Macronix DSP
  - Instruction memory: 8 KB RAM, 8 KB ROM
  - Data memory: 8 KB RAM, 4 KB ROM
  - 64 channels 16-bit 48 kHz ADPCM[14]
  - Dolby Pro Logic II multi-channel information encoded within stereophonic output

GameCube Disc

Storage media:

- Panasonic-developed CAV miniDVD-like 8 cm optical disc, 2.000 MB/s–3.125 MB/s transfer rate, 128 ms average access time, 1.5 GB capacity
- Memory cards of varying sizes for saved game storage

Memory and storage

The GameCube features two ports that accommodate memory cards for saving game data. The three official memory card sizes are: 59 blocks (4 Mbit/512 KB, gray card), 251 blocks (16 Mbit/2 MB, black), and 1019 blocks (64 Mbit/8 MB, white). Cheaper third-party memory cards are also available.[15]

Memory Card 59

Controller


GameCube controller

The standard GameCube controller has a wing grip design, and was designed to fit well in the player's hands. It includes a total of eight buttons, two analog sticks, a D-pad, and an internal rumble motor. The primary analog stick was on the left, with the D-pad below it. On the right are four buttons; a large green "A" button in the center, a smaller red "B" button to the left, an "X" button to the right and a "Y" button to the top. Below those, there was a yellow "C" stick, which often serves different functions, such as controlling the camera. The Start/Pause button was located at the middle of the controller face, and the rumble motor was encased within the center of the controller.

On the top of the controller there are two analog shoulder buttons marked "L" and "R," as well as one digital button marked "Z." The "L" and "R" shoulder buttons feature both analog and digital capabilities. Each of these buttons behaves as a typical analog button until fully depressed, at which point the button "clicks" to register an additional digital signal. This method effectively serves to provide two functions per button without actually adding two separate physical buttons.

The WaveBird wireless controller was an RF-based wireless controller, based on the same design as the standard controller. This controller comes in light grey and platinum. It communicates with the GameCube system wirelessly through a receiver dongle connected to one of the system's controller ports. It was powered by two AA batteries. As a power-conservation measure, the WaveBird lacks the rumble function of the standard controller.

Technical issues

Some revisions of the GameCube consoles developed disc read problems with the optical pickup becoming thermally sensitive over time, causing read errors when the console reached normal operating temperature. Failures of this sort require replacement of the optical pickup. Affected consoles have sometimes been serviced free of charge by Nintendo even after the expiration of the warranty period.[16]

Software library

Launch games

The GameCube launched in North America with the following twelve games:

Title	Developer	Publisher(s)
All-Star Baseball 2002	Acclaim	Acclaim
Batman Vengeance	Ubisoft	Ubisoft
Crazy Taxi	Hitmaker	Sega
Dave Mirra Freestyle BMX 2	Z-Axis	Acclaim
Disney's Tarzan Untamed	Ubisoft	Ubisoft
Luigi's Mansion	Nintendo	Nintendo
Madden NFL 2002	EA Tiburon	EA Sports
NHL Hitz 20-02	EA Black Box	Midway
Star Wars Rogue Squadron II: Rogue Leader	Factor 5	LucasArts
Super Monkey Ball	Amusement Vision	Sega
Tony Hawk's Pro Skater 3	Neversoft	Activision
Wave Race: Blue Storm	NST	Nintendo

One of the defining aspects of the Nintendo GameCube was the rejuvenated relationship between Nintendo and its licensees. Unlike previous generations in which Nintendo was seen by some as bullying its third-party game developers, Nintendo openly sought game-development aid on the Nintendo GameCube. Sometimes, Nintendo would merely request that a third-party developer produce a game based on the third-party's own game franchises; other times, Nintendo would request that the third-party developer produce a game based on Nintendo's own game franchises. In both cases, Nintendo often took an active role in cooperating with the developer. This policy on Nintendo's part resulted in exclusive third-party games for the Nintendo GameCube, and the arrival of multi-format games for the console.

Market share

Despite Nintendo's efforts, the GameCube failed to reclaim the market share lost by its predecessor, the Nintendo 64. It was in third place compared to its competitors, Sony's PlayStation 2 (still currently supported) and Microsoft's Xbox (discontinued in 2006). The console's "family-friendly" appeal and lack of support from certain third-party developers skewed the GameCube toward a younger market, which represented a minority of the gaming population during the sixth generation (see chart [17]). Some third-party games popular with teenagers or adults, such as several first-person shooters and the controversial *Grand Theft Auto* series, skipped a GameCube port in favor of the PlayStation 2 and Xbox. The GameCube does, however, have over forty M (for Mature) rated games, a considerably larger amount than Nintendo's previous consoles.

The strong sales of first-party games did not seemingly benefit third-party developers. Many cross-platform games—such as sports franchises released by Electronic Arts—sold far below their PlayStation 2 and Xbox counterparts, eventually prompting some developers to scale back or completely cease support for the GameCube. After several years of losing money from developing for Nintendo's console, Eidos Interactive announced in September 2003 that it would end support for the GameCube, canceling several games that were in development.[17] Later, however, Eidos resumed development[18] of GameCube titles, releasing hit games such as *Lego Star Wars: The Video Game* and *Tomb Raider: Legend*.

The 1.5 GB proprietary disc format may also have been a limiting factor since the PlayStation 2 and Xbox could use 8.5 GB Dual-Layer DVDs for larger games. The GameCube disc still had sufficient room for most games, although a few would require an extra disc or, less often, feature less content than the other versions. Higher video compression for some games was also potentially more apparent on some GameCube versions, if employed by developers as a workaround for storage constraints.

Also, due to Nintendo's lack of support for the online capabilities of the GameCube (as compared to Sega, Sony, and Microsoft, who actively promoted online gaming by releasing first-party online titles and soliciting developers for support), multi-platform games with online functionality were released offline-only on the GameCube. Although online support was added in late 2002 and both Sony and Nintendo followed a similar decentralized online model (in contrast to the centralized Xbox Live), lower sales of the GameCube versions of games during its launch year precluded developers from including online support.

Due to sagging sales, Nintendo halted GameCube production for a brief period in 2003 in order to reduce surplus units.[19] Sales rebounded slightly after a price drop to US$99 on September 24, 2003[20] and the release of *The Legend of Zelda: Collector's Edition* bundle. A demo disc, the *Nintendo GameCube Preview Disc*, was also released in a bundle in 2003. Beginning with this period, GameCube sales continued to be steady, particularly in Japan, but the GameCube remained in third place in worldwide sales during the sixth generation era due to weaker sales performance elsewhere.

Some third-party companies, such as Ubisoft, THQ, Disney Interactive Studios, Humongous Entertainment and EA Sports, continued to release GameCube games well into 2007.[21] [22] [23] [24] These titles include *TMNT*, *Meet the Robinsons*, *Surf's Up*, *Ratatouille* and *Madden NFL 08*.

Online gaming

The GameCube was at one point online compatible by using a GameCube Broadband Adapter or Modem Adapter, though only four games featured an online component which were *Homeland*, *Phantasy Star Online Episode I & II*, *Phantasy Star Online Episode I & II Plus* and *Phantasy Star Online Episode III: C.A.R.D. Revolution*. This online play was ended as of April 2007. Although the official servers for the PSO titles are now offline, it is still possible to play online on various private servers such as SCHTHACK. LAN gameplay is still available for the three titles that originally supported it as well: *Mario Kart: Double Dash!!*, *1080° Avalanche* and *Kirby Air Ride*. There are some third-party PC applications such as *Warp Pipe* and XLink Kai that allows online play of these three games by tunneling the network traffic through a computer and across the Internet, though this is not supported by Nintendo.

Reception and sales

Although generally receiving positive comments on its game library, the GameCube did receive some criticism for its "toy-ish" exterior and for lacking some of the technical features of its competitors (such as DVD playback and digital audio output).[25]

The GameCube sold nearly 22 million units worldwide during its lifetime,[2] lagging far behind the PlayStation 2's almost 144 million.[26] [27] The GameCube finished its generation slightly behind the Xbox, which sold 24 million units before being discontinued, and well ahead of the short-lived Dreamcast, which sold 10.6 million. The GameCube did not outsell its predecessor, the Nintendo 64, which sold almost 33 million units in its lifetime.[28]

In September 2009, IGN named the GameCube the 16th best gaming console of all time, behind all three of its competitors: the PlayStation 2 (3rd), Dreamcast (8th), and Xbox (11th). Aside from the Virtual Boy (which did not make the list at all), it was the only Nintendo console to not make the list's top 10.[25]

Games

The number of games released for the console exceeds 600, with 208.56 million GameCube games sold as of June 30, 2008.

Hidden music

There are several hidden sounds within the Gamecube system software, including two hidden startup tunes. If the Z button is held on one controller during startup, the sounds of a squeaking toy, xylophone, springs, and childish laughter will play in place of the original tune. If four controllers are connected and all four Z buttons are held, kabuki-style sounds will be played, including vocalization and drumming.[29] [30] [31]

The music which plays when accessing the GameCube system menu is a mellow, and significantly slowed down version of the Famicom Disk System startup theme.[32]

See also

- Nintendo GameCube accessories
- Nintendo GameCube Linux
- Dolphin (emulator)

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External links

- Nintendo GameCube (http://www.nintendo.com/consumer/systems/nintendogamecube/index.jsp) Official webpage by Nintendo of America
- Nintendo GameCube (http://web.archive.org/web/20080501165134/http://register.nintendo.com/systemsgcn) at Nintendo.com (archived versions (http://web.archive.org/web/*/http://www.nintendo.com/systemsgcn) at the Internet Archive Wayback Machine)
- GameCube (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Nintendo/GameCube/) at the Open Directory Project

Xbox

Xbox console with "Controller S"

Manufacturer	Microsoft
Product family	Xbox
Type	Video game console
Generation	Sixth generation
Retail availability	• NA November 15, 2001 • JP February 22, 2002 • PAL March 14, 2002
Discontinued	• JP 2005 • NA 2006 • EU 2006
Units sold	24+ million (as of May 10, 2006)[1]
Media	DVD, CD
Operating system	Custom (Based on Windows NT architecture and Windows XP (through Xbox LIVE))
CPU	Custom 733 MHz Intel Pentium III "Coppermine-based" processor
Storage capacity	8 or 10 GB internal Hard Drive (both formatted to 8 GB), 8 MB memory card
Memory	64 MB of DDR SDRAM @ 200 MHz
Graphics	233 MHz nVidia NV2A
Controller input	4x Xbox controller ports (proprietary USB interface)
Connectivity	100 Mbit Ethernet
Online services	Xbox Live
Best-selling game	*Halo 2*, 8 million (as of May 9, 2006)[2] [3]
Successor	Xbox 360

The **Xbox** is a sixth-generation video game console manufactured by Microsoft. It was released on November 15, 2001 in North America, February 22, 2002 in Japan, and March 14, 2002 in Australia and Europe and is the predecessor to the Xbox 360. It was Microsoft's first foray into the gaming console market, and competed with Sony's PlayStation 2, Sega's Dreamcast, and Nintendo's GameCube. The integrated Xbox Live service allowed

players to compete online.[4]

The Xbox was discontinued in late 2006, although the final Xbox game, *Madden NFL 09* was released in August 2008. Support for out-of-warranty Xbox consoles was discontinued on March 2, 2009; any in-warranty repair now needed will not be undertaken and faulty consoles will be replaced with an Xbox 360 instead. Xbox Live support was discontinued on April 15, 2010.[4]

In 2009, IGN named the Xbox the 11th best video game console of all time, out of 25 other consoles.[5]

History

The console was Microsoft's first product that ventured into the video game console market, after having collaborated with Sega in porting Windows CE to the Dreamcast console. The Xbox first edition was initially developed by a small Microsoft team that included game developer Seamus Blackley. Microsoft repeatedly delayed the console, which was first mentioned in late 1999 during interviews with then-Microsoft CEO Bill Gates. Gates stated that a gaming/multimedia device was essential for multimedia convergence in the new times, confirmed by Microsoft with a press release.[6] When Bill Gates unveiled the Xbox at the Game Developers Conference in 2000, audiences were impressed by the console's technology. At the time of Gates' announcement, Sega's Dreamcast was diminishing and Sony's PlayStation 2 was just hitting the streets in Japan.[7]

Concentrating on making a big splash in Japan, Microsoft delayed its European launch, though Europe later proved to be the more receptive market.[7] Two of the original members of the Xbox team, Seamus Blackley and Kevin Bachus, left the company early on. The other founding members, Otto Berkes and Ted Hase, are still with Microsoft, but by 2004 were no longer working on the Xbox project.

Some of Microsoft's plans proved effective. In preparation for its launch, Microsoft acquired Bungie and used *Halo: Combat Evolved* as its launch title. At the time, *Goldeneye 007* for Nintendo 64 had been one of the few hit FPS games to appear on a console, some of other ones being Perfect Dark and Medal of Honor. *Halo: Combat Evolved* proved a good application to drive the Xbox's sales.[7] In 2002, Microsoft overtook Nintendo to capture the second place slot in consoles sold in North America.

Popular launch games for the console included *Dead or Alive 3*, *Amped: Freestyle Snowboarding*, *Halo: Combat Evolved*, *Fuzion Frenzy* and *Project Gotham Racing*.

The name for the Xbox was originally the DirectX box as it came from a group of Microsoft DirectX developers, but later changed to Xbox after focus testing. The marketing team apparently "created this whole, long list of better names for the machine", former Microsoft VP of game publishing Ed Fries said in a interview with Gamasutra.[8]

Xbox 360

Nvidia ceased production of the Xbox's GPU in August 2005, which marked the end of Xbox production and the quick release of the Xbox 360 on November 22, 2005. The Xbox 360 had superior storage, audio and video capabilities compared to the original Xbox.

When equipped with a removable hard drive add-on, the Xbox 360 supports a limited number of the Xbox's game library through emulation. Emulation adds support for anti-aliasing as well as upscaling of the still standard definition image. These emulators are periodically updated to add compatibility for older games and are available free through Xbox Live or as a file download to be burned to a DVD-R from the Xbox web site. These updates are also available monthly as part of the demo disc that comes with each issue of Official Xbox Magazine. As the architectures are different between Xbox and Xbox 360, software emulation is the only way to have compatibility without including hardware from the original Xbox.

Hardware and accessories

Hardware

The Xbox was the first video game console to feature a built-in hard disk drive, used primarily for storing game saves and content downloaded from Xbox Live. This eliminated the need for separate memory cards (although some older consoles, such as the TurboGrafx-CD, Sega CD and Sega Saturn had featured built-in battery backup memory prior to 2001). An Xbox user could rip music from standard audio CDs to the hard drive, and these songs were used for the custom soundtracks in some games.[9]

The Xbox was the first gaming product to feature Dolby Interactive Content-Encoding Technology, which allows real-time Dolby Digital encoding in game consoles. Previous game consoles could only use Dolby Digital 5.1 during non-interactive "cut scene" playback.[10]

The Xbox is based on commodity PC hardware and is much larger and heavier than its contemporaries. This is largely due to a bulky tray-loading DVD-ROM drive and the standard-size 3.5 inch hard drive. The Xbox has also pioneered safety features, such as breakaway cables for the controllers to prevent the console from being pulled from the surface it rests on.

Several internal hardware revisions have been made in an ongoing battle to discourage modding (hackers continually updated modchip designs in an attempt to defeat them), to cut manufacturing costs, and to make the DVD-ROM drive more reliable (some of the early units' drives gave Disc Reading Errors due to the unreliable Thomson DVD-ROM drives used). Later generation units that used the Thomson TGM-600 DVD-ROM drives and the Philips VAD6011 DVD-ROM drives were still vulnerable to failure that rendered the consoles either unable to read newer discs or caused them to halt the console with an error code usually indicating a PIO/DMA identification failure, respectively. These units were not covered under the extended warranty.

In 2002 Microsoft and Nvidia entered arbitration over a dispute on the pricing of Nvidia's chips for the Xbox.[11] Nvidia's filing with the SEC indicated that Microsoft was seeking a US$13 million discount on shipments for NVIDIA's fiscal year 2002. Microsoft alleged violations of the agreement the two companies entered, sought reduced chipset pricing, and sought to ensure that Nvidia fulfill Microsoft's chipset orders without limits on quantity. The matter was privately settled on February 6, 2003.[12]

Launch-era Xbox gaming units were made in Hungary and the controllers made mostly in Indonesia.

Controllers & Accessories

Original Xbox controller (left) with Controller S

The Xbox controller features two analog sticks, a pressure sensitive directional pad, two analog triggers, a Back button, a Start button, two accessory slots and six 8-bit analog action buttons (A/Green, B/Red, X/Blue, Y/Yellow, and Black and White buttons).[13] The standard Xbox controller (also known by many nicknames, such as the "Duke", the "Fatty", and the "Alarm Clock") was originally the Xbox controller for all territories except Japan. The controller has been criticized for being bulky compared to other video game controllers (it was awarded "Blunder of the Year" by *Game Informer* in 2001[14] and a Guinness World Record for the biggest controller in Guinness World Records Gamer's Edition 2008, as well as being ranked the second worst video game controller ever by IGN editor Craig Harris.[15]). The "Controller S", a smaller, lighter Xbox controller, was originally the standard Xbox controller only in Japan (codenamed "Akebono"),[16] designed for users with smaller hands.[17] [18] The "Controller S" was released in other territories by popular demand and eventually replaced the standard controller in the Xbox's retail package, with the larger original controller available as an accessory. An 8 MB removable solid state memory card can be plugged into the controllers, onto which game saves can either be copied from the hard

drive when in the Xbox dashboard's memory manager or saved during a game. Most Xbox games can be copied to the memory unit and to another console but some Xbox saves are digitally signed, each console has a unique signing key, and some games (e.g., *Ninja Gaiden* and *Dead or Alive Xtreme Beach Volleyball*) will not load saved games signed by a different Xbox, limiting the utility of the memory card. Some game saves can be tagged as uncopyable or simply padded to over 8 MB (*Star Wars: Knights of the Old Republic*). The signing mechanism has been reverse-engineered by the Xbox hacking community, who have developed tools to modify savegames to work in a different console, though the signing key of the recipient Xbox (the "HDkey") and the ramped-up title key of the game (the "authkey") must be known. It is also possible to save an Xbox Live account on a memory unit, to simplify its use on more than one Xbox. The Xbox includes a standard AV cable which provides composite video and monaural or stereo audio to TVs equipped with RCA inputs. European Xbox's also included an RCA jack to SCART converter block as well as the standard AV cable.

Operating system

The Xbox runs a custom operating system which was once believed to be a modified version of the Windows 2000 kernel.[19] It exposes APIs similar to APIs found in Microsoft Windows, such as DirectX 8.1.

Sandy Duncan, former VP of Xbox in Europe, however states that "the [Xbox] Kernel was based on Windows NT...but that was about 150K of code....".[20] The system software may have been based on the Windows NT architecture that powered Windows 2000; it is not a modified version of either.

The user interface for the Xbox is called the Xbox Dashboard. It features a media player that can be used to play music CDs, rip CDs to the Xbox's built-in hard drive and play music that has been ripped to the hard drive; let users manage game saves, music and downloaded content from Xbox LIVE; and lets Xbox LIVE users sign in and manage their account. the dashboard is only available when the user is not watching a movie or playing a game. It uses many shades of green and black for the user interface, to be consistent with the physical Xbox color scheme. When the Xbox was released in 2001 the LIVE service was not online yet, so the dashboard's LIVE feature was unusable.

Xbox LIVE was released in 2002, but in order to access it users had to buy the Xbox LIVE starter kit containing a headset, a subscription, and supplemental. While the Xbox was still being supported by Microsoft, the Xbox Dashboard was updated via Xbox LIVE several times to reduce cheating and add features.

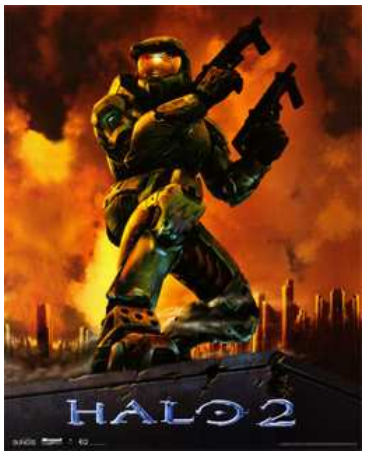
Xbox Live

Xbox Live logo since 2005

On November 15, 2002, Microsoft launched its Xbox Live online gaming service, allowing subscribers to play online Xbox games with other subscribers around the world and download new content directly to the system's hard drive. The online service works only with a broadband Internet connection. Approximately 250,000 subscribers signed up within two months of Xbox Live's launch.[21] In July 2004, Microsoft announced that Xbox Live had reached one million subscribers; in July 2005, membership reached two million, and by July 2007 there were more than 3 million subscribers. By May 2009, the number had ballooned to 20 million current subscribers.[22] On February 5, 2010, Marc Whitten posted on gamerscoreblog that Xbox Live support for the original Xbox games would be discontinued as of April 15, 2010.[4] Services were discontinued on schedule, but a group of 20 gamers continued to play for almost a month afterwards by simply leaving their consoles on connected to *Halo 2*.[23] APACHE N4SIR was the final user to play on the original Xbox's Live Service and was finally disconnected on at 01:58 EDT (UTC-4).[24] [25]

Games

The Xbox launched in North America on November 15, 2001. Its most successful launch game was *Halo: Combat Evolved* which was praised by critics.[26] Its sequel, *Halo 2*, is the best-selling Xbox game worldwide.[3] Although there were several more popular second-party launch titles, including *NFL Fever 2002*,[27] *Project Gotham Racing*,[28] and *Dead or Alive 3*,[29] the early public reputation of the Xbox was damaged by the failure of *Azurik: Rise of Perathia* and other games designed and marketed by Microsoft.[30]



Box cover of *Halo 2*, Xbox's best selling game

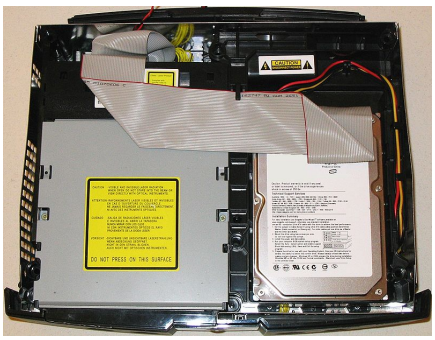
Although the console gained strong third party support from its inception, many early Xbox games did not fully use its powerful hardware, with few additional features or graphical improvements to distinguish them from the PS2 version, thus negating one of the Xbox's main selling points. Sony countered the Xbox for a short time by temporarily securing PlayStation 2 exclusives for highly anticipated games such as the *Grand Theft Auto* series and *Metal Gear Solid 2: Sons of Liberty*.

In 2002 and 2003, several releases helped the Xbox gain momentum and distinguish itself from the PS2. The Xbox Live online service was launched in late 2002 alongside pilot titles *MotoGP*, *MechAssault* and *Tom Clancy's Ghost Recon*. Several best-selling and critically praised titles for the Xbox were published, such as *Tom Clancy's Splinter Cell*, *Ninja Gaiden* and LucasArts' *Star Wars: Knights of the Old Republic*. Take-Two Interactive's exclusivity deal with Sony was amended to allow *Grand Theft Auto III* and its sequels to be published for the Xbox. Many other publishers got into the trend of releasing the Xbox version alongside the PS2 version, instead of delaying it for months.

In 2004 *Halo 2* became the highest-grossing release in entertainment history, making over $125 million in its first day[31] and becoming Xbox Live's first killer app. That year Microsoft made a deal to put Electronic Arts's popular titles on Xbox Live.

The last game released on the Xbox was *Madden NFL 09*, on August 12, 2008. It was also the only Xbox game released in 2008.

Technical specifications


Xbox drives

- CPU: 32-bit 733 MHz, custom Intel Pentium III Coppermine-based processor in a Micro-PGA2 package (though soldered to the mainboard using BGA). 180 nm process.[32]
  - SSE floating point SIMD. Four single-precision floating point numbers per clock cycle.
  - MMX integer SIMD
  - 133 MHz 64-bit GTL+ front-side bus to GPU
  - 32 KB L1 cache. 128 KB on-die L2 cache
- Shared memory subsystem
  - 64 MB DDR SDRAM at 200 MHz; in dual-channel 128-bit configuration giving 6400 MB/s
  - Supplied by Hynix or Samsung depending on manufacture date and location
- GPU and system chipset: 233 MHz "NV2A" ASIC. Co-developed by Microsoft and Nvidia.

    - Geometry engine: 115 million vertices/second, 125 million particles/second (peak)
    - 4 pixel pipelines with 2 texture units each
    - 932 megapixels/second (233 MHz x 4 pipelines), 1,864 megatexels/second (932 MP×2 texture units) (peak)
        - Peak triangle performance (32pixel divided from filrate): 29,125,000 32-pixel triangles/s raw or w. 2 textures and lit.
            - 485,416 triangles per frame at 60 frame/s
            - 970,833 triangles per frame at 30 frame/s
    - 8 textures per pass, texture compression, full scene anti-aliasing (NV Quincunx, supersampling, multisampling)
    - Bilinear, trilinear, and anisotropic texture filtering
    - Similar to the GeForce4 Ti4200 PC GPU in features and performance
- Storage media
    - 2×–5× (2.6 MB/s–6.6 MB/s) CAV DVD-ROM
    - 8 or 10 GB, 3.5 in, 5,400 RPM hard disk. Formatted to 8 GB. FATX file system.
    - Optional 8 MB memory card for saved game file transfer.
- Audio processor: NVIDIA "MCPX" (a.k.a. SoundStorm "NVAPU")
    - 64 3D sound channels (up to 256 stereo voices)
    - HRTF Sensaura 3D enhancement
    - MIDI DLS2 Support
    - Monaural, Stereo, Dolby Surround, Dolby Digital Live 5.1, and DTS Surround (DVD movies only) audio output options
- Integrated 10/100BASE-TX wired ethernet
- DVD movie playback (Add-on required)
- A/V outputs: composite video, S-Video, component video, SCART, Digital Optical TOSLINK, and stereo RCA analog audio
- Resolutions: 480i, 480p, 576i, 576p, 720p, 1080i
- Controller ports: 4 proprietary USB 1.1 ports
- Weight: 3.86 kg (8.5 lb)
- Dimensions: 320×100×260 mm (12.5×4×10.5 in)[33]

Marketing

Sales

Region	Units sold (as of May 10, 2006)	First available
North America	16 million	November 15, 2001
Europe	6 million	March 14, 2002
Asia	2 million	February 22, 2002
Worldwide	**24 million**	

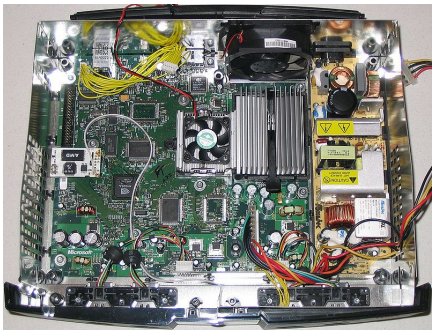
On November 15, 2001, Xbox launched in North America and quickly sold out. Its competitor, the Nintendo GameCube launched in September.

The Xbox has sold 24 million units worldwide as of May 10, 2006, according to Microsoft.[1] This is divided out to 16 million units sold in North America, six million units in Europe, and two million units sold in Asia.

UK advertising controversy

In 2002 the Independent Television Commission (ITC) banned a television advertisement for the Xbox in the United Kingdom after complaints that it was highly distasteful, violent, scary and upsetting. It depicted a mother giving birth to a small boy who was fired like a projectile through a hospital window and who aged rapidly as he flew through the air yelling. As he soared across a large area, he passed quickly through stages of his life as though time was passing him by. After aging into an old man, he crash-landed into his own grave. Dust and smoke poured from the grave. The advertisement ended with the slogan *Life is short. Play more.*[34]

Modding



Xbox motherboard, with installed modchip

The popularity of the Xbox, as well as (in the United States) its comparatively short 90-day warranty, inspired efforts to circumvent the built-in hardware and software security mechanisms, a practice informally known as modding. Within a few months of its release the Xbox BIOS was dumped and hacked by MIT student Andrew Huang so that it would skip digital signature checks and media flags, allowing unsigned code, Xbox game backups, etc., to be run. This was possible due to flaws in the Xbox's security.[35] Modding an Xbox in any manner will void its warranty, as it may require disassembly of the console. Having a modified Xbox may also disallow it from accessing Xbox Live if detected by Microsoft, as it contravenes the Xbox Live Terms of Use,[36] But most modchips can be disabled, allowing the Xbox to boot in a "stock" configuration. Softmods can be disabled by "coldbooting" a game (having the game in the DVD drive before turning the console on, so the softmod is not loaded) or by using a multiboot configuration.

There are four main methods of modding the Xbox:

- Modchip: installing a modchip inside the Xbox that bypasses the original BIOS, with a hacked BIOS to circumvent the security mechanisms.[37]
- TSOP flashing: reflashing the onboard BIOS chip with a hacked BIOS to circumvent the security mechanisms. The Xbox BIOS is contained on a commodity EEPROM (the 'TSOP'), which can be made writable by the Xbox by bridging points on the motherboard.[38] Flashing is usually carried out by using a specially crafted gamesave (see 'Game save exploit', below) to flash the onboard TSOP, but the TSOP can also be de-soldered and re-written in a standard EEPROM programmer. This method only works on 1.0 to 1.5 Xboxes, as later versions replace the commodity TSOP with an LPC ROM contained within a proprietary chip.[39]
- Softmods: installing additional software files to the Xbox hard drive, which exploit programming errors in the Dashboard to gain control of the system, and overwrite the in-memory copy of the BIOS.[40] Soft modification is known to be safe for Xbox Live if the user enables multibooting with the Microsoft dashboard and an original game disc is used. (*See also*: Xbox softmods)
  - Game save exploit: using select official game releases to load game saves that exploit buffer overflows in the save game handling.[41] When these special game saves are loaded, they access an interface with scripts for installing the necessary softmod files. Disassembly of the Xbox is not required when installing most game save exploits.
- Hot swapping: using a computer to change the data on the hard drive. This requires having the Xbox unlock the hard drive when it is turned on, then swapping the powered hard drive into a running computer. By using a Linux-based Live CD, data on the hard drive can be read, altered, and deleted. In most cases, an automated script will automatically install the softmod files directly to the Xbox hard drive. This technique has been used extensively to harbor cheating on many online games. Disassembly of the console is required to perform a hot

swap.

Features

Although technologically many aspects of the Xbox are out of date there is still a large following who continually build upon the capabilities of the original. No matter the method of an Xbox the features and results are relatively the same. Here is a list of features.

- Dashboards – A hacked dashboard can also resort back to the original "MS" dashboard. A hacked dashboard is able to backup information, install and uninstall programs.

Alternative operating systems

Beyond gaming, a modded Xbox can be used as a media center with XBMC.[42]

There are also distributions of Linux developed specifically for the Xbox, including those based on Gentoo,[43] Debian (see also Xebian), Damn Small Linux and Dyne:bolic.

List of alternative operating systems:

- Xbox Linux is a project that ported Linux to the Xbox.
- FreeBSD and NetBSD[44] have also been ported to Xbox.
- Windows CE[45]

One advantage over a regular, unmodded Xbox, is the ability to use a trainer.

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External links

- Official Xbox website (http://www.xbox.com/)
- Xbox (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Microsoft/Xbox/) at the Open Directory Project

The Seventh Generation

History of video game consoles (seventh generation)

In the history of video games, the **seventh generation** of consoles is the current one, made up of those consoles released since late 2005 by Nintendo, Microsoft, and Sony.[1] For home consoles, the seventh generation began[2] on November 22, 2005 with the release of Microsoft's Xbox 360 and continued with the release of Sony's PlayStation 3 on November 11, 2006, and Nintendo's Wii on November 19, 2006. Each new console introduced a new type of breakthrough in technology. The Xbox 360 offered HD upscaling to 1080p, the PlayStation 3 offered full 1080p high-definition graphics and Blu-ray Disc technology, and the Wii focused on integrating controllers with movement sensors as well as joysticks.[3] Recently, joining Nintendo in the motion market, Sony has released the PlayStation Move. The PlayStation move features motion sensing gaming, similar to that of the Nintendo's Wii, but with much more precision and accuracy. Microsoft has also joined Sony and Nintendo, with its new Kinect. Unlike the other two systems (PlayStation 3 and Wii), Kinect does not use any controllers of any sort and makes users the "controller." While the Xbox 360 offers wired controllers as a standalone product, all PlayStation 3 controllers can be used in wired and wireless configurations. There are also other home consoles in the seventh generation, such as EVO Smart Console and Hyperscan.

Starting with handheld consoles, the seventh generation began on November 21, 2004 with the North American introduction of the Nintendo DS as a "third pillar", alongside Nintendo's existing Game Boy Advance and GameCube consoles.[4] The Nintendo DS features a touch screen and built-in microphone, and supports wireless IEEE 802.11 (Wi-Fi) standards.[5] More recently, the new DSi features many new things including two built in cameras, the ability to download games from the DSi store, and a web browser. The PlayStation Portable, or PSP, released later the same year on December 12, 2004, followed a different pattern. It became the first handheld video game console to use an optical disc format, Universal Media Disc (UMD), as its primary storage media.[6] [7] Sony also gave the PSP robust multi-media capability,[8] connectivity with the PlayStation 3 and other PSPs, and Internet connectivity.[9] [10] The Nintendo DS likewise has connectivity to the internet through the Nintendo Wi-Fi Connection and Nintendo DS Browser, as well as wireless connectivity to other DS systems and Wii consoles. Despite high sales numbers for both consoles, PlayStation Portable sales have consistently lagged behind those of the Nintendo DS; nonetheless, the PlayStation Portable has the distinction of being the best-selling non-Nintendo handheld gaming system.[11]

Home consoles

Wii

Nintendo entered this generation with a new approach embodied by its Wii. The company planned to attract current hardcore and casual gamers,[12] non-gamers,[13] and lapsed gamers by focusing on new gameplay experiences and new forms of interaction with games rather than cutting edge graphics and expensive technology.[14] This approach was previously implemented in the portable market with the Nintendo DS.[15] Nintendo expressed hope that the new control schemes it has implemented will render current conventionally controlled consoles obsolete, leading to Nintendo capturing a large portion of the existing market as well.[16]

This strategy paid off, with demand for the Wii outstripping supply throughout 2007.[17] Since Nintendo profited on each console right from the start unlike its competitors,[18] it has already achieved very positive returns.[19] With

only a few exceptions, monthly worldwide sales for the Wii have been higher than the Xbox 360 and PlayStation 3,[20] [21] [22] eroding Microsoft's early lead and widening the gap between its market share and Sony's.[15] On September 12, 2007, it was reported by the British newspaper *Financial Times* that the Wii's sales had surpassed the Xbox 360, which was released one year previously, and became the market leader in worldwide home console sales for the current generation.[23]

As in previous generations, Nintendo has provided strong support for its new console with popular first-party franchises like *Mario*, *The Legend of Zelda*, *Metroid*, and *Pokémon*, among others. To appeal to casual and non-gamers, Nintendo developed a group of core Wii games, consisting of *Wii Sports*, *Wii Play*, *Wii Fit*,[24] and *Wii Music*,[25] where players make use of the motion-sensing abilities of the console and its peripherals to simulate real world activities.[26] With the exception of *Wii Music*, the games and their sequels have all been highly successful.

Publishers such as Ubisoft, EA, Capcom, and Majesco continue to release exclusive titles for the console, but the Wii's strongest titles still remain within its first-party line-up. Analysts speculated that this will change in time as the Wii's growing popularity persuades third-party publishers to focus on it;[21] [27] however, some third party developers are beginning to express frustration at low software sales. Goichi Suda, developer of *No More Heroes* for the Wii, noted that "only Nintendo titles are doing well. This isn't just because of the current situation in Japan, as this is happening outside Japan. I am very surprised about the reality about Wii, because before I was making this game, I wasn't expecting that Wii would be a console targeted only for non-gamers. I expected more games for hardcore gamers. The reality is different to what I expected."[28] Conversely, the PAL publisher of *No More Heroes* Rising Star Games were greatly impressed with the game's sales.[29] Goichi Suda later retracted his comment, saying his "point was that *No More Heroes*, unlike a lot of Nintendo Wii titles currently available is the kind of product that will attract a different kind of consumer to the hardware, *i.e.* gamers who are looking for a different genre to the products that have been successful on this platform thus far."[30]

In early 2008, the NPD Group revealed sales data showing that, while the Wii's life-to-date attach rate is low, in December 2007, it reached 8.11—higher than the attach rates for the Xbox 360 and PlayStation 3 in that month.[31] The Wii's low overall attach rate could be explained by reference to its rapidly increasing installed base, as financial analysts have pointed to the Xbox 360's high attach rates as indicative of an unhealthy lack of installed base growth, and warned that what actually benefits third-party developers is “quicker adoption of hardware and a rapidly growing installed base on which to sell progressively more game units,” which tends to lower the attach rate of a product.[32]

On September 23, 2009, Nintendo announced its first price drops for the console. In the United States, the price was reduced by fifty dollars resulting in a new Manufacturer's Suggested Retail Price (MSRP) of $199.99, effective September 27, 2009.[33] For Japan, the price dropped from ¥25,000 to ¥20,000, effective October 1, 2009.[34] In Europe (with the exception of the United Kingdom), the price of a Wii console dropped from €249 to €199.[35] On May 3, 2010, Nintendo announced that Wii consoles sold in the Americas will now include Wii Sports Resort and Wii MotionPlus, effective May 9, 2010.[36]

Xbox 360

Microsoft's Xbox 360 gained an early lead in terms of market share, largely due to its established Xbox Live online gaming system, and its early launch date, which was one year before its rivals. Sales in North America and Europe have continued to be strong, even after the release of the Wii and PlayStation 3. Like its predecessor, the Xbox 360 received a muted reception in Japan,[37] attributed to the lack of content aimed at Japanese gamers.[38]

This early launch did come with some trouble, as technical problems appeared in a portion of Xbox 360 units sold. The most well known problem is the "red ring of death", which received (and still receives) a great deal of attention due to some users' having to replace their consoles multiple times. Microsoft attempted to address this by offering a three year warranty on all affected consoles and repairing them free of charge.[39] It also retroactively reimbursed owners of affected systems who paid for repairs.[39] According to *The Mercury News*, new models of the console featuring 65-nanometer technology will address this and other issues; the new technology is expected to reduce heat

production, which will lower the risk of overheating and system failures; although, this has never been officially confirmed by Microsoft.[40]

As they share many cross-platform games and compete for the same audience as their predecessors, frequent comparisons are made between the Xbox 360 and PlayStation 3.[41] The PS3 uses the Blu-ray format, while the Xbox 360 uses a standard DVD9. The Xbox 360 is less expensive to produce, and analysts expect that a mid-revision will allow Microsoft to break-even on manufacturing costs,[42] [43] while industry consensus is that the Xbox 360's conventional architecture is easier to develop for.[44] [45]

At the end of first half of 2007, the console stabilized at 11.6 million units shipped as sales dropped 60% while its rival, Wii, gained momentum and Sony announced a competitive price drop on the PlayStation 3.[46] [47] Microsoft's strategy to boost sales with the release of the highly anticipated *Halo 3* in September 2007 paid off, outselling the Wii that month in North America.[20] Microsoft's Entertainment and Devices Division experienced a huge increase in revenue, largely driven by the release of *Halo 3*, and posted a quarterly profit for the first time in two years.[48]

The Xbox 360's advantage over its competitors owes itself to the release of high profile games, such as additions to the Halo franchise. The 2007 Game Critics Awards honored the platform with 38 nominations and 12 wins – more than any other platform.[49] [50] By March 2008, the Xbox 360 had reached a software attach rate of 7.5 games per console in the US – a record for any console in history; the rate was 7.0 in Europe, while its competitors were 3.8 (PS3) and 3.5 (Wii), according to Microsoft.[51] At the 2008 Game Developers Conference, Microsoft announced that it expected over 1,000 games available for Xbox 360 by the end of the year.[52] The Xbox 360 has managed to gain a simultaneous release of titles that were initially planned to be PS3 exclusives, including *Devil May Cry*,[53] *Ace Combat*,[54] *Virtua Fighter*,[55] *Grand Theft Auto IV*,[56] *Final Fantasy XIII*,[57] *Tekken 6*,[58] *Metal Gear Solid : Rising*,[59] and *L.A. Noire*.[60]

In August 2007, the first price drop was announced for all Stock Keeping Units (SKU's) of the Xbox 360.[61] The Core system's price was reduced in the United States by $20, the Premium by $50, and the Elite model by $30.[61] Also, the HDMI out port, previously exclusive to the Elite system, was added to new models of the Premium and Arcade systems, the Core system has been discontinued.[62] Note: the "premium" system is sold in Australia as the "pro", Arcade and Elite systems retain the same names.

At E3 2010, Microsoft released a new $299.99 Xbox 360 SKU, sans model name though referred to as the "Slim" by various media outlets. It replaced the Elite at the same price and comes with an 802.11n-compliant WLAN adapter, a 250 GB HDD, and will not require an additional power supply to make use of Microsoft's upcoming Kinect motion control accessory and comes with a wired headset. A $199.99 version was released on August 3, 2010 in the US. It replaced the Arcade at the same price and had 4GB of internal memory, has no included headset and is otherwise the same.

PlayStation 3

Sony's PlayStation 3 was released on November 11, 2006 in Japan and November 17, 2006 in USA and Canada. The system's reliance on new technology such as the Cell microprocessor and Blu-ray format has caused difficulties in manufacturing, especially the Blu-ray diode, leading to shortages at launch and the delay of the PAL region launches; however, by early December 2006, Sony announced that all production issues had been resolved.[63]

Market analysts[64] and Sony executives have stated that the success of the PlayStation 3 and the Blu-ray format are dependent on one another; Rich Marty, VP of New Business Development at Sony Pictures Home Entertainment stated that the "PS3 is critical to the success of Blu-ray,"[65] while Phil Harrison stated that the PlayStation 3's success will be ensured because "the growth of the Blu-ray Disc movie market ... is a positive factor which will play more into the consumer psyche ... as more consumer electronics firms launch standalone disc players, as more Blu-ray Disc movies become available, and as more shelf space is dedicated to the category at retail."[66]

Sony will provide support for its console with new titles from acclaimed first-party franchises such as *Gran Turismo* and *God of War*, and secured a number of highly anticipated third-party exclusive titles, including *Metal Gear Solid*

4, *Final Fantasy Versus XIII*, *Tekken 5: Dark Resurrection Online*, and *Agent*. Titles that were originally exclusive or recognized with the platform, such as *Devil May Cry*,[53] *Ace Combat*,[54] *Virtua Fighter*,[55] and *Monster Hunter*,[67] have been released on other platforms. The previous *Grand Theft Auto* titles were originally timed exclusives on the PlayStation 2, before making their release on other platforms, such as the Xbox, months later; however, *Grand Theft Auto IV*, the latest instalment, arrived day one on the Xbox 360 with the release of the PlayStation 3 version.[56] Announced exclusives titles for the PlayStation 3 such as *Assassin's Creed*;[68] *Bladestorm: The Hundred Years' War*, and *Fatal Inertia* were released on Xbox 360 as well, with the latter making its release on Xbox 360 before the PlayStation 3 version.[69] The *Katamari* series, which has long been PlayStation 2 exclusives, found one of the more recent installments, *Beautiful Katamari*, exclusive to Xbox 360.[70] These releases, which had fueled rumors and fear to the fans that *Final Fantasy XIII* and *Tekken 6*, two highly anticipated exclusive PlayStation 3 games at one point in time, would also be available for Xbox 360, the PlayStation 3's primary competitor[71] [72] [73] [74] [75] and at E3 2008, it was announced that *Final Fantasy XIII* would be simultaneously released on the Xbox 360 in Europe and North America;[57] later on October 8, 2008, it was announced that *Tekken 6* would also be releasing on the Xbox 360;[58] [76] the fifth installment of the *Metal Gear* series, *Metal Gear Solid: Rising*, has also been announced for the Xbox 360; *L.A. Noire*, which was announced as an exclusive since the beginning of its development, has also been announced for the Xbox 360; however, *Metal Gear Solid 4*, *Final Fantasy Versus XIII*, *Tekken 5: Dark Resurrection Online*, and *Agent* still remain PlayStation 3 exclusives.[77] [78] [79] [80] [81] Sony has blamed lower-than-expected sales, loss of exclusive titles in the PlayStation 3 software library, its higher price, and stock shortages.[82] [83] [84]

In July 2007, Sony announced a drop in the price of the console by $100.[85] This measure only applied to the 60 GB models and was exclusive to the United States and Canada, where those models are no longer in production.[86]

On October 18, 2007, Sony announced a US$100 price drop for the 80 GB model and a new US$399 40 GB model to launch on November 2, 2007[87] with reduced features such as the removal of backward compatibility with PS2 games. Within weeks, Sony announced that sales of the 40 GB and 80 GB models by major retailers had increased 192%.[88]

In November 2008, Sony launched a $499 160 GB model,[89] and on 18 August 2009, Sony announced the PS3 Slim. The PS3 slim sold 1 million in under a month. It was then announced that a 250GB slim model was to be released. It was released on September 1 (or 3 depending on country) and costs $299, £249 and €299.[90] In Australia the console will cost A$499, which is A$200 less than the standard PS3.[91]

In September 2009, a $299 120 GB Slim Model was released. A $349 250 GB Model was later released later in 2009. The Slim model is currently the only model in production.

In August 2010, the 160 GB Slim Model was released for $299. The same price for a 120 GB PS3 slim Model. In Japan, the 160GB slim model is also available in white.[92]

On September 17, 2010, Sony released the 320 GB Slim Model, but it only sold with the PlayStation Move for US$399.99.

Comparison

Name	Xbox 360	PlayStation 3	Wii
Console			
Release dates	• NA November 22, 2005 • EU December 2, 2005 • JP December 10, 2005 • AUS March 23, 2006 More...	• JP November 11, 2006 • NA November 17, 2006 • PAL March 23, 2007 More...	• NA November 19, 2006 • JP December 2, 2006 • AUS December 7, 2006 • EU December 8, 2006 More...
United States launch prices	US$299.99 (Core) (discontinued) US$399.99 (Premium - 20 GB) (discontinued) US$249.99 (Premium - 60 GB) (discontinued) US$479.99 (Elite) (120 GB) (discontinued) US$299.99 (Arcade - 256 MB internal memory) (discontinued) US$199.99 (Arcade - 512 MB internal memory) (discontinued) US$299.99 ("Super Elite") (250 GB) (discontinued) US$299.99 (Xbox 360 S - 250 GB) US$199.99 (Xbox 360 S - 4 GB internal memory)	US$499.99 (20 GB)[93] (discontinued) US$599.99 (60 GB)[93] (discontinued) US$499.99 (80 GB - old)[94] [95] (discontinued) US$399.99 (40 GB)[96] (discontinued) US$399.99 (80 GB - new) (discontinued) US$499.99 (160 GB) (discontinued) US$299.99 (120 GB "Slim") (discontinued) US$299 (160 GB "Slim") [97] US$349.99 (250 GB "Slim")[98] US$399.99 (320 GB "Slim". Only with PlayStation Move)	US$249.99 (white console with *Wii Sports* included) (discontinued) US$199.99 (white console or black console with *Wii Sports*, *Wii Sports Resort* and Wii MotionPlus included)[36]
Japan launch prices	¥27,800 (Arcade 256 MB internal memory) (discontinued) ¥27,800 (Arcade 512 MB internal memory) (discontinued) ¥29,000 (Core) (discontinued) ¥39,795 (Premium) (20 GB) (discontinued) ¥29,800 (Premium) (60 GB) (discontinued) ¥47,800 (Elite) (discontinued) ¥??,??? (Xbox 360 S - 250 GB)	¥49,980 (20 GB) (discontinued)[93] ¥59,980 (60 GB) (discontinued) ¥39,980 (40 GB) (discontinued)[99] ¥49,980 (80 GB) (discontinued) ¥39,980 (80 GB - new) (discontinued)[93]	¥25,000 (white console) ¥25,000 (black console)[100] ¥33,000 (black console with *Monster Hunter Tri* and Classic Controller Pro included)[101]

Europe launch prices	€179/ £199.99 (Arcade 256 MB internal memory) (discontinued) €179 / £199.99 (Arcade 512 MB internal memory) (discontinued) €299.99 / £209.99 (Core) (discontinued) €399.99 / £279.99 (Premium) (discontinued) £299.99 (Elite) (discontinued) €249.99 / £199.99 (Xbox 360 S - 250 GB)[102] €???.?? / £149.99 (Xbox 360 S - 4 GB)[103]	€399.99 / £299.99 (40 GB) (discontinued) €599.99 / £424.99 (60 GB) (discontinued) €399.99 / £299.99 (80 GB - new) (discontinued) €299.99 / £249.99 (120 GB "Slim") (discontinued)	€249.99 / £179.99 (white console with *Wii Sports* included) €199.99 / £179.99 (black console with *Wii Sports Resort* and Wii MotionPlus included)[104]
Media	DVD-DL	Blu-ray Disc	Wii Optical Disc
Best-selling game	*Halo 3*, 8.1 million (as of March, 2008)[105]	*Unknown*	*Wii Sports* (pack-in, except in Japan), 60.69 million (as of December 31, 2009)[106] Best selling non-bundled game: *Wii Play* (26.71 million)[107]
CPU	3.2 GHz IBM PowerPC tri-core codenamed "Xenon"	Cell Broadband Engine (3.2 GHz POWER-based PPE with seven 3.2 GHz SPEs)	729 MHz PowerPC based IBM "Broadway"[108]
GPU	500 MHz codenamed "Xenos" (ATI custom design)	550 MHz RSX 'Reality Synthesizer'[109] (based on NVIDIA G70 architecture)[110]	243 MHz ATI "Hollywood"
Memory	512 MB GDDR3 @ 700 MHz shared between CPU & GPU 10 MB EDRAM GPU frame buffer memory	256 MB XDR @ 3.2 GHz 256 MB GDDR3 @ 700 MHz	24 MB "internal" 1T-SRAM integrated into graphics package 64 MB "external" GDDR3 SDRAM 3 MB GPU frame buffer memory
Dimensions	8.3 cm × 30.9 cm × 25.8 cm (6,616.9 cm³) / 3.3 in × 12.2 in × 10.2 in (403.8 in³)	"Slim"- 6.5 cm × 29 cm × 29 cm (5,466.5 cm³) / 2.6 in × 11.4 in × 11.4 in (337.9 in³)[111] Original- 9.8 cm × 32.5 cm × 27.4 cm (8,726.9 cm³) / 3.9 in × 12.8 in × 10.8 in (532.5 in³)[112]	4.4 cm × 16 cm × 21.5 cm (1,513.6 cm³) / 1.7 in × 6.3 in × 8.5 in (92.4 in³)
Weight	3.5 kg (7.7 lb)[113]	"Slim"- 3.2 kg (7.1 lb)[111] Original- 5 kg (11 lb)[112] [114]	1.2 kg (2.6 lb)[115]
Included accessories (game packages not listed)			
Accessories (retail)			

Controller	• Xbox 360 controller (up to four controllers; any combination of a maximum of 3 wired [4 with the use of a USB hub] or 4 wireless) • Xbox 360 Wireless Racing Wheel • Scene It Trivia Controller (known as the Big Button Controller) • Xbox Live Vision Camera • Xbox 360 Universal Media Remote • Kinect Motion sensor	• Sixaxis/DualShock 3 controller (up to 7 via Bluetooth) • Dualshock/Dualshock 2 via adapter8* • PSP via Wi-Fi* or USB • PlayStation Eye camera • Buzz!: Quiz TV wireless buzzers • Playstation Move Motion Controller • PS3 Bluetooth Blu-ray remote	• Wii Remote (up to 4 via Bluetooth) • Wii MotionPlus attachment • Nunchuk attachment • Classic Controller • GameCube Controller with selected Wii games, all GameCube and Virtual Console games (up to 4) • GBA via Link Cables • Nintendo DS (via Wi-fi) • Wii Balance Board • Wii Zapper
User interface	Xbox 360 Dashboard New Xbox Experience (NXE)	XrossMediaBar (XMB)	Wii Menu
System software features			
Backward compatibility	465 Selected Xbox games (as of November 2007). Additions made with software updates. Hard drive required. Some Xbox titles are also available for download from Xbox Originals service.	North American and Japanese 20 GB and 60 GB models have full backwards compatibility for PS1 and PS2 titles.[116] The PAL region 60 GB model and North American and Japanese 80 GB versions offer partial backwards compatibility through part hardware, part software emulation[117] with additions made with software updates. The 40 GB, 80 GB (new), and 160 GB models in all regions have support for PS1 titles, but not PS2 titles.[118] Some PS1 titles are available for download from the PlayStation Store.	Supports all Nintendo GameCube software and most accessories. Many games from systems prior to Nintendo GameCube, including NES, SNES, N64, Sega Master System, Mega Drive/Genesis, GameGear, Neo-Geo, TurboGrafx-16, Commodore 64, and arcade games are available for download through Virtual Console.

Online services	Xbox Live Xbox Live Arcade Xbox Live Marketplace Xbox Live Vision (webcam), headset Xbox Live Video Marketplace Windows Live Messenger Netflix (North America Only, separate subscription required) ESPN (North America Only, Available with Xbox Live Gold Subscription) Sky Player (UK Only, separate subscription required) Facebook (Only Available with Xbox Live Gold Subscription) Twitter last.FM Zune AT&T U-Verse (North America Only, separate subscription required) Vodafone Casa TV (Portugal Only, separate subscription required)	Remote Play PlayStation Network PlayStation Store Internet browser Video chat using PlayStation Eye camera or other USB webcam What's New PlayStation Home Qore (North America only) FirstPlay (Europe only).[119]) VidZone (Europe, Australia & New Zealand only) Mubi (Europe only, separate subscription required)[120] BBC iPlayer (UK only, via internet browser)[121] TVNZ ondemand (New Zealand only, via internet browser)[122] Life with PlayStation LoveFilm (Europe only, separate subscription required)[123] Netflix (North America only, separate subscription required)[124] Facebook MLB.tv (North America only, separate subscription required) [125] ABC iView (Australia only)	Nintendo Wi-Fi Connection WiiConnect24 BBC iPlayer (UK only) Internet Channel News Channel Forecast Channel Everybody Votes Channel Wii Shop Channel Check Mii Out Channel Nintendo Channel Netflix (North America only, separate subscription required)[124] Wii no Ma (Japan only) Wii Speak Channel (Available only with purchase of Wii Speak) Food Delivery channel(Japan only),Tv guide channel(Japan only),Today and tomorrow channel
Consumer programmability	Development on PC with XNA Game Studio ($99/year subscription, binary distribution with XNA 1.0 Refresh)[126]	Featured development on console (excluding RSX graphics acceleration) via free Linux platform or PC (excluding all Slim models and any console updated to firmware 3.21 and later)	WiiWare Homebrew Channel (Non-official software)
I/O	IrDA-compliant infrared for remote* 2 Memory Card slots* 3 USB 2.0 ports** 1 Ethernet port *Discontinued on Slim models **5 USB 2.0 ports on Slim models	Bluetooth 2.0 EDR 4 USB 2.0 ports* 1 Gigabit Ethernet port 1 Memory Stick slot Pro/Duo** 1 SD/mini SD port** 1 Compact Flash port** *2 USB 2.0 ports on 3rd gen and 4th gen (slim) models **Only 60/80(old) GB versions only	Bluetooth 2.0 2 USB 2.0 ports Four controller and two memory card ports (GameCube) 1 SD(HC) Card slot[127] [128]
Optical media	12x DVD (65.6–132 Mbit/s), CD	2x BD-ROM (72 Mbit/s), 8x DVD, 24x CD, 2x SACD* *Compatibility removed in 3rd & 4th gen models	Wii Optical Disc, Nintendo GameCube Game Disc (DVD-Video playback was announced for Japan in 2007, but has not been released)[129]
Video outputs	RGB, VGA,[130] Component, S-Video, Composite, SCART, HDMI 1.2a[131] (on models manufactured after August, 2007)	RGB, Component, S-Video, Composite, SCART, HDMI 1.3a	RGB, Component, S-Video, Composite, SCART, D-Terminal

Resolutions	HDTV-capable (480i, 480p, 576i (50 Hz), 576p, 720p, 1080i, 1080p) Various monitor resolutions available via VGA and HDMI/DVI (640×480, 848×480, 1024×768, 1280×720, 1280×768, 1280×1024, 1360×768, 1440×900, 1680×1050 & 1920×1080)	HDTV-capable (480i, 480p, 576i, 576p, 720p, 1080i, 1080p)	EDTV-capable (480i, 480p, 576i)
Audio	Dolby Digital, WMA Pro, DTS*, DTS-ES* *(DVD and HD DVD movies only)	Dolby Digital, DTS, Dolby Digital Plus*Dolby TrueHD*, DTS-HD Master Audio*, DTS-HD High Resolution Audio*,[132] DTS-ES‡, DTS 96/24‡, DTS-ES Matrix†[133] *DVD and Blu-ray movies only. ‡DVD movies only. †Blu-Ray movies only.	Dolby Pro Logic II surround, stereo sound and an additional Mono speaker is built into the controller.
Network	100BASE-TX Ethernet Optional 802.11a/b/g/n Wi-Fi adapter (Built in with the Slim models)	10BASE-T/100BASE-TX/1000BASE-T Ethernet Built-in 802.11 b/g Wi-fi (all models except 20 GB)	Built-in 802.11 b/g Wi-fi Optional Ethernet via USB adapter
Storage	Included/Optional* detachable SATA upgradeable 20 GB, 60 GB, 120 GB or 250 GB hard drive. Xbox 360 memory cards USB mass storage (AV content) *Premium version includes 20 GB or 60 GB HDD, Elite includes 120 GB HDD, and all HDDs are available for separate purchase.	2.5-inch upgradeable SATA 20/40/60/80/120/160/250/320 GB (depending on model) hard drive (upgradeable with any 2.5-inch SATA 1.0 compliant HDD or Solid State Drive). Memory Stick, SD, & Type I/II CompactFlash / Microdrive* USB mass storage *60/80(old)GB models only	512 MB built-in flash memory SD card (up to 32GB with 4.0 software) Nintendo GameCube Memory Cards The Wii Remote contains a 16 KiB EEPROM chip from which a section of 6 kilobytes can be freely read and written

Sales standings

Worldwide figures are based on data from the manufacturers. The Canada and the United States figures are based on data from the NPD Group, the Japan figures are based on data from *Famitsu*/Enterbrain, and the United Kingdom figures are based on data from GfK Chart-Track.

Console	Units shipped to retailers (worldwide)	Units sold to customers in Australia	Units sold to customers in Canada	Units sold to customers in Japan	Units sold to customers in the US	Units sold to customers in Europe
Wii	75.90 million[134] (as of September 30, 2010)	2+ million[135] (as of October, 2010)	2+ million[136] (as of December 16, 2009)	10.79 million[134] (as of September 30, 2010)	30 million[137] (as of August 2010)	22+ million[138] (as of June 10, 2010)
Xbox 360	44.6 million[139] (as of September 30, 2010)	1+ million[140] (as of April 20, 2010 and include sales from New Zealand)	870,000[141] (as of July 31, 2008)	1,235,049[142] (as of February 28, 2010)	18.6 million[143] (as of December 31, 2009)	10 million[144] (as of November 12, 2009 and include sales from the Middle East and Africa)
PlayStation 3	41.6 million[145] (as of September 30, 2010)	850,000[146] (as of May 18, 2010)	1.5 million[147] (as of October 6, 2010)	5+ million[148] (as of April 11, 2010)	11.1 million[143] (as of December 31, 2009)	10 million[149] (as of August 2009)

Discontinuations and revisions

- The PlayStation 3 20 GB was discontinued in North America in April, 2007[150] and effectively discontinued in Japan in early 2008.[151]
- The PlayStation 3 60 GB was discontinued in NTSC territories by September 2007, and replaced with the 80 GB version.[152]
- The PlayStation 3 60 GB was effectively discontinued for PAL territories in late 2007. When the remaining stock in stores was sold, the 40 GB version served as its replacement.
- Sony announced before the PS3 launch in Europe that the PlayStation 2's Emotion Engine CPU would be removed from it for cost savings, and all backwards compatibility would be software-based.[153] This is also the same for the 80 GB model launched in the North American market in 2007.[154]
- An HDMI out port was added to the Premium Xbox 360 in May 2007.[155]
- The Xbox 360 Core system was discontinued and replaced by the "Arcade" version in October, 2007.[156]
- The price of the Xbox 360 Premium version was dropped to $299 in North America on July 13, 2008. Supplies of the existing 20 GB model were exhausted by early August and it was replaced by an identical model with a 60 GB HDD at a MSRP of $349.[157]
- The PlayStation 3 40 GB was discontinued in all territories in early August 2008 and the new 80 GB version served as its replacement.
- The Xbox 360 Arcade 256MB internal memory SKU was discontinued in all territories in early 2009 and a new 512MB internal memory SKU still named the Xbox 360 Arcade was released.[158]
- The PlayStation 3 Slim was introduced on August 18, 2009 and at $299 USD is $100 less than the previous model and is ~1/3 lighter and more energy efficient.[159] The two current PS3 Slim models, priced at $299.99 and $349.99 respectively hold 120/250 GB. More recently however, priced at $299.99 and $399.99 respectively hold 160GB/320GB.
- The black Wii console was released in Japan on August 1, 2009[100] and in Europe in November 2009.[104]
- The Wii package for North America will be updated to include a copy of Wii Sports Resort as well as the required Wii MotionPlus accessory to play it, beginning May 9, 2010. The console will also be available in black.[36]
- The Xbox 360 S (standing for *Slim*) was announced at E3 2010 by Microsoft. It is a smaller revision of the Xbox 360 hardware, now with a built-in 250 GB hard drive (although the Super Elite also had 250GB) and a 802.11n Wi-Fi hardware[160]

Backward compatibility

The Wii is fully backwards compatible with titles from the Gamecube of the same region as the Wii. It also offers support for some of its predecessor's accessories. Later versions of the PlayStation 3 and all models of the Xbox 360 only offer partial support and use software emulation for backwards compatibility. Current versions of the PS3 do not offer PlayStation 2 compatibility, though PS1 compatibility is retained. The first generation of the PS3 offered full backwards compatibility for PS2 games. The Xbox 360's compatibility is increased through game-specific patches automatically downloaded from Xbox Live or downloaded and burned to a CD or DVD from the Xbox website[161] and the PS3's compatibility is expanded with firmware updates. All three consoles provide titles from older consoles for download; the Xbox 360 through the Xbox Originals service, the PlayStation 3 through the PlayStation Store, and the Wii through the Virtual Console. When purchased, the game is saved to console's internal memory or, optionally on the Wii, to an inserted SD/SDHC card.

High definition and enhanced definition video

Both the PlayStation 3[162] and the Xbox 360[163] support 1080p high definition video output. However, the output signal may be protected by digital rights management and may require an HDCP-compliant display if HDMI is used. The Xbox Live Marketplace service and the PlayStation Store offer HD movies, TV shows, movie trailers, and clips for download to the console's HDD.[164] [165] Other regional PlayStation Stores only allow download of movie trailers and short segment clips. As of November 2009, the Video Download service present on the American PlayStation Store will be available for select European countries.

While only a small number of games render video in native 1080p, all games can be automatically scaled to output this resolution.

The Wii is capable of outputting 480p for the Wii Menu and most games through a component cable, which must be purchased separately.

Reliability

In the September 2009 issue of Game Informer magazine, survey results were published in which among nearly 5000 readers who responded, 54.2% of those who owned an Xbox 360 had experienced a console failure for that system, compared with 10.6% for PlayStation 3, and 6.8% for Wii.[166]

In August 2009, warranty provider SquareTrade published console failure rate estimates, in which the proportion of its customers reporting a system failure in the first two years is 23.7% for Xbox 360, 10.0% for PlayStation 3, and 2.7% for Wii.[167]

Handheld systems

For video game handhelds, the seventh generation began with the release of the Nintendo DS on November 21, 2004. This handheld was based on a design fundamentally different from the Game Boy and other handheld video game systems. The Nintendo DS offered new modes of input over previous generations such as a touch screen, the ability to connect wirelessly using IEE 802.11b, as well as a microphone to speak to in-game NPCs.[168] On December 12, 2004, Sony released its first handheld, PlayStation Portable. The PlayStation Portable was marketed at launch to an above 25 year old[169] or "core gamer" market,[170] while the Nintendo DS proved to be popular with both core gamers and new customers.[171]

Nokia plans to revive its N-Gage platform in the form of a service for selected S60 devices. This new service launched on April 3, 2008.[172]

Other less-popular handheld systems released during this generation include the Gizmondo (launched on 19 March 2005 and discontinued in February 2006) and the GP2X (launched on 10 November 2005 and discontinued in August 2008). The GP2X Wiz, Pandora, and Gizmondo 2 were scheduled for release in 2009.

Another aspect of the seventh generation was the beginning of direct competition between dedicated handheld gaming devices, and increasingly powerful pda/cellphone devices such as the iPhone and iPod Touch, and the latter being aggressively marketed for gaming purposes. Simple games such as Tetris and Solitaire had existed for PDA devices since their introduction, but by 2009 PDAs and phones had grown sufficiently powerful to where complex graphical games could be implemented, with the advantage of distribution over wireless broadband.

In 2010, at the E3 conference, Nintendo reveals the successor to the Nintendo DS called the Nintendo 3DS. This is the first gaming system that will feature 3D content without the special need of special glasses that were used for 3D films or 3DTVs. The system will add a "tag mode" in the system's firmware called StreetPass to enable data exchange between systems when the device is in sleep mode. The 3DS will capture 3D pictures and play 3D movies and possibly videos. The Nintendo 3DS will release on February 26, 2011 in Japan with the price of 25,000 yen, and on March 2011 in Europe and North America. [173]

Handheld comparison

Name	Nintendo DS / DS Lite / DSi / DSi XL	PSP-1000 series / PSP-2000 Series / PSP-3000 Series / PSP Go
onsole	 Pictured left to right: Nintendo DS, Nintendo DS Lite, Nintendo DSi	 Pictured left to right: PSP-1000 series, PSP-2000 series, PSP-3000 series, PS Go/PSP-N1000 series
ase dates	• [NA] November 21, 2004 • [JP] December 2, 2004 • [AUS] February 24, 2005 • [EU] March 11, 2005	• [JP] December 12, 2004 • [NA] March 24, 2005 • [PAL] September 1, 2005
Logos	NINTENDO DS NINTENDO DS lite NINTENDO DS NINTENDO DS XL	PlayStation Portable PSP go PlayStation Portable
ch prices	**DS:** *Japan:* ¥15,000 *North America:* US$149.99 *Europe:* €149.99 *UK:* £99.99 **DS Lite:** *Japan:* ¥24,800 (¥26,040 tax incl.)[174] *North America:* US$129.99 / CDN$299.99[175] *Europe:* €249 [175] *UK:* £179.99	**PSP-1000 series Pack:** *Japan:* ¥19,800 (¥20,790 tax incl.)[176] *North America:* US$199.99 / CDN$229.99[177] *Europe:* €199.99 [178] *UK:* £179.99 **PSP-2000 series Core Pack:** *Japan:* ¥19,800[179] *North America:* US$169.99 / CDN$199.99[180] *Europe:* €169 / £129.99[181] [182] *UK:* £129.99 **PSP-3000 series:** *North America:* US$169.99 (core package), US$199.99 (bundle packag **PSP Go (PSP-N1000):** US$249.99
Media	Nintendo DS Game Card, Game Boy Advance cartridge (DS, DS Lite only), SD(HC) Card (DSi only)	Universal Media Disc (UMD) (PSP-1000, PSP-2000, PSP-3000 series only), Me Stick Duo (PSP-1000, PSP-2000, PSP-3000 series only), Memory Stick Micro(M Flash Memory (PSP Go only), Content delivery via PSN
st-selling game	*Nintendogs*, 22.27 million, all versions combined (as of March 31, 2009)[106] *New Super Mario Bros.*, 18.45 million (as of March 31, 2009)[106]	*Monster Hunter Portable 2nd G*, 2.7 million (as of January 2009)[183] *Grand Theft Auto: Liberty City Stories* 2.7 million (as of November 26, 2008)[1 [185] [186]
cluded sories and xtras	• Launch model DS: Stylus, wrist strap, *Metroid Prime Hunters* demo (not in Japan) • DS Lite: Stylus, wrist strap (Japan only)	• PSP-1000 Value Pack: PSP Case, Hand Strap, 32 MB Memory Stick Pro Du Headphones with Remote control

cessories retail)	• Rumble Pak • Nintendo DS Headset • Nintendo MP3 Player • Nintendo DS Browser • Nintendo DS Memory Expansion Pak • Nintendo DS Digital TV Tuner • More...	• PSP Camera attachment • GPS attachment • PSP Extended Battery Pack • PSP Portable Travel Case • LocationFree Player • PSP Microphone • PSP Media Manager • PSP analog AV cable • PSP component cable • PSP USB cable
CPU	**DS and DSL:** 67 MHz ARM9 and 33 MHz ARM7 **DSi:** 133 MHz ARM9 and 33 MHz ARM7	MIPS R4000-based; clocked from 1 to 333 MHz (2 of these)
emory	**DS and DSL:** 4 MB SRAM **DSi:** 16 MB	EDRAM (5 MB reserved for kernel, 3 for music) **PSP-1000:** 32 MB **PSP-2000, PSP-3000, PSP Go:** 64 MB
terface	• D-pad • Six face buttons • Two shoulder buttons • Touch screen • Microphone • 0.3 Megapixel camera & VGA camera(DSi only)	• D-pad • Six face buttons • Two shoulder buttons • "Home" button ("PS" button for PSP-3000 series and PSP Go) • Analog nub • Microphone (PSP-3000 and PSP Go Only)
nensions	**DS**: 148.7 × 84.7 × 28.9 mm (5.85 × 3.33 × 1.13 inches) **DS Lite**: 133 × 73.9 × 21.5 mm (5.24 × 2.9 × 0.85 inches)	**PSP 1000**: 74 mm (2.9 in) *(h)* 170 mm (6.7 in) *(w)* 23 mm (0.91 in) *(d)* **PSP Slim & Lite**:71.4 mm (2.81 in) *(h)* 169.4 mm (6.67 in) *(w)* 18.6 mm (0.73 i **PSP Go**: 69 mm (2.7 in) *(h)* 128 mm (5.0 in) *(w)* 16.5 mm (0.65 in) *(d)*
Veight	**DS:** 275 g (9.7 oz) **DSL:** 218 g **DSi:** 214 g **DSi XL:** 314 g	**PSP 1000**: 280 grams (9.9 oz) **PSP Slim & Lite** 189 grams (6.7 oz) **PSP Go**: 158 grams (5.6 oz)
ne service	Nintendo Wi-Fi Connection, DSi Shop (DSi only)	PlayStation Network, RSS reader, Skype (PSP-2000 series, PSP-3000 series and Go only), PlayStation Store
ckward patibility	Plays almost all Game Boy Advance cartridges (DS, DS Lite only).	Plays some PS3 games and all PlayStation games through PS3 via remote play o downloaded from PlayStation Store
n software	Nintendo DS Menu (DS, DS Lite), Nintendo DSi Menu (DSi)	XrossMediaBar (XMB)
nsumer ammability	See Nintendo DS homebrew	See PlayStation Portable homebrew
olutions	256 × 192 (both screens)	480 × 272
etwork	Wi-Fi 802.11b, Wi-Fi 802.11g (DSi only, only functions with DSi-specific software), wireless ad-hoc with other DS units and Nintendo Wii	Wi-Fi (802.11b), IrDA (only for PSP-1000 series), Bluetooth (only for PSP Go) wireless ad-hoc with other PSP units and PlayStation 3
Audio	Stereo speakers, headphone jack	Stereo speakers, headphone jack
I/O	1 Nintendo DS Game Card slot 1 GBA slot (DS, DS Lite only) 1 SD(HC) card slot (DSi Only)	UMD drive (PSP-1000, PSP-2000, PSP-3000 series only) 1 USB device port 1 Memory Stick Duo/PRO Duo slot 1 IrDA (PSP-1000 series only)
torage	Nintendo DS Game Card, SD(HC) card (DSi only)	Memory Stick Duo/PRO Duo, Memory Stick Micro(M2) (PSP Go only), 16 GB memory (PSP Go only)
ttery life	DS, backlight on: 14 hours DS Lite, minimum brightness setting: 15–19 hours[187] DSi, minimum brightness setting: 9–14 hours[187]	MP3 playback: 10 hours Game: approximately 3–6 hours Video playback: 3–7 hours depending on screen brightness setting Wi-Fi internet browsing: approximately 3–4 hours

s sold (all nodels mbined)	Worldwide: 128.89 million (as of March 31, 2010)[134] Japan: 30.4 million (as of March 31, 2010)[134] United Kingdom: 8.8 million (as of January 3, 2009)[188] United States: 28 million (as of January 31, 2009)[189]	Worldwide: 60 million (as of December 31, 2009)[190] Japan: 11,078,484 (as o December 28, 2008)[191] [192] [192] United Kingdom: 3.2 million (as of January 3, 2009)[188] United States: 10.47 million (as of January 1, 2008)[193] [194] [195]

Note: First year of release is the first year of the system's worldwide availability.

Other systems

Gizmondo (2005)

GP2X (2005)

Static

2D graphics consoles

Most of the 2D graphics consoles are made in China and have a similar name and design of the known consoles - Xbox 360, PlayStation 3 and Wii. Names of such a consoles - Vii, WiWi, MiWi, iSport, MyGame, PolyStation, PX 3600. Apart from these consoles, there are 2D consoles that aren't produced by Chinese companies, such as HyperScan and Game Wave Family Entertainment System.

3D graphics consoles

Name	Manufacturer	Release date
EVO Smart	Envizions Computer Entertainment	October 20, 2006
Zeebo	Zeebo Inc.	Brazil - May 25, 2009
HyperScan	Mattel	2006

Handheld

Name	Manufacturer	Release date
Ez MINI	Mitac or Mio	China - 2005
Gizmondo	Tiger Telematics	March 19, 2005
GP2X	GamePark Holdings	November 10, 2005
Pelican VG Pocket	Pelican Accessories	August, 2006
iPod touch	Apple Inc.	September, 2007
Leapster 2	LeapFrog Enterprises, Inc.	2008
GP2X Wiz	GamePark Holdings	March 2009
Dingoo A320	Shenzhen Dingoo Digital Co., Ltd.	March 2009
Zune HD	Microsoft	September, 2009
Mi2 console	Planet interactive	Netherlands - November, 2009
Gemei X760+		

Remakes

Name	Manufacturer	Release date
Atari Flashback 2	Atari	July 2005
FC Twin Video Game System	Yobo	November 20, 2006
Generation NEX	Messiah Entertainment Inc.	2005

Gaming on demand services

Name	Manufacturer	Product family	Release date	Predecessor	Suggested retail price
OnLive	OnLive		June 17, 2010		TBD
Gaikai	Gaikai				
OTOY	OTOY				
Playcast					

Milestone titles

- *Batman: Arkham Asylum* (Microsoft Windows, PlayStation 3, Xbox 360) has been praised for its innovation, gameplay, and compelling storyline. It won a Guinness World Record for 'Most Critically Acclaimed Superhero Game Ever'. It broke the record in this category by achieving an average score of 91.67 from reviews around the world.[196]
- *BioShock* (Microsoft Windows, PlayStation 3, Xbox 360) is considered a major influential and artistic game of this generation[197] [198] with a plot that quickly created controversy with the decisions the player makes during the game.[199]
- *Call of Duty: Modern Warfare 2* is the biggest selling game of all time, exceeding *Grand Theft Auto IV*'s previous record. Modern Warfare 2 was praised by many game critics for its compelling storyline and addictive multiplayer.
- *Gears of War* (Microsoft Windows, Xbox 360) had preorder sales that were second only to *Halo 2* in the studio's history.[200] *Gears of War* was also the first Xbox or Xbox 360 game to sell out and reach the top ten charts in

Japan.[201] On November 7, 2006—the day that it was released—it became the most popular game on the Xbox Live service, overtaking *Halo 2*, which had held the spot since its launch in November 2004.[202] By January 19, 2007, just ten weeks after its debut, over three million units of the game had been sold.[203]

- *Grand Theft Auto IV* (Microsoft Windows, PlayStation 3, Xbox 360) is a sandbox-style action-adventure video game developed by Rockstar North. A few Hollywood producers have set precedent by beginning to browse video-game release dates to check for conflicts due to *Grand Theft Auto IV*'s potential harm to the May 2, 2008 release of *Iron Man*.[204] As of October 2008, the PS3 and Xbox 360 version has taken the third and eighth positions of GameRankings' best-rated games of all time, respectively.[205] *GTA IV* also shattered worldwide weekly sales records of any entertainment media to date by grossing over $500 million within the first week of its release.
- *Halo 3* (Xbox 360) broke many first day records, including preorders (1.7 million+), and first day sales (US$170 million+), surpassing its predecessor, *Halo 2*, in both of these fields.[206] [207] It also featured advanced artificial intelligence (AI) technology for enemies, though the player's allies' intelligence was less refined.[208] [209]
- *LittleBigPlanet* (PlayStation 3) was one of the most highly anticipated games of 2008. Upon release, it received high critical acclaim with a score of 95/100 on MetaCritic and was the second most highly-rated game of that year (behind Grand Theft Auto IV).[210] It was praised by G4 TV as a game that "not only lives up to the hype but exceeds it so many ways" and IGN called it "nothing short of astounding".[211]
- *Super Mario Galaxy* (Wii), currently one of the most critically acclaimed titles of the seventh generation, sold more copies in its first week, including over 500,000 in the US, than any other *Mario* title in the history of the franchise.[212] As of August 2010, it is the second best-reviewed game of all-time, as listed on GameRankings,[205] along with being the recipient of many game of the year awards.
- *Super Smash Bros. Brawl* (Wii) is a product of Nintendo, with a small portion of content made in cooperation with Sega and Konami.[213] [214] It is the third in a series of cross-over fighting games. It is also the first in the series to have third-party characters, with the inclusion of Solid Snake and Sonic the Hedgehog.[215] It dominated sales during its first week in Japan and the United States, selling 820,000 in Japan and becoming the fastest-selling video game in Nintendo of America's history with 1.4 million sold in the US.[216] [217] [218]
- *Uncharted 2: Among Thieves* (PlayStation 3) was the most positively-reviewed game of 2009[219] and is one of the most critically acclaimed games of the generation. It received universal critical acclaim with a Metacritic score of 96 out of 100, a GameRankings score of 95.50%, and a GameStats score of 9.5 out of 10.[220] [221] [222] At E3 2009, Uncharted 2 won the most E3 awards of any game of all time. Critics praised almost every aspect of the game ranging from high quality music and sound to graphics.[223] [224]
- *Wii Sports* (Wii) has been attributed as a major factor in the Wii's worldwide success.[225] The game, along with *Wii Fit*, has been cited as attracting more casual, female, and elderly gamers.[226] This is a rarity among seventh generation games, as developers tend to try to attract young men.[227] It has also been cited as one game that can provide a bonding experience among family members,[228] and as a means of exercising and losing weight when played regularly.[229] As of March 31, 2009, the game has sold over 60 million copies worldwide—including bundled copies, making it the best-selling Wii game and the best-selling video game of all time.[230]

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Xbox 360

250 GB slim model and new-style controller

Developer	Microsoft
Manufacturer	Flextronics, Wistron, Celestica[2]
Product family	Xbox
Type	Video game console
Generation	Seventh generation era
Retail availability	
Units sold	Worldwide: 44.6 million (as of September 30, 2010)[3] (details)
Media	DVD, Compact Disc, Download Add-on: HD DVD (*discontinued*)
CPU	3.2 GHz PowerPC Tri-Core Xenon
Storage capacity	
Memory	512 MB of GDDR3 RAM clocked at 700 MHz
Display	
Graphics	500 MHz ATI Xenos
Sound	• Analog stereo • Stereo LPCM (TOSLINK and HDMI) • Dolby Digital 5.1 (TOSLINK and HDMI) • Dolby Digital with WMA pro (TOSLINK and HDMI)
Controller input	
Connectivity	**Original models** 2.4 GHz wireless, 3 × USB 2.0, IR receiver, 100 Mbit Ethernet Add-on: Wifi 802.11a/b/g, Wifi 802.11a/b/g/n[4] **Revised "S" models** 2.4 GHz wireless, 5 × USB 2.0, IR receiver, 100 Mbit Ethernet, Wifi 802.11b/g/n, AUX port

Online services	Xbox Live
Best-selling game	*Halo 3* (8.1 million copies sold as of)[5]
Backward compatibility	478 original Xbox games[6] (requires hard drive and the latest update)
Predecessor	Xbox

The **Xbox 360** is the second video game console produced by Microsoft, and the successor to the Xbox. The Xbox 360 competes with Sony's PlayStation 3 and Nintendo's Wii as part of the seventh generation of video game consoles. Some major features of the Xbox 360 are its integrated Xbox Live service that allows players to compete online, download arcade games, game demos, trailers, TV shows, music and movies and its Windows Media Center multimedia capabilities. The Xbox 360 also offers region specific access to third-party media streaming services such as Netflix and ESPN in the USA or Sky Player in the UK.

The Xbox 360 was officially unveiled on MTV on May 12, 2005, with detailed launch and game information divulged later that month at the Electronic Entertainment Expo (E3). The console sold out completely upon release in all regions except in Japan.[7] [8] [9] As of June 2010, there are over 41.7 million Xbox 360 consoles worldwide.[3]

At their E3 presentation on June 14, 2010, Microsoft announced a redesigned Xbox 360 that would ship on the same day.[10] The redesigned console is slimmer than the previous Xbox 360 model and features integrated 802.11 b/g/n Wi-Fi, TOSLINK S/PDIF optical audio output, 5 USB 2.0 ports (compared to the 3 from older versions) and a special AUX port.[11] Older models of the Xbox 360 have since been discontinued.[12] The first new console to be released features a 250 GB hard drive, while a later, less expensive SKU features 4 GB internal storage.

With the announcement of the Xbox 360 S, Microsoft have said that they believe that the console is only mid-way through its life-cycle and will continue on through 2015.[13] [14] [15] In 2009, IGN named the Xbox 360 the sixth greatest video game console of all time, out of a field of 25.[16]

Overview

Development

Known during development as **Xbox Next**, **Xenon**, **Xbox 2**, **Xbox FS** or **NextBox**[17] , the Xbox 360 was conceived in early 2003.[18] In February 2003, planning for the Xenon software platform began, and was headed by Microsoft's Vice President J Allard.[18] That month, Microsoft held an event for 400 developers in Bellevue, Washington to recruit support for the system.[18] Also that month, Peter Moore, former president of Sega of America, joined Microsoft. On August 12, 2003, ATI signed on to produce the graphic processing unit for the new console, a deal which was publicly announced two days later.[19] Before the launch of the Xbox 360, several Alpha development kits were spotted using Apple's Power Mac G5 hardware. This was due to the system's PowerPC 970 processor running the same PowerPC architecture that the Xbox 360 would eventually run under IBM's Xenon processor. The cores of the Xenon processor were developed using a slightly modified version of the PlayStation 3's Cell Processor PPE architecture. According to David Shippy and Mickie Phipps, the IBM employees were "hiding" their work from Sony and Toshiba."[20]

Launch

The Xbox 360 was released on November 22, 2005, in the United States and Canada; December 2, 2005, in Europe and December 10, 2005, in Japan. It was later launched in Mexico, Brazil, Chile, Colombia, Hong Kong, Singapore, South Korea, Taiwan, Australia, New Zealand, South Africa, India, and Russia. In its first year on the market, the system launched in 36 countries, more countries than any console has launched in a single year.[21]

Retail configurations

At launch, the Xbox 360 was available in two configurations: the "Xbox 360" package (unofficially known as the 20 GB Pro or Premium), priced at US$399 or GB£279.99, and the "Xbox 360 Core," priced at US$299 and GB£209.99. The original shipment of the Xbox 360 version included a cut-down version of the Media Remote as a promotion. The Elite package was launched later at US$479. The "Xbox 360 Core" was replaced by the "Xbox 360 Arcade" in October 2007[22] and a 60 GB version of the Xbox 360 Pro was released on August 1, 2008. The Pro package was discontinued and marked down to US$249 on August 28, 2009 to be sold until stock ran out, while the Elite was also marked down in price to US$299.[23] [24] In June 2010, Microsoft announced a new, redesigned, model and the discontinuation of the Elite and Arcade models.[12]

Current models (Xbox 360 S)

250 GB Xbox 360 S console

Technically designated the **Xbox 360 S**[25] [26] [27] and marketed simply as the **Xbox 360**;[28] current Xbox 360 consoles are based around a redesign of the Xbox 360 hardware which was officially announced on during a press briefing prior to that year's E3.

It was speculated that a complete redesign of the Xbox 360 hardware was being produced after pictures of a possible new motherboard design surfaced on .[29] Ads later surfaced on showing a slimmer Xbox 360 design, which was expected to include a 250 GB hard drive and integrated Wi-Fi functionality.[30]

Xbox 360 S consoles feature redesigned internal architecture with the Valhalla motherboard, which allows for around 30% more space than previous motherboards,[31] and the XCGPU, an integrated CPU/GPU/eDRAM chip using a 45 nm fabrication process.[32] This allows them to be both smaller and quieter than the previous versions of the Xbox 360. They also feature 5 standard USB 2.0 ports (2 more than previous models) and an additional custom USB port for use with peripherals such as the Kinect sensor.[32] Unlike older models, 2.4 GHz 802.11 b/g/n Wi-Fi[33] and a TOSLINK S/PDIF optical audio connector are also built-in, allowing for digital audio and wireless networking without the need for external adapters.[32] The Memory Unit slots found on previous consoles have been removed in favor of the USB flash drive solution added in a previous system software update (released on)[34] and the power and DVD drive eject 'buttons' are touch sensitive rather than the physical buttons found on previous models. The external hard disk drive connector has also been swapped for an internal bay for use with a proprietary hard drive; this is neither a standard drive nor compatible with older models. Other notable hardware changes include the use of one larger fan compared to the previous Xbox 360 models (which used two smaller ones) and the design of the vents, which are similar to those used on the original Xbox. Unlike previous generations of the console which had names to distinguish different SKUs, the new models are to be marketed solely by the amount of included storage,[12] in a similar fashion to current models of its main competitor the PlayStation 3. When the first new models began to ship, remaining stock of the Elite package dropped in price to US$249.99[12] or AU$349[35] and the Arcade dropped to US$149.99.[12]

Xbox 360 250 GB

The first Xbox 360 S SKU to be revealed includes a 250 GB hard drive[36] and its casing features a glossy black finish. It was shipped to US retailers the same day it was announced () and went on sale later that week. It was released in Australia on ,[37] in New Zealand on [37] and in Europe on [38] . It retails at US$299.99,[37] £199.99,[37] AU$449.00,[37] NZ$499.00[37] or €249.00,[39] replacing the Xbox 360 Elite at that price point.

Xbox 360 4 GB

A second SKU which includes 4 GB of internal flash storage and has matte black casing (much like the Xbox 360 Elite)[40] was released on in the US[40] and in the Europe.[41] It replaced the Xbox 360 Arcade and is priced at US$199.99, £149.99 or €199.99.[42] [40] [43] [41] Although this model has on-board storage, *Xbox Product Director* Aaron Greenberg confirmed that it does have a drive bay which Microsoft has "the opportunity to use in the future".[40] On , Microsoft announced a 250 GB stand-alone hard drive for use with Xbox 360 S models priced at US$129.99.[44]

Discontinued models

Xbox 360 Core/Arcade, Pro and Elite consoles

Xbox 360 Core

The **Xbox 360 Core** was an entry level Xbox 360 which was later replaced with the "Arcade". Although available at launch in other regions, it was not available in Japan until November 2, 2006.[45] The *Core* system came bundled with composite video cables, capable of only SDTV resolutions. It was however capable of the same HDTV resolutions (up to 1080i) as the other models when connected to a separately sold Component cable. In October 2006, 1080p support was added for all models in a system update,[46] including the "Core" using either the component cable, or the new VGA cable (although 1080p via component was not widely supported by televisions). It may also utilize a separately sold Xbox 360 hard drive. Unlike all other SKUs, it shipped with a wired version of the Xbox 360 controller, instead of the wireless version found in other SKUs.

Xbox 360 Pro / Xbox 360 Premium

The **Xbox 360 Pro**[47] (sometimes referred to as **Premium** and packaged as simply **Xbox 360** with the subheading "Go Pro") included all the features of the Xbox 360 Arcade and included a hybrid composite and component cable with optional optical out instead of a composite cable. This model also included a detachable Hard Disk Drive (initially 20 GB, while later models had 60 GB) to store downloaded content, provide compatibility with original Xbox games, and store game data. The included hard drive came with game demos, video clips and a free Live Arcade game, *Hexic HD*. In July 2007, this version of the Xbox 360 began appearing with the Zephyr motherboard (the motherboard used in the Elite) which features HDMI 1.2 output and an improved GPU heatsink. Although this package did include an HDMI output, it did not come with an HDMI cable.[48] [49] Starting at the end of September 2007, the newest systems were shipped with the new "Falcon" motherboard. This motherboard includes the new 65-nm CPUs, making them quieter and cooler than the older systems.[50] On August 1, 2008, the 20 GB version was discontinued and was replaced by a 60 GB HDD model at the same price. Holiday 2008 consoles were bundled with *Lego Indiana Jones: The Original Adventures* and *Kung Fu Panda*.[51] Price cuts that took effect on September 4, 2008 reduced the price from $349 to $299.[52] The Xbox 360 Pro, following its discontinuation, retailed for $249.99 until stocks were exhausted.

Xbox 360 Elite

The **Xbox 360 Elite** included a 120 GB hard drive and a matte black finish. The Elite retail package also included a controller and headset that match the system's black finish.[53] The initial release price was $479.99 USD,[54] C$549.99,[54] £299.99, and AU$729.95. The Elite was released in North America on April 29, 2007,[55] Europe on August 24, 2007, and Australia on August 30, 2007. These Elites (and other Xbox 360 models using the Falcon) can be identified from earlier versions by a re-designed power connector and a power supply rated to 175 W. In 2009, Elite models using the Jasper chipset became available. These can also be identified by their power supply, which is rated at 150W and has a 12.1A 12v rail. Holiday 2008 consoles were bundled with *Lego Indiana Jones: The Original Adventures* and *Kung Fu Panda*.[51] The Elite's price tag was cut from $449 to $399 on September 4, 2008.[23] [24] With the announcement of the new Xbox 360 250 GB model, the Elite dropped in price to US$249.99 for remaining units until stocks are exhausted.[12]

Xbox 360 Arcade

The **Xbox 360 Arcade**[56] replaced the "Xbox 360 Core" as the entry level Xbox 360 on , while retaining the Core's price of US$279.99.[57] It was publicly revealed by Microsoft's president of Entertainment Devices division Robbie Bach to the *Financial Times* on October 18, 2007,[58] and officially announced on October 22, 2007,[22] although it was available in stores far earlier.[56] It included a wireless controller, composite AV cable, HDMI 1.2 output, a 256 MB memory unit and 5 Xbox Live Arcade titles:[59] *Boom Boom Rocket*, *Feeding Frenzy*, *Luxor 2*, *Pac-Man Championship Edition*, and *Uno* on a single disk, which also included a "Welcome Video" and several game trailers/demos.[60] Like its predecessor the "Core", it did not include a hard disk drive, which is required for Xbox software backwards compatibility. In Autumn (Fall) 2008, with the introduction of the Jasper motherboard revision, the memory unit was removed from the package and replaced with an 256 MB internal memory chip.[61] This was later upgraded to a 512 MB chip in Summer 2009.[62] Holiday 2008 consoles were bundled with *Sega Superstars Tennis*.[51] With the price cuts on , the Arcade fell from US$279 to US$199 in the US.[52] In the UK, with the 2009 Elite price drop and discontinuation of the "Premium" Pro SKU, the Arcade price rose from GB£129.99 to GB£159.99.[63] With the unveiling of the Xbox 360 S redesign, the Arcade dropped in price to US$149.99 for remaining units until stocks are exhausted. The Arcade was replaced at the US$200 price tier by the 4 GB Xbox 360 S.

Xbox 360 Super Elite

The Xbox 360 Elite has also been configured with a 250 GB hard disk drive and 2 wireless controllers on special limited editions of the console. Also referred to as the **Xbox 360 Super Elite**[64] the console retailed at US$399.99, GB£249.99 and AU$599.00[65] as of November 10, 2009. A *Call of Duty: Modern Warfare 2* bundle included a special limited edition black console featuring Modern Warfare 2 branding. Other bundles included a standard Elite finish and either the game *Forza Motorsport 3*[66] [67] or both Halo 3 and Halo 3: ODST.[68] On March 9, 2010, alongside the release of Final Fantasy XIII, Microsoft released another 250 GB bundle with the same extras as the Modern Warfare bundle except bundled with the Final Fantasy XIII game. Unlike other Super Elites, this console and its accessories featured a the same white color scheme as "Pro" models. This bundle also included exclusive downloadable items for use with Xbox 360 avatars and a specially branded 250 GB hard drive.[69] [70] In April 2010, a *Splinter Cell: Conviction* Super Elite bundle featuring special print on the console and the same extras as the other bundles was released along side the Splinter Cell: Conviction game.

Comparison of features

Information is based on current specifications for standard packages. Older or holiday packages may differ from current configurations.

Model	Storage	HDMI	Appearance	Accessories/Bundled Items		Suggested Retail Price	First Available	In Prod.
S[12] [25]	250 GB HDD	Yes	Gloss black Gloss black disc drive	Wireless controller Wired Headset[71] Composite video cable[b]		$299.99 $299.99 £199.99 €249.99 [72] $449.00[37] $499.00[37]	• NA AU [37] NZ [37] • EU [73]	Yes
	4 GB onboard[42] [40] [43]	Yes	Matte black Matte black disc drive	Wireless controller Composite video cable[b]		$199.99[43] £149.99[43]	• NA [40] • EU [41]	Yes
Elite	250 GB HDD[a]	Yes	Matte black Chrome disc drive	Ethernet cable Wired Headset Composite video cable[b][g][74]	2 wireless controllers	$399.99 $399.99 £249.99 €329.99 $599.00	[67]	No[75]
	120 GB HDD				1 wireless controller	$299.99 $299.99 £199.99 €299.99 ¥29,800 $549.00[76] [77] [78]		No[12] [75]
Arcade	512 MB[62] onboard	Yes	Matte white Matte white disc drive	Wireless controller Composite video cable[b][79] Xbox Live Arcade compilation disc[e] (not included with all units)		$199.99 $149.99 £159.99 €179.99 ¥19,800 $299.00[63] [78]	June 2009	No[12] [80] [75]
	256 MB[61] onboard						December 2008	No
	256 MB memory unit							
Pro	60 GB HDD	Yes	Matte white Chrome disc drive	Wireless controller Ethernet cable Wired Headset[f] Hybrid video cable[c]		$249.99 $299.99 £169.99 €239.99 ¥29,800 $399.00[78]		No
	20 GB HDD	After 2007						No
Core	None	No	Matte white Matte white disc drive	Wired controller Composite video cable[b]		$279.99 £199.99 ¥27,800		No

All Xbox 360s come with Xbox Live Free membership (Prior to October 2010, the free service was known as *Xbox Live Silver*)[81] and a one-month trial of Xbox Live Gold membership (only new accounts are eligible).
All Xbox 360s are backwards compatible with supported Xbox titles as long as they have an Xbox 360 HDD attached. This can be purchased separately for the Core/Arcade pack.
All hard drives (included with a console or bought separately) come with the Xbox Live Arcade game Hexic HD.
Included accessories match the color scheme of the console they are bundled with.
All European consoles also include a composite SCART adapter (RGB Scart cable sold separately).

a Elite in this configuration was only available as part of limited/special edition bundles (see below).

b The standard composite cable features three RCA connectors, for standard left and right channel audio and composite video, supporting a PAL, PAL-60 or NTSC image. It also lacks the TOSLINK connector found on the hybrid cable.

c The hybrid video cable features six RCA connectors, for standard left and right channel audio, composite video and HD component (YP_BP_R) supporting up to 1080p image[82] It also has a connector to attach a TOSLINK optical

audio cable, which supports either 2 channel (stereo) LPCM or dolby digital 5.1.
d The audio dongle contains two RCA connectors for left and right audio and a TOSLINK optical audio connector.
e Compilation disk includes Boom Boom Rocket, Feeding Frenzy, Luxor 2, Pac-Man Championship Edition, and Uno.
f Excluding Mexican and older Australian and New Zealand versions, where a Media Remote is bundled instead.
g Hybrid video cable,[c] HDMI cable and audio dongle[d] were included with the 120 GB model prior to September 2009.

Special editions

On a few occasions, Microsoft has produced special editions of the console, usually to coincide with the release of a major product. These special editions are typically custom-colored Xbox 360 models, and are produced in limited numbers.

Halo 3 Special Edition

- At the E3 2007 press conference, Microsoft announced the *Halo 3* Special Edition console, released September 25, 2007. It sports a *Halo 3* theme on the console, a wired headset, a wireless controller, and a Play and Charge Kit. Other than the unique "Spartan green-and-gold" color scheme, exclusive dashboard theme and downloads, and an HDMI port,[83] its features were identical to those of the Xbox 360 system at the time.[84] It is priced at US$399.99 and £279.99 (the original price of the Xbox 360).[85]
- To promote *The Simpsons Movie*, Microsoft created a specially designed, yellow Xbox 360 console.[86] The configuration was based on the Xbox 360 package of the time, the only difference being the color scheme of the Xbox 360 console and wireless controller. The consoles were to be given out to winners of drawings taking place between July 18, 2007 and July 27, 2007, in which a name was randomly drawn each day in the "10 Days and 10 Chances to Win" sweepstakes.[87] 100 consoles were produced in total.[88]
- A *Resident Evil 5* bundle containing a red Xbox 360 Elite console was released on March 13, 2009.[89] The bundle also contains a red, wireless controller and a black, wired headset.[90]
- A *Halo: Reach* special edition bundle is to be available concurrently with the game on . It will consist of a custom branded silver 250 GB Xbox 360 S console, two silver and black branded controllers, a *Halo: Reach* themed wired headset, a copy of the game and a download voucher for "Limited Edition Elite" armor and an episode from the Halo Legends anime. The press release in which it was announced also revealed that it "not only captures the look and feel of the game, but also features custom sound effects from the Halo universe". The bundle will retail for US$399.[91] [92] [93]

Super Elite special editions

- On September 15, 2009 Microsoft announced a special 250 GB hard disk limited edition version of the Xbox 360 Elite for *Call of Duty: Modern Warfare 2*. The unit is highlighted by special game product branding and includes two wireless controllers and a headset. This was the first Xbox 360 announced to come with a 250 GB hard drive.[66]
- A *Final Fantasy XIII* 250 GB limited edition bundle of the Xbox 360 console was announced on February 11, 2010, for release to coincide with the release of Final Fantasy XIII (March 9, 2010). The bundle includes an imprinted white 250 GB Xbox 360 Elite (Final Fantasy XIII imprinted where HDD size imprint goes), two wireless controllers, a standard edition copy of Final Fantasy XIII, and exclusive downloadable avatar items. Other than the HDD imprint, this console is cosmetically identical to the (discontinued) Pro models.[94]

- In March 2010, Microsoft announced a special limited edition black Xbox 360 Elite console for *Tom Clancy's Splinter Cell: Conviction*. The unit includes a 250 GB hard drive, two black wireless controllers, a black wired headset, an Ethernet cable, a standard definition Composite A/V cable, and the standard edition version of the game.[95]

Xbox 360 Launch Team Edition

The Launch Team Console with controller.

A white console with green accents was released in 2005 only to the Launch Team as a gift from Microsoft. The consoles came complete with a 20 GB HDD also in green to match the top and bottom sections that are typically grey in color. The HDD plate was also personalized and engraved with the team member's gamertag. Few examples have been seen with simply the console release date November 22, 2005 engraved on the HDD plate. The consoles came with a limited issue controller to accompany the console. The difference with the controller again is the grey part on the controller is replaced with a green molded plastic, not painted contrary to popular belief, to match the console. Each console came with a plain white faceplate. However as an additional gift, each team member was given an additional packaged faceplate with one of a kind art with the caption "I Made This" on the USB door of the faceplate. Very few examples have been sold off from original team member's collection. Larry Hyrb, better known as "Major Nelson", is known to own one which he displays pictures of on his website having been a member of the Launch Team. The special edition Launch Team console, hard drive, controller and the special faceplate were never sold in stores or meant for the general public. It is unknown as of now how many of these very rare consoles exist today.

Holiday bundles

As with the original Xbox, Microsoft has continued bundling two video game titles in console retail packaging during the holiday season. During the holidays of 2007, the Xbox 360 Pro and Elite packages were bundled with *Forza Motorsport 2* and *Marvel: Ultimate Alliance*.[96] In the UK, Ireland and the Netherlands, *Forza Motorsport 2* was bundled with *Viva Piñata*.[97] Holiday 2008 Xbox 360 and Xbox 360 Elite packages were bundled with *Lego Indiana Jones: The Original Adventures* and *Kung Fu Panda*, while Arcade consoles were bundled with *Sega Superstars Tennis*.[51] Holiday 2009 packages include an Elite console, LEGO Batman, and Pure.

Hardware and accessories

Hardware

The main unit of the Xbox 360 itself has slight double concavity in matte white or black. The official color of the white model is Arctic Chill. It features a port on the top when vertical (left side when horizontal) to which a custom-housed hard drive unit can be attached in sizes of either 20, 60, 120 or 250 GB. Inside, the Xbox 360 uses the triple-core IBM designed Xenon as its CPU, with each core capable of simultaneously processing two threads, and can therefore operate on up to six threads at once.[98] Graphics processing is handled by the ATI Xenos, which has 10 MB of eDRAM. Its main memory pool is 512 MB in size.

Xbox 360 Wireless Controller

Accessories

Many accessories are available for the console, including both wired and wireless controllers, faceplates for customization, headsets for chatting, a webcam for video chatting, dance mats and Gamercize for exercise, three sizes of memory units and four sizes of hard drives (20 GB, 60 GB, 120 GB and 250 GB (initially Japan only,[99] but later also available in elsewhere[100] [101])), among other items, all of which are styled to match the console.

Kinect

Kinect is a "controller-free gaming and entertainment experience" for the Xbox 360. It was first announced on June 1, 2009 at the Electronic Entertainment Expo, under the codename, *Project Natal*. The add-on peripheral enables users to control and interact with the Xbox 360 without a game controller by using gestures, spoken commands and presented objects and images. The Kinect accessory is compatible with all Xbox 360 models,[102] connecting to new models via a custom connector, and to older ones via a USB and mains power adapter.[103] During their CES 2010 keynote speech, Robbie Bach and Microsoft CEO Steve Ballmer went on to say that Kinect will be released during the holiday period (November–January) and it will work with every 360 console. Its name and release date of were officially announced on , prior to Microsoft's press conference at E3 2010.[104]

The *Kinect* sensor device.

Software

Dashboard

The Xbox 360's original graphical user interface was the *Xbox 360 Dashboard*; a tabbed interface that featured five "Blades" (formerly four blades), and was designed by AKQA. It could be launched automatically when the console booted without a disc in it, or when the disc tray was ejected, but the user had the option to select what the console does if a game is in the tray on start up, or if inserted when already on. A simplified version of it was also accessible at any time via the Xbox Guide button on the gamepad. This simplified version showed the user's gamercard, Xbox Live messages and friends list. It also allowed for personal and music settings, in addition to voice or video chats, or returning to the Xbox Dashboard from the game.

On November 19, 2008, the Xbox 360's dashboard was changed from the "Blade" interface, to a dashboard reminiscent of that present on the Zune and Windows Media Center, known as the "New Xbox Experience" or NXE.

Since the console's release, Microsoft has released several updates for the Dashboard software. These updates have included adding new features to the console, enhancing Xbox Live functionality and multimedia playback capabilities, adding compatibility for new accessories, and fixing bugs in the software. The latest Dashboard update was made available on November 1, 2010. The update includes a specialized menu layout optimized for motion navigation as well as a significant visual refresh for the standard controller-navigated menus to match the style of the "Metro" interface used in Zune HD and Windows Phone 7. The update is compulsory; access to Xbox Live is disabled until the update is performed.

New Xbox Experience

At E3 2008, at Microsoft's Show, Microsoft's Aaron Greenberg and Marc Whitten announced the new Xbox 360 interface called the "New Xbox Experience" (NXE). The update was intended to ease console menu navigation. Its GUI uses the Twist UI, previously used in Windows Media Center and the Zune. Its new Xbox Guide retains all Dashboard functionality (including the Marketplace browser and disk ejection) and the original "Blade" interface.

The NXE also provides many new features. Users can now install games from disc to the hard drive to play them with reduced load time and less disc drive noise, but each game's disc must remain in the system in order to run. A new, built-in Community system allows the creation of digitized Avatars that can be used for multiple activities, such as sharing photos or playing Arcade games like *1 vs. 100*. The update was released on November 19, 2008.[105]

While previous system updates have been stored on internal memory, the NXE was the first to require a storage device—at least a 128 MB memory card or a hard drive.

Multimedia

The Xbox 360 supports videos in Windows Media Video (WMV) format (including high-definition and PlaysForSure videos), as well as H.264 and MPEG-4 media. The December 2007 dashboard update added support for the playback of MPEG-4 ASP format videos.[106] The console can also display pictures and perform slideshows of photo collections with various transition effects, and supports audio playback, with music player controls accessible through the Xbox 360 Guide button. Users may play back their own music while playing games or using the dashboard, and can play music with an interactive visual synthesizer.

Music, photos and videos can be played from standard USB mass storage devices, Xbox 360 proprietary storage devices (such as memory cards or Xbox 360 hard drives), and servers or computers with Windows Media Center or Windows XP with Service Pack 2 or higher within the local-area network in streaming mode.[107] [108] As the Xbox 360 uses a modified version of the UPnP AV protocol,[109] some alternative UPnP servers such as uShare (part of the GeeXboX project) and MythTV can also stream media to the Xbox 360, allowing for similar functionality from non-Windows servers. This is possible with video files up to HD-resolution and with several codecs (MPEG-2, MPEG-4, WMV) and container formats (WMV, MOV, TS).[110]

As of 27 October 2009,[111] UK and Ireland users are also able to access live and on-demand streams of Sky television programming.[112] [113] [114] [115] [116] [117] [118] [119]

Canadian users can access a streaming HDTV service from Telus.[120]

At the 2007, 2008, and 2009 Consumer Electronics Shows, Microsoft had announced that IPTV services would soon be made available to use through the Xbox 360. In 2007, Microsoft chairman Bill Gates stated that IPTV on Xbox 360 was expected to be available to consumers by the holiday season, using the Microsoft TV IPTV Edition platform.[121] In 2008, Gates and president of Entertainment & Devices Robbie Bach announced a partnership with BT in the United Kingdom, in which the BT Vision advanced TV service, using the newer Microsoft Mediaroom IPTV platform, would be accessible via Xbox 360, planned for the middle of the year.[122] BT Vision's DVR-based

features would not be available on Xbox 360 due to limited hard drive capacity.[123] In 2010, while announcing version 2.0 of Microsoft Mediaroom, Microsoft CEO Steve Ballmer mentioned that AT&T's U-verse IPTV service would enable Xbox 360s to be used as set-top boxes later in the year.[124] As of January 2010, IPTV on Xbox 360 has yet to be deployed beyond limited trials.

XNA community

XNA Community is a feature whereby Xbox 360 owners can receive community-created games, made with Microsoft XNA Game Studio, from the XNA Creators Club . The games are written, published, and distributed through a community managed portal. XNA Community provides a channel for digital videogame delivery over Xbox Live that can be free of royalties, publishers and licenses.[125] [126] XNA game sales, however, did not meet original expectations.[127]

Games

The 2007 Game Critics Awards honored the Xbox 360 platform with 38 Nominations and 11 Wins - more than any other platform.[128] By March 2008, the Xbox 360 had reached a software attach rate of 7.5 games per console—a record for any console in history, in EU the rate was 7.0 while its competitors were 3.8 (PS3) and 3.5 (Wii).[129]

The Xbox 360 launched with 14 games in North America and 13 in Europe. The console's best-selling game for 2005, *Call of Duty 2*, sold over a million copies.[130] Five other games sold as well in the console's first year in the market: *Ghost Recon Advanced Warfighter*,[131] *The Elder Scrolls IV: Oblivion*,[132] *Dead or Alive 4*,[133] *Saints Row*,[134] and *Gears of War*.[135] *Gears of War* would become the best-selling game on the console with 3 million units,[136] before being surpassed in 2007 by *Halo 3*, with 8.1 million units.[137]

Six games were initially available in Japan, while eagerly anticipated titles such as *Dead or Alive 4* and *Enchanted Arms* were released in the weeks following the console's launch.[138] Games tailored specifically for the region were also released in the console's first year, such as *Chromehounds*, *Ninety-Nine Nights*, and *Phantasy Star Universe*.[139] Microsoft also had the support of Japanese developer Mistwalker, founded by *Final Fantasy* creator Hironobu Sakaguchi. Mistwalker's first game, *Blue Dragon*, was released in 2006 and had a limited-edition bundle which sold out quickly with over 10,000 pre-orders.[140] *Blue Dragon* is one of three Xbox 360 games to surpass 200,000 units in Japan, along with *Tales of Vesperia* and *Star Ocean: The Last Hope*. Mistwalker's second game, *Lost Odyssey* also sold over 100,000 copies.[141]

At E3 2007, Microsoft announced that Disney movies would be coming to Xbox Live Marketplace.New trailers were shown for *Halo 3* and *Halo Wars*, as well as the announcement of a *Halo*-themed Xbox 360. Demos were also showcased for *BioShock*, *Call of Duty 4: Modern Warfare* and *Assassin's Creed*.[142] At E3 2008, Microsoft demonstrated a number of titles for their 2008 line-up, including *Fallout 3*, *Gears of War 2*, *Fable II*, and *Resident Evil 5*, among other games. A television-style gaming channel "Primetime" was revealed with a game based on the popular game show *1 vs. 100* shown as an example, with hints of games based on *Big Brother* and *Deal or no Deal*. *Final Fantasy XIII* was also announced for release on Xbox 360 in Europe and North America.[143] E3 2009 saw the exclusive announcements of *Crackdown 2*, *Left 4 Dead 2* and *Halo: Reach*, as well as live demos for *Halo 3: ODST*, *Splinter Cell: Conviction* and *Alan Wake*. *Metal Gear Solid: Rising* was also unveiled, making it the first *Metal Gear* game to appear on the Xbox 360.[144] E3 2010 was focused primarily on software for the motion-based peripheral Kinect, showcasing casual experiences such as *Kinectimals*, *Your Shape: Fitness Evolved* and *Dance Central*. However, gameplay demos for core games, such as *Gears of War 3*, *Fable 3* and *Call of Duty: Black Ops*, were also displayed.[145]

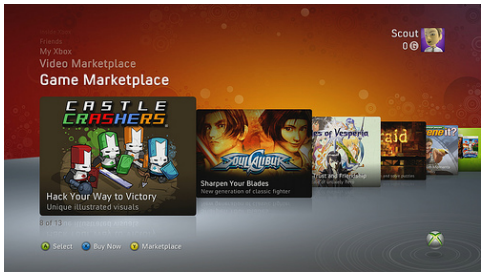
Xbox Live

Xbox Live Dashboard (2008-2010)

When the Xbox 360 was released, Microsoft's online gaming service Xbox Live was shut down for 24 hours and underwent a major upgrade, adding a basic non-subscription service (Silver) to its already established premium subscription-based service (which was renamed Gold). Xbox Live Silver is free of charge and is included with all SKUs of the console. It allows users to create a user profile, join on message boards, and access Microsoft's Xbox Live Arcade and Marketplace and talk to other members.[146] A Live Silver account does not generally support multiplayer gaming; however, some games that have rather limited online functions already, (such as *Viva Piñata*) or games that feature their own subscription service (e.g. EA Sports games) can be played with a Silver account. Xbox Live also supports voice and video communication, the latter a feature possible with the Xbox Live Vision; an add-on USB web camera designed specifically for the Xbox 360.[147] The Gamercard of a player with a Silver account has a silver trim, rather than gold.

Xbox Live Gold includes the same features as Silver and includes integrated online game playing capabilities outside of third-party subscriptions. Microsoft has allowed previous Xbox Live subscribers to maintain their profile information, friends list, and games history when they make the transition to Xbox Live Gold. To transfer an Xbox Live account to the new system, users need to link a Windows Live ID to their gamertag on Xbox.com.[148] When users add an Xbox Live enabled profile to their console, they are required to provide the console with their passport account information and the last four digits of their credit card number, which is used for verification purposes and billing. An Xbox Live Gold account has an annual cost of US$49.99, C$59.99, NZ$90.00, GB£39.99, or €59.99. As of May 14, 2008, Xbox Live has over 20 million subscribers.[149]

Xbox Live Marketplace



Xbox Live Marketplace (2008-2010)

The Xbox Live Marketplace is a virtual market designed for the console that allows Xbox Live users to download purchased or promotional content. The service offers movie and game trailers, game demos, Xbox Live Arcade games, gamertag images, and Xbox 360 Dashboard themes as well as add-on game content (items, costumes, levels etc.). These features are available to both silver and gold members on Xbox Live. A hard drive or memory unit is required to store products purchased from Xbox Live Marketplace.[150] In order to download priced content, users are required to purchase Microsoft Points for use as scrip;[151] though some products (such as trailers and demos) are free to download. Microsoft Points can be obtained through prepaid cards in 1,600 and 4,000 point denominations. Microsoft Points can also be purchased through Xbox Live with a credit card in 500, 1,000, 2,000, and 5,000 point denominations. Users are able to view items available to download on the service through a PC via the Xbox Live Marketplace website.[152] An estimated seventy percent of Xbox Live users have downloaded items from the Marketplace.[153]

Video store

On November 6, 2006, Microsoft announced the Xbox Video Marketplace, an exclusive video store accessible through the console. Launched in the United States on November 22, 2006, the first anniversary of the Xbox 360's launch, the service allows users in the United States to download high-definition and standard-definition television shows and movies onto an Xbox 360 console for viewing. With the exception of short clips, content is not currently available for streaming, and must be downloaded. Movies are also available for rental. They expire in 14 days after download or at the end of the first 24 hours after the movie has begun playing, whichever comes first. Television episodes can be purchased to own, and are transferable to an unlimited number of consoles. Downloaded files use 5.1 surround audio and are encoded using VC-1 for video at 720p, with a bitrate of 6.8 Mbit/s.[154] Television content is offered from MTV, VH1, Comedy Central, Turner Broadcasting, and CBS; and movie content is Warner Bros., Paramount, and Disney, along with other publishers.[155]

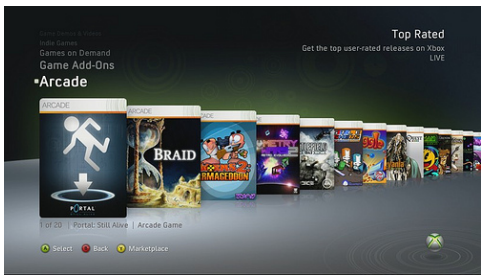
After the Spring 2007 update, the following video codecs are supported:

- H.264 video support: Up to 15 Mbit/s, Baseline, Main, and High (up to level 4.1) Profiles with 2 channel AAC LC and Main Profiles.
- MPEG-4 Part 2 video support: Up to 8 Mbit/s, Simple Profile with 2 channel AAC LC and Main Profiles.

As a late addition to the December Xbox 360 update, 25 movies were added to the European Xbox 360 video market place on the December 11, 2007 and cost 250 Microsoft points for the SD version on the movie and 380 Microsoft points for the HD version of the movie.[156] Xbox Live members in Canada featured the ability to go on the Xbox Live Marketplace as of December 10, 2007 with around 30 movies to be downloaded for the same amount of Microsoft Points.

On May 26, 2009 Microsoft announced the future release of the Zune HD (in the fall of 2009), the next addition to the Zune product range. This is of an impact on the Xbox Live Video Store as it was also announced that the Zune Video Marketplace and the Xbox Live Video Store will be merged to form the Zune Marketplace, which will be arriving on Xbox Live in 7 countries initially, the United Kingdom, the United States, France, Italy, Germany, Ireland and Spain.[157] Further details will be released at the Microsoft press conference at E3 2009.

Xbox Live Arcade



Xbox Live Arcade (2008-2010)

Xbox Live Arcade is an online service operated by Microsoft that is used to distribute downloadable video games to Xbox and Xbox 360 owners. In addition to classic arcade games such as *Ms. Pac-Man*, the service offers some new original games like *Assault Heroes*. The Xbox Live Arcade also features games from other consoles, such as the PlayStation game *Castlevania: Symphony of the Night* and PC games such as *Zuma*. The service was first launched on November 3, 2004,[158] using a DVD to load, and offered games for about US$5 to $15. Items are purchased using Microsoft Points, a proprietary currency used to reduce credit card transaction charges. On November 22, 2005, Xbox Live Arcade was re-launched with the release of the Xbox 360, in which it was now integrated with the Xbox 360's dashboard. The games are generally aimed toward more casual gamers; examples of the more popular titles are *Geometry Wars*, *Street Fighter II' Hyper Fighting*, and *Uno*.[159] On March 24, 2010, Microsoft introduced the Game Room to Xbox Live. Game Room is a gaming service for Xbox 360 and Microsoft Windows that lets players compete in classic arcade and console games in a virtual arcade.[160]

Sales

Region	Units sold	First available
Canada	870,000 as of August 1, 2008[161]	November 22, 2005
United States	18.6 million as of December 31, 2009[162]	
EMEA region (Europe, Middle East and Africa)	10 million as of November 13, 2009[163] (Includes UK sales)	December 2, 2005
United Kingdom	3.9 million as of January 13, 2009[164]	
Japan	1,235,975 as of March 2, 2010[165]	December 10, 2005
Australia & New Zealand	1 million as of April 19, 2010[166]	March 23, 2006
Worldwide	**44.6 million** as of 30 September 2010 [3]	(more...)

The Xbox 360 began production only 69 days before launch.[167] [168] As a result, Microsoft was not able to supply enough systems to meet initial consumer demand in Europe or North America.[169] Many potential customers were not able to purchase a console at launch. Forty thousand units appeared on eBay during the initial week of release; this was 10% of the total supply.[170] By year's end, Microsoft had shipped 1.5 million units, including 900,000 in North America, 500,000 in Europe, and 100,000 in Japan.[171]

At E3 in May 2006, Bill Gates announced that Microsoft would have a head start of 10 million units by the time Sony and Nintendo entered the market.[172] Microsoft later specified that goal and estimated shipments of 10 million units by the end of 2006.[173]

Cumulative sales from the system's launch until June 30, 2007 were predicted to reach 12 million units, down from 13 to 15 million units estimated earlier. Being released one year ahead of its competitors, the Xbox 360 was the market leader throughout the first half of 2007; however, on September 12, 2007, it was reported by the *Financial Times* that the Xbox 360 had been surpassed by the Wii in terms of worldwide home console sales.[174]

On October 4, 2007, after the launch of *Halo 3*, Microsoft stated that Xbox 360 sales had more than doubled compared to the previous average.[175] According to the NPD Group, the Xbox 360 outsold the Wii for the month of September in the United States, helped in part by the spike in sales seen after the launch of *Halo 3*, which sold 3.3 million copies in the US in a 12-day period.[176] The Xbox had sales of 528,000 units for September, while the Wii had sales of 501,000 units.[177]

Despite the relatively strong sales figures, Microsoft's gaming division was losing money. Through 2005, the Xbox gaming division had lost over $4 billion,[178] However, Microsoft expected the console to start making money in 2008.[179] due to a loss leader market strategy of selling consoles below cost in order to obtain market saturation and gain profits on software and peripherals with a much higher profit margin.[180] [181] Additionally, Microsoft took a charge of $1 billion dollars on its June 2007 Income Statement to account for the cost of replacing bricked Xbox 360s.[182]

In Europe, the Xbox 360 sold 2 million units in 2006 and 1.9 million in 2007 according to estimates by Electronic Arts.[183] [184] In 2007, the Xbox 360 sold 4.62 million units in the US according to the NPD Group,[185] [186] [187] and 257,841 in Japan according to Enterbrain.[188] [189] [190] In 2008, the Xbox 360 sold 317,859 units in Japan, according to Enterbrain.[190] [191]

On February 13, 2008, Microsoft announced that the Xbox 360 suffered shortages in the US in January 2008, possibly continued into February.[192] [193] [194] Prior to the release of the NPD Group's video game statistics for January 2008, the Xbox 360 was in second place behind the Wii in US sales for most months since the Wii and PS3's release.[193] On May 14, 2008, Microsoft announced that 10 million Xbox 360s had been sold and that it was the

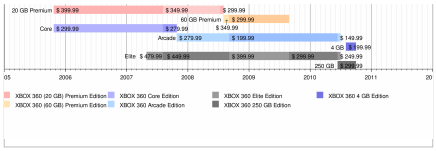
"first current generation gaming console" to surpass the 10 million figure in the US.[195] In the US, the Xbox 360 was the leader in current-generation home console sales until June 2008, when it was surpassed by the Wii.[196] [197] [198]

In the first seven months of 2008, the Xbox 360 has sold 154,000 units in Canada, being outsold by the PlayStation 3 and Wii;[161] the Xbox 360 has sold a total of 870,000 units in Canada as of August 1, 2008.[161] In Europe, the Xbox 360 has sold seven million units as of November 20, 2008, according to Microsoft.[163] In Japan, the Xbox 360 has sold 866,167 units as of December 28, 2008, according to Enterbrain.[191] [199] In the United Kingdom, the Xbox 360 has sold 3.9 million units as of June 27, 2009, according to GfK Chart-Track.[164]

On May 13, 2008, Microsoft stated that there will not be a release of a newer version of the Xbox 360 in 2009. Microsoft representative says, "While we [Microsoft] don't normally comment on rumors like this [release of newer and smaller Xbox 360], we can tell you that we have no plans to release a new console in 2009".[200]

On May 28, 2009, Microsoft announced that sales have surpassed the 30-million unit-mark, stating that 2008 was Microsoft's "biggest year in history" also due to the increase of Xbox Live users.[201]

Timeline of hardware models



U.S.

- Launch of Xbox 360 Premium (20 GB) - $399.99
- Launch of Xbox 360 Core - $299.99

April 29, 2007

- Launch Xbox 360 Elite (120 GB) - $479.99[202]

August 6, 2007[85]

- Price Cut on Xbox 360 Premium (20 GB) - $349.99
- Price Cut on Xbox 360 Core - $279.99
- Price Cut on Xbox 360 Elite - $449.99

October 27, 2007

- Launch of Xbox 360 Arcade - $279.99[203]
- Discontinuation of Xbox 360 Core

July 13, 2008[204]

- Discontinuation of on Xbox 360 (20 GB) (Price Cut to $299.99 for remaining stock)

August 1, 2008[204]

- Launch of Xbox 360 Premium (60 GB) - $349.99

September 5, 2008[205]

- Price Cut on Xbox 360 Elite - $399.99
- Price Cut on Xbox 360 (60 GB) - $299.99
- Price Cut on Xbox 360 Arcade - $199.99

August 28, 2009

- Discontinuation of Xbox 360 (60 GB) (Price Cut to $249.99 for remaining stock)
- Price Cut on Xbox 360 Elite - $299.99

June 19, 2010[12]

- Launch of Xbox 360 S 250 GB - $299.99
- Discontinuation of Xbox 360 Elite (Price Cut to $249.99 for remaining stock)
- Discontinuation of Xbox 360 Arcade (Price Cut to $149.99 for remaining stock)

August 3, 2010

- Launch of XBox 360 S 4 GB - $199.99

Technical problems

The Xbox 360 is subject to a number of technical problems. Since the console's release in 2005, users have reported concerns over its reliability and failure rate.[206] [207] [208]

The Xbox 360 displaying three red lights, indicating a "general hardware failure" (often referred to as a "red ring of death")

To aid customers with defective consoles, Microsoft extended the Xbox 360's manufacturer's warranty to three years for hardware failure problems that generate a "General Hardware Failure" error report. A "General Hardware Failure" is recognized by three quadrants of the ring around the power button flashing red. This error is often known as the "Red Ring of Death".[209] In April 2009 the warranty was extended to also cover failures related to the E74 error code.[210] The warranty extension is not granted for any other types of failures that do not generate these specific error codes.

Since these problems surfaced, Microsoft has attempted to modify the console to improve its reliability. Modifications include a reduction in the number, size, and placement of components, the addition of dabs of epoxy on the corners and edges of the CPU and GPU as glue to prevent movement relative to the board during heat expansion,[211] and a second GPU heatsink to dissipate more heat.[212] With the release of the redesigned Xbox 360 S, the warranty for the newer models do not include the three-year extended coverage for "General Hardware Failures".[213]

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External links

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- Official Xbox 360 website (http://www.xbox.com/)
- "Xbox development team blog" (http://web.archive.org/web/20080213124920/http://blogs.msdn.com/xboxteam/default.aspx). Archived from the original (http://blogs.msdn.com/xboxteam/default.aspx) on 2008-02-13.
- Xbox 360 (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Microsoft/Xbox_360/) at the Open Directory Project

PlayStation 3

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""PS3 Slim gains ability to bitstream Dolby TrueHD, DTS-HD MA"". Joystiq. 2009-08-21. . Retrieved 2010-03-22.PlayStation 3 logoOriginal model, Sixaxis controller, DualShock 3 controller and Slim modelCounter-clockwise from the top: Original logo, new logo, original "fat" model, Sixaxis controller, DualShock#DualShock 3DualShock 3 controller, current "slim" model.DeveloperSony Computer EntertainmentSCEIManufacturerSony EMCS, Foxconn, AsusASUSTeKShilov, Anton (2006-07-18). "Asustek Computer Ships PlayStation 3 Consoles". X-bit labs. . Retrieved 2007-05-05.Product familyPlayStationTypeVideo game consoleHistory of video gamesGenerationHistory of video game consoles (seventh generation)Seventh generation eraRetail availability November 11, 2006 Units sold 41.6 million (as of September 30, 2010) "PlayStation®3 Worldwide Hardware Unit Sales". Sony Computer EntertainmentSCEI. . Retrieved 2010-07-29.MediaBlu-ray Disc (PlayStation 3 game disc) DVDCompact DiscPlayStation (console)PlayStation game disc PlayStation 2 game disc (#Model comparison1st & 2nd generations only)Super Audio CD (#Model comparison1st & 2nd generations only)Digital distributionOperating systemXrossMediaBarPlayStation 3 system softwareSystem software version 3.50 "PlayStation 3.com - Support - System Updates". Sony. . Retrieved 2009-06-23.Central processing unitCPU 3.2 GHz Cell (microprocessor)Cell Broadband Engine with 1 Cell (microprocessor)#Power_Processor_Element (PPE)PPE & 7 Cell (microprocessor)#Synergistic Processing Elements (SPE)SPEsStorage capacity 2.5" SATA hard diskhard drive(20 GB, 40 GB, 60 GB, 80 GB, 120 GB, 160 GB, 250 GB, or 320 GB included) (upgradeable)Memory 256 MB system and 256 MB videoDisplayGraphics 550 MHz NVIDIA/Sony Computer EntertainmentSCEI RSX 'Reality Synthesizer'SoundController inputSixaxis, DualShock#DualShock 3DualShock 3, Logitech Driving Force GT, PlayStation 3 accessories#Logitech Cordless Precision™ ControllerLogitech Cordless Precision™ controller, standard PlayStation 3 accessories#USB ControllersUSB controllers, GT Force, Rhythm game controllers, PlayStation Move, GunConGunCon 3, PlayStation Portable, Keyboard and MouseConnectivityOnline servicesPlayStation NetworkBackward compatibilityBackwardcompatibilityPlayStation (console)PlayStation (all models)PlayStation 2 (20 GB, 60 GB and some (CECHExx) 80 GB models)PredecessorPlayStation 2The PlayStation 3 (□□□□□□□□□3 Pureisutēshon Surī, officially abbreviated as PS3 "Entertainment on PS3 has a new look". Sony Computer EntertainmentSony Computer Entertainment Europe. 2009-08-18. . Retrieved 2009-09-01.) is the third home video game console produced by Sony Computer Entertainment and the successor to the PlayStation 2 as part of the PlayStationPlayStation series. The PlayStation 3 competes with Microsoft's Xbox 360 and Nintendo's Wii as part of the History of video game consoles (seventh generation)seventh generation of video game consoles.A major feature that distinguishes the PlayStation 3 from its predecessors is its unified online gaming service, the PlayStation Network, "PlayStation Direct.net". PlayStation Direct.net. . Retrieved 2010-08-06. which contrasts with Sony's former policy of relying on video game developers for online gameonline play. "Sony confirms PS2 online plans". The Register. 2002-08-15. . Retrieved 2008-01-14. Other major features of the console include its robust multimedia capabilities, "PlayStation.com - PLAYSTATION®3 Features: Multimedia". Sony Computer Entertainment America. . Retrieved 2010-08-06. connectivity with the PlayStation Portable,De Leon, Al (2007-12-26). "PlayStation Blog — PS3 Tips — Remote Play and PlayStation Store". SCEA. . Retrieved 2008-01-14. and its use of the Blu-ray Disc as its primary storage medium. "PlayStation 3 Features - BluRay". SCEA. . Retrieved 2010-03-04. The PS3 was also the first

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Two stock-keeping units were available at launch: a basic model with a 20 GigabyteGB hard disk drive and a premium model with a 60 GB hard drive and several additional features "IGN: E3 2006: The final word on PlayStation". IGN. 2006-05-24. . Retrieved 2008-01-14. (the 20 GB model was not released in Europe or Oceania). "Reeves: No PAL 20GB/80GB PS3 Plans". Interactive Entertainment Today. June 10, 2007. . Retrieved 2007-08-31. Since then, several revisions have been made to the console's available models, most notably with the release of a new slim model in September 2009 to coincide with rebranding of the console and its logo. "Sony PlayStation 3 review". CNET. 2007-11-16. . Retrieved 2008-01-14. "Entertainment on PS3 has a new look". PlayStation UK. 2009-08-18. . Retrieved 2009-08-18.HistorySony officially unveiled the PlayStation 3 (then marketed as PLAYSTATION 3 "PLAYSTATION is in capitals". Kotaku. 2006-08-10. . Retrieved 2008-01-18.) to the public along with its original boomerang style controller "E3 2005: PlayStation 3 - The ("boomerang") Controller". IGN Entertainment, Inc. 2005-05-16. . Retrieved 2010-02-07. on May 16, 2005, during the E3 2005E3 2005 conference.Sulic, Ivan (2005-05-16). "IGN: E3 2005: PS3 Official". IGN. . Retrieved 2008-01-14. A functional version of the system was not present there, "TGS 2005 booth round-up". Gamasutra. 2005-09-15. . Retrieved 2008-01-14. nor at the Tokyo Game Show in September 2005, "Sony E3 2005 press conference video". IGN. 2005-05-17. . Retrieved 2008-01-14. although demonstrations (such as Metal Gear Solid 4: Guns of the Patriots) were held at both events on software development kits and comparable personal computer hardware. Video footage based on the predicted PlayStation 3 specifications was also shown (notably a Final Fantasy VII tech demo).Allen, Jason (2005-05-15). "E3 2005: Eyes-on the Final Fantasy VII Tech Demo". IGN. . 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With it being a somewhat last-minute delay, some companies had taken deposit-based pre-orders, to which Sony informed customers that they were eligible for full refunds or could continue the pre-order. "Official PS3 News Thread - Page 61 - NTSC-uk.com Forums". Ntsc-uk.domino.org. . Retrieved 2010-08-25. On January 24, 2007, Sony announced that the PlayStation 3 would go on sale on March 23, 2007 in Europe, Australia, the Middle East, Africa and New Zealand. The system sold about 600,000 units in its first two days. "Sony’s PS3 has record launch in Europe". Financial Times. March 28, 2007. . Retrieved 2007-09-01. On March 7, 2007, the 60 GB PlayStation 3 launched in Singapore with a price of Singapore DollarS$799. "Singapore's PS3 launch party". CNET. 2007-03-08. Archived from the original on February 19, 2008. . Retrieved 2008-01-14. The console was launched in South Korea on June 16, 2007 in a single version equipped with an 80 GB hard drive and IPTV. "PlayStation 3 (80 GB) Korean". SCEI. . Retrieved 2008-01-18.PS3 Slim and console rebranding Following speculation that a 'slim' model was in the pipeline Sony officially announced the PS3 CECH-2000 model on August 18, 2009 at the Sony Gamescom press conference. "Sony Announces Slim PS3 - It Lives This September!". Kotaku. 2009-08-18. . Retrieved 2009-08-18. Among its features are a slimmer form factor and quieter noise when powered on. It was released in major territories by September 2009. As part of the release for the slim model, the logo was changed from the "Spider-Man (film series)Spider-Man font" and capitalized PLAYSTATION 3 to a more traditional PlayStation (console)PlayStation and PlayStation 2 like 'PlayStation 3' logo with "PS3" imprinted on the console.the console's finish Along with the console and logo redesign, the boot screen of all consoles changed from "Sony Computer Entertainment" to "PS3 PlayStation 3", with a new chime and the game start splashscreen being dropped.the console The cover art and packaging of games has also been changed to reflect the redesign.Console configurationsSystem unit The PlayStation 3 is convex on its left side, with the PlayStation logo upright, when vertical (the top side is convex when horizontal) and has a glossy black finish. PlayStation designer Teiyu Goto stated that the Spider-Man (film)Spider-Man font-inspired logo "was one of the first elements SCEI president Ken Kutaragi decided on and the logo may have been the motivating force behind the shape of PS3". "Kutaragi "insisted" on Spider-Man font for PS3". computerandvideogames.com. 2007-03-29. . Retrieved 2008-01-18.The PlayStation 3 features a slot-loading 2x speed Blu-ray Disc drive for games, Blu-ray movies, DVDs, CDs and other optical media. "PlayStation 3 Technical Specifications". SCEA. Archived from the original on January 13, 2008. . Retrieved 2008-01-14. It was originally available with hard drives of 20 and 60 GB (20 GB model was not available in PAL regions) "PS3 60 GB review". CNET. 2006-11-13. . Retrieved 2008-01-14. but various sizes up to 320 GB "Sony Computer Entertainment Japan to introduce PlayStation®3 (PS3®) with 160GB and 320GB hard disk drive, available from July 29, 2010 at a Recommended Retail Price of 29,980 yen and 34,980 yen respectively". Sony. 2010-07-06. . Retrieved 2010-07-06. "White PS3 Slim out in Japan this month". Eurogamer. 2010-07-06. . have been made available since then (see: #Model comparisonmodel comparison). All PS3 models have user-upgradeable 2.5" SATA hard drives.Rubenstein, Jeff (2007-12-28). "PlayStation Blog — Upgrading the PS3's hard drive". . Retrieved 2008-01-14.The PlayStation 3 uses the Sony, Toshiba, IBM-designed Cell microprocessor as its CPU, which is made up of one 3.2 GHz PowerPC-based "Power Processing Element" (PPE) and eight Synergistic Processing Elements (SPEs). "Cell Introduction" (PDF). IBM. . Retrieved 2008-01-14. The eighth SPE is disabled to improve chip yields. "Sony PlayStation 3 Cell Processor". 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SPEs. And from those seven, one SPE will be used by the operating system for various tasks, This leaves six SPEs for game programmer to use." Only six of the seven SPEs are accessible to developers as the seventh SPE is reserved by the console's operating system. Computer graphicsGraphics processing is handled by the NVIDIA RSX 'Reality Synthesizer', which can output resolutions from 480i/576i Standard definitionSD up to 1080p high definition televisionHD. The PlayStation 3 has 256 MB of XDR DRAM main memory and 256 MB of GDDR3 video memory for the RSX. "PS3 Specs". IGN. 2005-05-16. . Retrieved 2008-01-14.The system has BluetoothBluetooth 2.0, gigabit Ethernet, Universal Serial BusUSB 2.0 and High-Definition Multimedia InterfaceHDMI 1.3a (now upgraded via firmware to spec HDMI 1.41.4), built in on all currently shipping models. Wi-Fi networking is also built-in on the 40, 60, 80 GB and slim models while a flash card reader (compatible with Memory Stick, Secure Digital cardSD/MultiMediaCardMMC and CompactFlash/Microdrive media) is built-in on 60 GB and CECHExx 80 GB models. The system supports up to 7 controllers that are connected via Bluetooth 2.0 technology. quick reference manual for 20 GB US PlayStation 3 page 14The PS3's hardware has also been used to PlayStation 3 clusterbuild supercomputers for high-performance computing. "Building Supercomputer Using PlayStation 3". Console Watcher.com. 2006-08-28. . Retrieved 2006-08-28. Fixstars Solutions sell a version of Yellow Dog Linux for the PlayStation 3 (originally sold by Terra Soft Solutions). "Fixstars: Products". Fixstars Solutions. . Retrieved 2010-02-04. RapidMind produced a stream programming package for the PS3, "RapidMind and Terra Soft partner to unleash PlayStation 3 for Linux". RapidMind. 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As a more cost-effective alternative to conventional supercomputers, the U.S. military has purchased clusters of PS3 units for research purposes. "Sony still subsidizing US military supercomputer efforts". Ars Technica. . Retrieved 2009-12-18. Retail PS3 Slim units cannot be used for supercomputing, because the PS3 Slim lacks the ability to boot into a third-party OS. On March 22, 2007, SCE and Stanford University released the Folding@home project for the PlayStation 3. "Folding@home". Sony Computer Entertainment. . Retrieved 2007-03-18. This program allows PS3 owners to lend the computing power of their consoles to help study the physical process of protein folding. In December 2008, a group of hackers used a cluster of 200 PlayStation 3's to hack the security protocol Transport Layer SecuritySSL. "PlayStation 3 used to hack SSL". Engadget. . Retrieved 2009-10-31.Original model60 GB model with Sixaxis controller There are several original PlayStation 3 hardware models, which are commonly referred to by the size of their included hard disk drive: 20, 40, 60, 80 or 160 GB. "PlayStation 3 - Things to Know — PlayStation 3 model comparison". SCEA. Archived from the original on 2008-02-13. . Retrieved 2008-01-14. Although referred to by their HDD size, the capabilities of the consoles vary by region and release date. The only difference in the appearance of the first five models was the color of the trim, number of USB ports, the presence or absence of a door (which covers the flash card readers on equipped models) and some minor changes to the air vents. All retail packages include one or two Sixaxis controllers and/or a PlayStation 3 accessories#DualShock 3DualShock 3 controller (beginning June 12, 2008 "Metal Gear Solid 4 PS3 Bundle Announced | Kotaku Australia". Kotaku.com.au. . Retrieved 2008-10-27. "Metal Gear Solid 4: The PS3 Bundle: The Cardboard Box". Kotaku.com. . Retrieved 2008-10-27.), one miniUSB to USB cable (for connecting the controller and PlayStation Portable to the system), one composite video/stereo audio output cable, one Ethernet cable (20, 60 and CECHExx 80 GB only) and one power cable. "PS3 80GB bundle contents". SCEA. . Retrieved 2008-10-24. "Compare PLAYSTATION3 Systems". SCEA. . Retrieved 2009-08-14. All models support software emulation of the original PlayStation,Boyes, Emma (2007-10-05). "UK PS3 drops price, 40GB finally official". GameSpot. CNET. . Retrieved 2007-10-06.Plunkett, Luke. "Customer Service: Sony Could Run BC on 40GB PS3s.

They Just Don't Want To.". . Retrieved 2007-10-09. but support for PlayStation 2 backward compatibility has continually diminished with later models and the last model to advertise integrated backward compatibility was the 80GB Metal Gear Solid 4 Bundle. "Can I play PlayStation game console and PlayStation2 computer entertainment system format software titles on the PLAYSTATION3 computer entertainment system?". Sony. . Retrieved 2008-01-14. Compatibility issues with games for both systems are detailed in a public database hosted by the manufacturer. "PS3's Backwards Compatibility Detailed - Video Game News, Video Game Coverage, Video Game Updates, PC Game News, PC Game Coverage". GameDaily. 2006-11-21. . Retrieved 2009-08-07. All models, excluding the 20 GB model, include IEEE 802.11802.11 b/g Wi-Fi. In addition to all of the features of the 20 GB model, the 60 GB model has internal IEEE 802.11 b/g Wi-Fi, multiple flash card readers (SD/MultiMedia Card, CompactFlash Type I/Type II, Microdrive, "PlayStation 3 Safety & Support manual" (PDF). SCEI. . Retrieved 2008-01-15. Memory Stick/PRO/Duo) and a chrome colored trim. "About PlayStation3 - Technical Specifications". PlayStation.com. Archived from the original on 2008-02-13. . Retrieved 2008-02-25. In terms of hardware, the 80 GB model released in South Korea is identical to the 60 GB model released in the PAL regions, except for the difference in hard drive size. "South Korean PS3". gamesindustry.biz. 2007-05-21. . Retrieved 2008-01-14.Like the South Korean and European models, the North American 80 GB (2007) model also excludes the PlayStation 2 "Emotion Engine" CPU chip. However, it retains the "Graphics Synthesizer" GPU.Graft, Kris. "PS2 Software Emulation Unlikely for 40GB PS3". Nex Gen. . Retrieved 2010-03-04. Due to PlayStation 3 games#Removal of hardware supportthe elimination of the "Emotion Engine", the level of compatibility was reduced. The 40 GB, 80 GB (2008) and 160 GB models have two USB ports instead of the four USB ports on other models and do not include multiple flash card readers, Super Audio CDSACD support, "PS3 SACD FAQ". ps3sacd.com. . Retrieved 2009-08-22. or any backward compatibility with PlayStation 2 games. This was due to the removal of "Graphics Synthesizer" GPU, which stripped the units of all PlayStation 2 based hardware. "New PLAYSTATION3 Model to Take Holiday Season by Storm". Sony Computer Entertainment. October 5, 2007. . Retrieved 2007-10-05.Tretton, Jack (speaker). (2008-07-15). E3 2008: Sony Press Conference (Part 3). Sony Computer Entertainment America (via IGN). Event occurs at 17:38. . Retrieved 2008-07-16.No official Wi-Fi or flash memory card readers were ever released by Sony for the 20 GB system, although Sony had plans to do so.Ellie Gibson (2006-05-16). "20 GB PlayStation 3 will be upgradeable, says Sony". gamesindustry.biz. . Retrieved 2006-05-16. As of September 2009 Sony have placed no further emphasis on these proposed add-ons. Nevertheless, as the model features four USB 2.0 ports, wireless networking and flash memory card support can already be obtained through the use of widely available external USB adapters and third-party PS3-specific media hubs.It was rumored that the Cell processors in the third-generation PS3s (40 GB, 2008 80 GB and 160 GB) would move from a 90 nm process to the newer 65 nm process,Conrad Quilty Harper (2007-10-30). "40GB PS3 features 65nm chips, lower power consumption (30% less)". Engadget. . Retrieved 2007-10-31. which SCEI CEO Kaz Hirai later confirmed,Anoop Gantayat (2007-11-08). "New PS3 Uses 65nm Process". ign. . Retrieved 2007-11-10. and later to 45 nm. This change lowers the Energy conservationpower consumption of the console and makes it less expensive to produce.Jon Stokes (2008-02-07). "IBM shrinks Cell to 45nm". Ars Technica. . Retrieved 2009-01-07.Slim model120 GB Slim model with DualShock 3 controller. The redesigned, slimmer version of the PlayStation 3 (commonly referred to as the "PS3 Slim" and officially branded "PS3") is currently the only model in production. It features an upgradeable 120 GB, 160 GB, 250 GB or 320 GB hard drive and is 33% smaller, 36% lighter and consumes 34% (CECH-20xx) or 45% (CECH-21xx) less power than the previous model,Paul Miller (2009-08-18). "Sony unveils slimmer PS3: $300, lands in September (updated!)". Engadget. . Retrieved 2009-08-18. "PlayStation 3 Slim review". Engadget.com. . Retrieved 2010-08-25. or one third of the original PS3 model. The Cell microprocessor has moved to a 45nm45 nm manufacturing process, which lets it run cooler and quieter than previous models, and the cooling system has been redesigned. "Sony answers our questions about the new PlayStation 3". Ars Technica. August 18, 2009. . Retrieved August 19, 2009. The RSX 'Reality Synthesizer'RSX moved to a 40 nm process "Sony PS3 upgraded with cooler 40-nm RSX graphics chip, profits await (updated)". Engadget. . Retrieved 2010-08-25. in the latest revision. The PS3 slim also includes support for High-Definition Multimedia Interface#CECCEC (more

commonly referred to by its manufacturer brandings of BraviaSync, VIERA Link, EasyLink etc.) which allows control of the console over HDMI by using the TV's remote control. The PS3 Slim no longer has the "main power" switch like the previous PS3 models, similar to redesigned PstwoPlayStation 2 slim. Support for emulation to play PS2 titles is not present in the Slim version.The PS3 slim was officially released on September 1, 2009 in North America and Europe and on September 3, 2009 in Japan, Australia and New Zealand. "Entertainment on PS3 has a new look". PlayStation AU. 2009-08-18. . Retrieved 2009-08-24.David Carnoy (2009-08-18). "Sony officially announces $299 PS3 Slim". cnet. . Retrieved 2009-08-18. However, some retailers such as Amazon.com, Best Buy and GameStop started to sell the PS3 slim on August 25, 2009.Stephen Totilo (2009-08-21). "Sony, GameStop Indicate PS3 Slim Available In U.S. Before September". Kotaku. . Retrieved 2009-08-22.Ross Miller (2009-08-25). "PS3 Slim popping up all over the US (update: it's officially on sale)". Engadget. . Retrieved 2009-08-26. The PS3 Slim sold in excess of a million units in its first 3 weeks on sale. "New PS3 has sold over one million". Eurogamer. . Retrieved 2009-11-07. A 250 GB Final Fantasy XIII-themed PS3 Slim, which was white in color with pink designs, was officially announced on September 24, 2009 at the Tokyo Game Show as part of a bundle in Japan for Final Fantasy XIII, it was initially revealed in U.S. Federal Communications Commission (FCC) filings as the PS3 CECH-2000B.CJPC (2009-08-18). "PS3 Slim CECH-2000B 250GB Model Uncovered at FCC Site". ps3news. . Retrieved 2009-08-22. "First Look At The Final Fantasy XIII PlayStation 3". Kotaku. 2009-09-24. . Retrieved 2009-09-24. Sony Computer Entertainment Australia also announced later that day that it would be bringing the 250 GB PS3 slim to Australia which would be bundled with other games and will not feature the Final Fantasy XIII theme. Although no North American bundles have been announced for the 250 GB PS3 slim, it is sold as a stand-alone console in North America. "250GB PS3 Slim bundles coming to Australia". qj.net. 2009-09-24. . Retrieved 2009-09-25.In July 2010, Sony announced two new sizes of Slim PS3, 160 GB and 320 GB, with the 120 GB model being discontinued in Japan. These were launched on July 29, 2010 in Japan, with the 160 GB version available in "Classic White" as well as the standard "Charcoal Black". The black 160 GB version was also made available as a bundle with the Japan-only DVR accessory PlayStation 3 accessories#tornetorne. It was later announced that the new sizes were to be launched in other regions, with the 160 GB model available from August 2010 in North AmericaFrucci, Adam (2010-08-17). "New, Higher-Capacity PS3 Models Coming This Fall". Gizmodo, Gawker Media. . Retrieved 2010-08-18. and October 2010 in Europe. "Sony PlayStation Move Bundle Arrives in September". mashable.com. 2010-08-18. . Retrieved 2010-08-19. The 320 GB model is to be available in North America only as part of a bundle with PlayStation Move, a PlayStation Eye and a copy of Sports Champions, and in Europe with PlayStation Move, a PlayStation Eye and a demo disc. The bundles were released on September 19, 2010 and September 15, 2010 respectively, to coincide with the launch of PlayStation Move.Model comparison "Limited "Dragon" PlayStation 3 Console Is For Japanese Eyes Only". Kotaku. 2009-01-06. . Retrieved 2010-04-29. "PS3 250GB bundles priced, detailed". Eurogamer. 2009-09-09. . Retrieved 2010-05-20. Model Features Available Colors First Available In production Available bundles 20 GBCECHBxxNTSC 4 USB 2.0 ports Hardware-based PS2 emulatoremulationSuper Audio CDSACD playbackLinux support[a]Sixaxis controller N/A Piano Black, Black trim JapanJPNorth AmericaNA November 2006 No "Sony Scraps Sale of Priciest PlayStation 3s in Japan". 2008-01-10. . Retrieved 2008-01-10.N/A60 GBCECHAxxNTSCmemory cardFlash memory card readers 802.11b/g Wi-Fi Piano Black, Chrome trim No 60 GBCECHCxxPAL802.11b/g Wi-FiFlash memory card readers 4 USB 2.0 ports Partially software-based PS2 Video game console emulatoremulation "Sony's Euro PS3 will play fewer older games". IDG Network. . Retrieved 2009-11-07.Super Audio CDSACD playback Linux support[a]Sixaxis controller (MGS4 bundles sold with DualShock 3 controller)United KingdomUKRepublic of IrelandROI March 16, 2007EuropeEUAustralasiaAUS March 23, 2007MotorStorm, Resistance: Fall of Man and an extra Sixaxis gamepad (UK) "BBC Confirms European PS3 Bundle Deal". Kotaku. 2007-07-12. . Retrieved 2010-05-20.80 GBCECHExxNTSCNorth AmericaNA August 2007 Metal Gear Solid 4: Guns of the PatriotsMGS4MotorStorm40 GBCECHGxx CECHHxx CECHJxxPAL, NTSC802.11b/g Wi-Fi 2 USB 2.0 ports Linux support[a]DualShock 3 controller Piano Black Ceramic White[b] Satin Silver[c]Tanaka, John (2008-02-04). "New PS3 colour in Japan". IGN. . Retrieved 2008-02-05.(All with Satin Silver trim) Gun-Metal Grey, Gun-Metal

Grey trim[d]GamingBits (2008-05-19). "Metal Gear Solid 4 Limited Edition PLAYSTATION3 Bundle". Gamingbits.com. . Retrieved 2010-08-25.EuropeEUAustralasiaAUS October 2007 North AmericaNAJapanJP November 2007 NoRandolph Ramsay and Luke Anderson (2008-07-16). "E3 08: 80GB PS3 coming to Europe, Australia on August 27". GameSpot. . Retrieved 2008-07-17.MGS4 (Gun-Metal Grey console)[d]Grand Theft Auto IVGTA IV (Europe)Jem Alexander (2008-04-23). "GTA IV bundle confirmed for Europe". Joystiq. . Retrieved 2010-04-28.80 GBCECHKxx CECHLxx CECHMxxPAL, NTSC Piano Black Ceramic White Satin Silver[c](All with Satin Silver trim)North AmericaNAEuropeEUAustralasiaAUS August 2008 JapanJP October 2008 No 160 GBCECHPxx CECHQxxPAL, NTSC "company press release". SCEE. 2008-08-20. . Retrieved 2008-08-20. "Live from Leipzig: North American Hardware Announcements". SCEA. 2008-08-20. . Retrieved 2008-08-20. Piano Black Cloud Black[f]North AmericaNA November 2008 EuropeEU October 2008 Uncharted: Drake's FortuneUncharted (NTSC region)Final Fantasy VII: Advent Children Blu-ray ("Cloud Black" console with custom design)[f]North, Dale. "Final Fantasy VII Advent Children PS3 bundle is real". Destructoid. . (Japan)120 GB slimCECH-20xxA CECH-21xxAPAL, NTSC802.11b/g Wi-Fi 2 USB 2.0 ports BRAVIA Sync XMB control (HDMI-CECCEC) Slimmer form factor Dolby TrueHD & DTS-HD Master Audio bitstreamingDualShock 3 controller Charcoal Black North AmericaNAEuropeEU September 1, 2009 AustralasiaAUSJapanJP September 3, 2009 Sony Computer Entertainment Europe - Virtual Press OfficeLittleBigPlanet and Ratchet & Clank Future: A Crack in Time (NTSC region)Michael Jackson's This Is ItThis Is It Blu-rayEllie Gibson (2010-01-06). "Michael Jackson PS3 bundle on the way PlayStation 3 News - Page 1". Eurogamer.net. . Retrieved 2010-08-25.250 GB slimCECH-20xxBCECH-21xxBPAL, "TGS 09: Motion Controller Details, Other New Info". PlayStation Blog Europe. September 24, 2009. . Retrieved October 2, 2009. NTSC Charcoal Black White and Pink[g]JapanJP December 17, 2009 North AmericaNA November 3, 2009 "NEW 250GB PlayStation 3 System Available November 3 – PlayStation.Blog". Blog.us.playstation.com. 2009-10-15. . Retrieved 2010-08-25.EuropeEU October 2009AustralasiaAUS October 15, 2009160 GB slimCECH-25xxAPAL, NTSC Charcoal Black Classic White "White PS3 Slim with 160GB HDD hits Japan July 29th, new 320GB HDD option". Engadget. 2010-07-06. . Titanium BlueAshcraft, Brian (2010-08-18). "Gran Turismo 5 Gets Blue PS3 In Japan". Kotaku, Gawker Media. . Retrieved 2010-08-18.JapanJP July 29, 2010North AmericaNA August 2010EuropeEU October 2010Yes PlayStation 3 accessories#torneTorne (Japan)Gran Turismo 5 (Japan; Titanium Blue console)320 GB slimCECH-25xxBPAL, NTSC Charcoal Black Classic WhiteGilbert, Ben. "White 320GB PS3 coming to Japan October 21". Joystiq. .JapanJP July 29, 2010North AmericaNA September 19, 2010EuropeEU September 15, 2010PlayStation Move, PlayStation Eye and Sports Champions bundle (North-America)PlayStation Move, PlayStation Eye and demo disc bundle (Europe)Key:"1st Generation" "2nd Generation" "3rd Generation" "4th Generation" All Piano Black and Ceramic White models have a glossy finish "PlayStation 3 40GB model official specifications". SCEI. Archived from the original on 2008-01-23. . Retrieved 2008-01-15.All models include: Blu-ray DiscBlu-ray/DVD/CD drive, High-Definition Multimedia InterfaceHDMI 1.3a,Sony Computer Entertainment (2006-09-22). "PLAYSTATION3 HDD 20 GB EQUIPPED WITH HDMI AS STANDARD" (PDF). Press release. . Retrieved 2007-05-24. Bluetooth 2.0, Gigabit Ethernet (10BASE-T, 100BASE-TX, 1000BASE-T) and PlayStation (console)PlayStation One backward compatibility through software emulation.Model numbers differ by region. See PlayStation 3 hardware#Model numbersPlayStation 3 hardware – model numbers for details.a Linux support removed in firmware version 3.21. See #Removal of "OtherOS" supportRemoval of "OtherOS" support for detailsb Ceramic white model available in Asia and Japan only.c Satin silver model available in Asia and Japan only.d Gun-Metal Gray model is only available as part of the Metal Gear Solid 4: Guns of the PatriotsMGS4 bundle.e Yakuza 3 bundle features a Ceramic White model with custom grey dragon designs on its case. This version had a limited run of 10,000 units. "Yakuza 3 PS3 Special Edition unveiled". Quick Jump Network (QJ.net). 2009-01-06. . Retrieved 2010-04-29.f "Cloud Black" (dark grey) console is only available as part of a Japanese limited edition Final Fantasy VII: Advent Children bundle and features a custom white design on the consoleg White and Pink model is only available as part of the Japanese Final Fantasy XIII bundle and features a pink design of Final Fantasy XIII character "Lightning (Final Fantasy)Lightning" on its case.Controllers and accessoriesNumerous accessories for the console have been

developed including the wireless Sixaxis and DualShock 3 controllers, the Logitech Driving Force GT, the PlayStation 3 accessories#Logitech Cordless Precision™ ControllerLogitech Cordless Precision™ Controller, the PlayStation 3 accessories#Official PS3 Bluetooth Blu-ray remoteBD Remote, the PlayStation Eye camera and the PlayTV DVB-T tuner/digital video recorder accessory. "PlayStation 3 Accessories". SCEA. Archived from the original on 2008-01-13. . Retrieved 2008-01-14. "PlayTV on PlayStation 3 explained". Sony Computer Entertainment Europe via Kotaku. August 22, 2007. . Retrieved 2008-10-14.At Sony's 2006 E3 press conference, the (then) standard wireless Sixaxis controller was announced. The controller was based on the same basic design as the PlayStation 2PlayStation 2's DualShock#DualShock 2DualShock 2 controller but was wireless, lacked vibration capabilities, had a built-in accelerometer (that could detect motion in three directional and three rotational axes; six in total, hence the name Sixaxis) and had a few cosmetic tweaks. At its press conference at the 2007 Tokyo Game Show, Sony announced the DualShock 3 (trademarked DUALSHOCK 3), a PlayStation 3 controller with the same function and design as the Sixaxis, but with vibration capability included. "DualShock 3 Wireless Controller With Rumble Feature To Be Introduced For PlayStation 3". Sony Computer Entertainment. 2007-09-20. . Retrieved 2007-09-20. Hands-on accounts describe the controller as being noticeably heavier than the standard Sixaxis controller and capable of vibration forces comparable to the DualShock 2. "TGS '07: Spot On — The Dual Shock 3". GameSpot. 2007-09-19. . Retrieved 2007-09-20. It was released in Japan on November 11, 2007; "DualShock 3 will launch on November 11 in Japan". Kotaku. 2007-10-08. . Retrieved 2008-01-14. in North America on April 5, 2008; "Sony Announces New 80GB PS3 Bundle, DualShock 3, Red PSP". Daily Tech. 2008-02-26. . Retrieved 2008-03-17. in Australia on April 24, 2008; in New Zealand on May 9, 2008; in mainland Europe on July 2, 2008; "TGS 07: DualShock 3 announced". IGN. 2007-09-19. . Retrieved 2008-01-18. the United Kingdom and Ireland on July 4, 2008 and in the Seychelles on March 2010. During E3 09E3 2009, Sony unveiled plans to release a motion controller later to be named PlayStation Move at GDC 2010. It was released on September 15, 2010 in Europe; September 19, 2010 in North America and October 21, 2010 in Japan. "PlayStation Move motion controller to hit worldwide market starting this September". Sony Computer Entertainment. 2010-06-16. . Retrieved 2010-06-30.On October 13, 2010 Sony announced an official surround sound system for the PS3 through the official PlayStation Youtube channel.“”. "The official surround sound system for your PS3". YouTube. . Retrieved 2010-11-11.ReliabilityThe PlayStation 3 illuminating the yellow light, indicating a non-specific failureA 2009 study by SquareTrade, a warranty provider, found a two-year failure rate of 10% for PlayStation 3s.Sands A, Tseng V. (2009). Game Console Failure Rates: Wii 9 times more reliable than Xbox 360, 4 times more than PS3. SquareTrade. According to Ars Technica, the number of PlayStation 3 consoles that have experienced failure is well within the normal failure rates in the consumer electronics industry.Kuchera, Ben (2008-02-14). "Xbox 360 failure rates worse than most consumer electronics". Arstechnica.com. . Retrieved 2010-08-25.However, in September 2009, the BBC television programme Watchdog (TV series)Watchdog aired a report investigating the purported "yellow light of death" issue, which affects fewer than 0.5% of PlayStation 3s sold in the UK.Rob Unsworth (2009-09-17). "BBC "Watchdog" report on "Yellow Light of Death"". BBC. . Retrieved 2010-05-31. "Of all PS3's sold in the UK to date, fewer than one half of one percent of units have been reported as failing in circumstances where the yellow indicator is illuminated." The yellow light indicates a non-specific hardware failure which renders the system unusable.The program also noted that the PlayStation 3 has a one-year warranty (typical of most consumer electronics products). Out-of-warranty PlayStation 3 owners can pay Sony a set fee for a refurbished console. Sony PlayStation 3 and the "yellow light of death" Watchdog (TV series)Watchdog, September 17, 2009In response to the tone of the program, senior vice president and managing director, Ray Maguire issued a document criticizing the program and citing potential attempt to harm Sony and PlayStation brand and stating that the three PlayStation 3 systems the program tested is not evidence of a manufacturing defect. Sony tackles BBC over 'PS3 failure' report Gameindustry.biz, September 17, 2009Owen Good (2009-09-17). "Sony Pre-Emptively Blasts BBC Report on PS3 Failures". Kotaku. . Retrieved 2010-04-11.Leap year bug On March 1, 2010 (UTC), many of the original (non-Slim) PlayStation 3 models worldwide were experiencing errors related to their internal system clock. The error had a multitude of symptoms. Initially, the main problem seemed to be the inability to connect to the

PlayStation Network. However, the root cause of the problem was unrelated to the PlayStation Network, since even users who had never been online also had problems playing installed offline games (which queried the system timer as part of startup) and using system themes. At the same time many users noted that the console's clock had gone back to December 31, 1999. The event was nicknamed the ApocalyPS3, a play on the word Apocalypse.Previous post Next post. "ApocalyPS3: Buggy Clock Drives PlayStation 3 Haywire | GameLife". Wired.com. . Retrieved 2010-08-25.The error code displayed was typically 8001050F and affected users were unable to sign in, play games, use dynamic themes and view/sync trophies. Sony PS3 network glitch affects thousands The Daily Telegraph, March 1, 2010 The problem only resided within the 1st through to the 3rd generation original PS3 units while the newer "Slim" models were unaffected due to different internal hardware for the clock. Sony confirmed there was an error and stated “We are narrowing down the issue and continue to work to restore service to all.” "PlayStation Network Status Update – PlayStation.Blog.Europe". Blog.eu.playstation.com. . Retrieved 2010-08-25. By March 2 (UTC), 2010, owners of the original PS3 could connect to PSN successfully and the clock no longer showed December 31, 1999. "PS3 issues apparently resolved, game on". Engadget. . Retrieved 2010-08-25. Sony stated that the affected models incorrectly identified 2010 as a leap year, due to a bug in the Binary-coded decimalBCD method of storing the date.Jeff Bakalar (2010-03-01). "PS3 console errors fixed, leap year bug to blame". CNET.com. . Retrieved 2010-03-02.Hiroko Tabuchi (2010-03-01). "Error Blocked PlayStation 3 From Using Its Network". New York Times. . Retrieved 2010-03-02. However, for some users, the hardware's operating system clock (updated from the internet mainly and not associated with the internal clock) needed to be updated manually or by resyncing it via the internet. On June 29, 2010 Sony released PS3 system software update 3.40, which improved the functionality of the internal clock to properly account for leap years. "PlayStation 3 Features Software Updates". Sony. . Retrieved 2010-09-03.Operating systemSystem softwareSony has included the ability for the operating system, referred to as System Software, to be updated. "PlayStation.com - PLAYSTATION®3 - Features - SystemUpdate". SCEA. . Retrieved 2010-02-04. The updates can be acquired in several ways: If the PlayStation 3 has an active InternetworkingInternet connection, updates may be downloaded directly from the PlayStation Network to the PS3 and subsequently installed. Systems with active Internet will automatically check online for software updates each time the console is started. Using an external PC, a user may download the update from the official PlayStation website, transfer it to portable Computer storagestorage media and install it on the System. Some game discs come with system software updates on the disc. This may be due to the game requiring the update in order to run. If so, the software may be installed from the disc.The original PlayStation 3 also included the ability to install other operating systems, "Install Other OS". PlayStation 3 User's Guide. Sony Computer Entertainment. 2007. . Retrieved 2007-04-25. such as Linux on the PlayStation 3Linux.Boyes, Emma (2006-11-27). "Yellow Dog Linux launches for PS3". GameSpot. . Retrieved 2006-11-30. This was not included in the newer slim models and was removed from all older PlayStation 3 consoles with the release of firmware update 3.21 in April 2010. The functionality is now only available to users of original consoles who choose not to update their system software beyond version 3.15.Andrew Yoon (2010-03-29). "Linux support dropped from PS3 firmware 3.21". Joystiq. . Retrieved 2010-03-29.Graphical user interfaceThe standard PlayStation 3 version of the XrossMediaBar (pronounced Cross Media Bar, or abbreviated XMB) includes nine categories of options. These are: Users, Settings, Photo, Music, Video, Game, Network, PlayStation Network and Friends (similar to the PlayStation Portable media bar). A tenth TV category is displayed between Music and Video if PlayTV or torne is installed or if the console meets certain criteria to access select Internet televisioncatch-up television services. By default, the #What's NewWhat's New section of PlayStation Network is displayed when the system starts up. The PS3 includes the ability to store various master and secondary user profiles, manage and explore photos with or without a musical Slideshowslide show, play music and copy Red Book (audio CD standard)audio CD tracks to an attached data storage device, play movies and video files from the hard disk drive, an optical disc (Blu-ray Disc or DVD-Video) or an optional USB mass storage or Flash card, compatibility for a USB keyboard and mouse and a web browser supporting in/compatible file download function. "PlayStation 3 Features Connectivity". Sony. . Retrieved 2010-09-03. Additionally, Universal Plug and PlayUPnP media will appear in the respective audio/video/photo categories if a UPnP AV MediaServerscompatible media

server or Digital Living Network AllianceDLNA server is detected on the local network. The Friends menu allows mail with emoticon and attached picture features and Videoconferencingvideo chat which requires an optional PlayStation Eye or EyeToy webcam. "About the PlayStation Network". Sony. Archived from the original on 2008-01-12. . Retrieved 2008-01-13. The Network menu allows online shopping through the PlayStation Store and connectivity to the PlayStation Portable via Remote Play.Digital rights management The PlayStation 3 console protects certain types of data and uses digital rights management to limit the data's use. Purchased games and content from the PlayStation Network store are governed by PlayStation's Network Digital Rights Management (NDRM). The NDRM allows users to access the data from up to 5 different PlayStation 3's that have been activated using a users PlayStation Network ID. "PlayStation Knowledge Center". Sony. . Retrieved 2010-07-06. PlayStation 3 also limits the transfer of copy protected videos downloaded from its store to other machines and states that copy protected video "may not restore correctly" following certain actions after making a backup such as downloading a new copy protected movie. "PlayStation Knowledge Center". Sony. . Retrieved 2010-07-06.Photo managementPhoto GalleryPhoto Gallery main menu Photo Gallery is an optional application to view, create and group photos from the PS3, which is installed separately from the system software at 105 MB. It was introduced in system software version 2.60 and provides a range of tools for sorting through and displaying the system's pictures. The key feature of this application is that it can organize photos into groups according to various criteria. Notable categorizations are colors, ages, or facial expressions of the people in the photos. Slideshows can be viewed with the application, along with music and playlists. The software was updated with the release of system software version 3.40 allowing users to upload and browse photos on Facebook and Picasa. "PS3 System Software Update – 3.40". . Retrieved 2010-06-28.PlayMemories PlayMemories is an optional stereoscopic 3D (and also standard) photo viewing application, "What is the function of PlayMemories application?". . Retrieved September 22, 2010. which is installed from the PlayStation Store at 182 MB. The application is dedicated specifically to 3D photos and features the ability to zoom into 3D environments and change the angle and perspective of panoramas. "Sony launches PlayMemories app for 3D photos". . Retrieved September 22, 2010. It requires system software 3.40 or higher; 3D photos; a 3D HDTV, and an HDMI cable for the 3D images to be viewed properly. Video editor and uploader A new application was released as part of system software version 3.40 which allows users to edit videos on the PlayStation 3 and upload them to the Internet. The software features basic video editing tools including the ability to cut videos and add music and captions. Videos can then be rendered and uploaded to video sharing websites such as Facebook and YouTube.VidZoneVidZone is an online music video download service, accessible from the Music category on the XMB, which allows for free streaming of music videos. The VidZone catalogue encompasses over 1.5 million tracks, 25,000 music videos and 15,000 realtones, "Ericsson delivers complete and secure music billing for VidZone Digital Media". Ericsson. 2007-06-27. . Retrieved 2009-08-14. including full access to catalogues from Sony BMG "VidZone Digital Media inks deal with Sony BMG". Brand Republic. 2007-06-06. Archived from the original on 2007-09-13. . Retrieved 2008-08-22. and EMI. "VidZone Digital Media and EMI Music ink major deal". EMI Group. 2008-06-27. Archived from the original on 2008-02-06. . Retrieved 2008-08-22.On June 11, 2009, VidZone's service was extended to the PlayStation 3 video game system in Europe and Australia, allowing users to watch music videos for on their PS3 or streamed to their PlayStation PortablePSP via Remote Play.Kietzmann, Ludwig (2008-08-20). "GC 2008: PS3 getting free 'VidZone' music service in Europe". Joystiq. . Retrieved 2008-08-21.Catch Up TVCatch up TV services are IPTV streams of free to air broadcast programs specially formatted for display on the PS3. Where available select channels are accessible under a separate TV category on the XMB. MubiA Mubi application for the PlayStation 3 was announced in May 2010. The service integrates elements of social networking with video streaming, allowing users to watch and discuss films with other users. "PS3 + MUBI + YOU". SCEE. .PlayStation Portable connectivityPlaying a PlayStation 3 game through a PSP via Remote Play The PlayStation Portable can connect with the PlayStation 3 in many ways, including in-game connectivity. For example, Formula One Championship Edition, a racing game, was shown at E3 2006 using a PSP as a real-time rear-view mirror.Haynes, Jeff (2006-05-08). "E3 2006: Formula One 06 Resurfaces". IGN PlayStation 3. . Retrieved 2007-01-21. In addition, users are able to download original PlayStation format games from the PlayStation Store,

transfer and play them on the PSP as well as the PS3 itself.Deleon, Nicholas (2006-12-07). "Downloadable PS1 Games Hit The PSP (Provided You Have a PS3)". Gizmodo. . Retrieved 2007-01-21.Kennedy, Sam (2006-10-20). "Phil Harrison Talks Downloadable PS1 Games on PS3". 1up.com. . Retrieved 2007-04-03. It is also possible to use the Remote Play feature to play these and some PlayStation Network games, remotely on the PSP over a network or internet connection.Sony has also demonstrated the PSP playing back video content from the PlayStation 3 hard disk across an Mobile ad-hoc networkad-hoc wireless network. This feature is referred to as Remote Play located under the browser icon on both the PlayStation 3 and the PlayStation Portable. Remote play has since expanded to allow remote access to the PS3 via PSP from any wireless access point in the world.Nix, Marc (2006-10-20). "PSP and PS3 Play Together". IGN PSP. . Retrieved 2007-01-21.Removal of "OtherOS" support Among the changes made to the slim model was the removal of the OtherOS feature; the ability to install another operating system alongside the main system software. This was claimed to have been removed to focus on games and other content (new drivers etc. would have had to be written for the new hardware for use in the alternative OS), although it is possible that Sony discovered a vulnerability in the feature that would enable hacking of the console. Such a vulnerability was later found on the original (non-slim) versions by George Hotz, who created a hack that uses a combination of hardware modding and the OtherOS feature to take control of the hypervisor. "No otheros feature on new PS3 slim ?". 2009-09-22. . Retrieved 2009-09-22.As of firmware version 3.21, installation of other OSs is not supported on any model and the option has been removed from the XMB. "PSA: PS3 Firmware Update 3.21 available now". 2010-04-01. . Retrieved 2010-04-01. The reason given by Sony was 'disabling the “OtherOS” feature will help ensure that PS3 owners will continue to have access to the broad range of gaming and entertainment content from SCE and its content partners on a more secure system.' "PS3 Firmware (v3.21) Update". 2010-03-28. . Retrieved 2010-03-28. Sony's main Linux developer has been reassigned, so any PS3 Linux development would have to be on his own time. "Sony reassigned their main Linux developer, so Linux developer will do Linux-ps3 development on his own time.". 2010-03-30. . Retrieved 2010-03-30. This has caused some controversy as in effect Sony is removing officially advertised features and support from already sold products. "Sony Steals Feature From Your PlayStation 3". 2010-03-30. . Retrieved 2010-03-30. This controversy has also sparked several class action lawsuits aimed at making Sony return the feature and/or to get some sort of compensation.Oli Welsh (2010-05-11). "Sony hit by two more Other OS lawsuits". Eurogamer. . Retrieved 2010-05-11. "Man Files class action lawsuit over Other OS support removal". Joystiq date = 2010-04-30. . "PlayStation 3 Owner files class action lawsuit against Sony for dropping 'Other OS'". Kotaku. 2010-04-29. .Firmware update 3.21 is mandatory for access to the PlayStation Network and as such many features such as online gaming and access to the PlayStation store are unavailable to those who choose not to update. PlayStation NetworkPlayStation Network logoPlayStation Network is the unified online multiplayer gaming and digital media delivery service provided by Sony Computer Entertainment for the PlayStation 3 and PlayStation Portable, announced during the 2006 PlayStation Business Briefing meeting in Tokyo. The service is always connected, "PlayStation 3 announced for 2006". GameSpot. 2005-05-16. . Retrieved 2007-04-04. free, "Official PlayStation Website — PlayStation Network". SCEA. Archived from the original on 2008-03-15. . Retrieved 2008-01-15. and includes multiplayer support. The network enables online gaming, the PlayStation Store, PlayStation Home and other services. PlayStation Network uses real currency and PlayStation Network Cards as seen with the PlayStation Store and PlayStation Home.PlayStation PlusPlayStation Plus logoPlayStation Plus (commonly abbreviated PS+ and occasionally referred to as PSN Plus) is a premium PlayStation Network subscription service that was officially unveiled at E3 2010 by Jack Tretton, President and CEO of SCEA. Rumors of such service had been in speculation since Kaz Hirai's announcement at TGS 2009 of a possible paid service for PSN but with the current PSN service still available. Launched alongside PS3 firmware 3.40 and PSP firmware 6.30 on June 29, 2010, the paid-for subscription service provides users with enhanced services on the PlayStation Network, on top of the current PSN service which is still available with all of its features. These enhancements include the ability to have demos, game and system software updates download automatically to the PlayStation 3. Subscribers also get early or exclusive access to some betas, game demos, premium downloadable content and other PlayStation Store items. North American users also get a free subscription to Qore

(PlayStation Network)Qore. Users may choose to purchase either a one-year or a three-month subscription to PlayStation Plus.PlayStation StoreThe European PlayStation Store on the PlayStation 3. The PlayStation Store is an online virtual market available to users of Sony Computer EntertainmentSony's PlayStation 3 (PS3) and PlayStation Portable (PSP) Video game consolegame consoles via the PlayStation Network. The Store offers a range of downloadable content both for purchase and available free of charge. Available content includes full games, add-on content, Game demoplayable demos, Theme (computing)themes and game and movie Trailer (film)trailers. The service is accessible through an icon on the XrossMediaBarXMB on the PS3 and PSP. The PS3 store can also be accessed on the PSP via a Remote Play connection to the PS3. The PSP store is also available via the PC application, Media Go. As of September 24, 2009, there have been over 600 million downloads from the PlayStation Store worldwide. "TGS 2009: Keynote Address". IGN. .The PlayStation Store is updated with new content each Tuesday in North America, and each Wednesday in PAL regions. "PSN Thursday no more: say hello to PSN Tuesday and Wednesday". . In May 2010 this was changed from Thursdays to allow PSP games to be released digitally, closer to the time they are released on Universal Media DiscUMD. "PSN Store Day Move Not Due To 360". .What's NewThe What's New screen What's New was announced at Gamescom 2009 and was released on September 1, 2009, with PlayStation 3 system software 3.0. "PlayStation Games & Media News: – Entertainment on PS3 has a new look". SCEE. . The feature was to replace the existing [Information Board], which displayed news from the PlayStation website associated with the user's region. The concept was developed further into a major PlayStation Network feature, which interacts with the [Status Indicator] to display a ticker of all content, excluding recently played content (currently in North America and Japan only). The system displays the What's New screen by default instead of the [Games] menu (or [Video] menu, if a movie was inserted) when starting up. What's New has four sections: "Our Pick", "Recently Played", latest information and new content available in PlayStation Store. There are four kinds of content the What's New screen displays and links to, on the sections. "Recently Played" displays the user's recently played games and online services only, whereas, the other sections can contain website links, links to play videos and access to selected sections of the PlayStation Store. The PlayStation Store icons in the [Game] and [Video] section act similarly to the What's New screen, except that they only display and link to games and videos in the PlayStation Store, respectively.PlayStation HomePlayStation Home is a virtual 3D social networking service for the PlayStation Network. "GDC: Phil Harrison's Keynote Speech". Games Industry. May 16, 2007. . Home allows users to create a custom avatar (computing)avatar, which can be groomed realistically. "PlayStation Home unveiled". Engadget. 2007-03-07. . Retrieved 2008-01-15. "GDC 2007 Sony keynote speech". Engadget. 2007-03-08. . Retrieved 2008-01-15. Users can edit and decorate their personal apartments, avatars or club houses with free, premium or won content. Users can shop for new items or win prizes from PS3 games, or Home activities. Users interact and connect with friends and customise content in a virtual world. "PlayStation Home, the free virtual world of PlayStation 3". JoyStiq. 2007-03-07. . Retrieved 2008-01-15. Home also acts as a meeting place for users that want to play multiplayer games with others.A closed beta began in Europe from May 2007 and expanded to other territories soon after. "IGN: Europeans Go Home". IGN PlayStation 3. 2007-05-01. . Retrieved 2007-05-02. Home was delayed and expanded "PlayStation Home Beta Extended Today". . several times before initially releasing. "Virtual Worlds News: Sony Home Delayed to Spring 2008". Virtual Worlds News. September 20, 2007. . Retrieved 2009-07-01. "PlayStation Home not open till fall of 08". Platform Nation. 22 April 2007. . The Open Development stageBeta test was started on December 11, 2008. Home is available directly from the PlayStation 3 XrossMediaBar#PlayStation 3 XMBXrossMediaBar. Membership is free and requires a PSN account.Home features places to meet and interact, dedicated game spaces, developer spaces, company spaces and events. The service undergoes a weekly maintenance and frequent updates. At Tokyo Game ShowTGS 2009, Kazuo Hirai announced that Home has been downloaded by 8 million users. "TGS 09: Sony Keynote Liveblog - (the third 7:01)". 1up.com. .Life with PlayStationThe Life with PlayStation application showing weather forecasts and news headlines for New York City. Screenshot taken at approximately 8pm pacific standard timePST. Life with PlayStation, released on September 18, 2008 "Life with PlayStation". PlayStation.com. September 18, 2009. . Retrieved October 7, 2009. to succeed Folding@home#PlayStation 3Folding@home. Life with PlayStation uses virtual globe data to display news

and information by city. Along with Folding@home functionality, the application also provides the user with access to three other information "channels", the first of which being the Live Channel which offers news headlines and weather. Information is provided by Google News, The Weather Channel, the University of Wisconsin–Madison Space Science and Engineering Center, among other sources. "Life With PlayStation out now". Kotaku. . The second channel is the World Heritage channel which offers historical information about historical sites. The third channel is the United Village channel. United Village is a project designed to share information about communities and cultures worldwide. "United Village". . Retrieved October 1, 2009. A recent update has allowed video and photo viewing in the application. The fourth channel is the USA exclusive PlayStation Network Game Trailers Channel for direct streaming of game trailers.Games The PlayStation 3 launched in North America with 14 titles, with another three being released before the end of 2006 in video gaming2006. "IGN's Official PlayStation 3 FAQ". IGN PlayStation 3. 2007-03-26. pp. 3 of 4. . Retrieved 2007-05-02. After the first week of sales it was confirmed that Resistance: Fall of Man from Insomniac Games was the top-selling launch titlelaunch game in North America. "Gamestop Corp. Q3 2006 Earnings Conference Call Summary". Gamestop Corporation via alacrastore.com. 2006-11-21. . Retrieved 2009-01-08. "Saling The World: In Search of Zelda - week of November 24, 2006". Gamasutra. 2006-11-24. . Retrieved 2009-01-08. The game was heavily praised by numerous Computer and video gamesvideo game websites, including GameSpot and IGN, both of whom awarded it their PlayStation 3 Game of the Year award for 2006.GameSpot Staff (2006-12-21). "Best Games and Worst Games of 2006 at GameSpot — Best PlayStation 3 Game". GameSpot. . Retrieved 2007-04-30.IGN Staff (2006-12-21). "IGN.com presents The Best of 2006 - PlayStation 3: Game of the Year". IGN.com. . Retrieved 2007-04-30. Some titles missed the launch window and were delayed until early 2007 in video gaming2007, such as The Elder Scrolls IV: Oblivion, F.E.A.R. and Sonic the Hedgehog (2006 game)Sonic the Hedgehog. During the Japanese launch, Ridge Racer 7 was the top-selling game, while Mobile Suit Gundam: Crossfire also fared well in sales,Gantayat, Anoop (2006-11-13). "Sony Number Two in Japan". IGN. . Retrieved 2009-01-08. both of which were offerings from Namco Bandai HoldingsNamco Bandai. The PlayStation 3 launched in Europe with 24 titles, including ones that were not offered in the North American and Japanese launches, such as Formula One Championship Edition, MotorStorm and Virtua Fighter 5. Resistance: Fall of Man and MotorStorm were the most successful titles of 2007, "Cathedral row over video game". BBC. 2007-06-09. . Retrieved 2008-01-18. "Motorstorm completes hat-trick". Eurogamer. 2007-04-05. . Retrieved 2008-01-18. and both games subsequently received sequels in the form of Resistance 2 and MotorStorm: Pacific Rift.Evolution Studios (2007). "MotorStorm 2 sequel confirmed for PS3, in development at Evolution Studios". . . Retrieved 2007-09-06.Insomniac Games (2007). "Full Moon Show Podcast". . Archived from on 2007-09-27. . Retrieved 2007-11-12.At History of E3#2007 (July 11–13)E3 2007, Sony was able to show a number of their upcoming video games for the PlayStation 3, including Heavenly Sword, Lair (video game)Lair, Ratchet & Clank Future: Tools of Destruction, Warhawk (PlayStation 3 game)Warhawk and Uncharted: Drake's Fortune; all of which were released in the third and fourth quarters of 2007. They also showed off a number of titles that were set for release in 2008 in video gaming2008 and 2009 in video gaming2009; most notably Killzone 2, Infamous (video game)Infamous, Gran Turismo 5 Prologue, LittleBigPlanet and SOCOM: U.S. Navy SEALs Confrontation. "Best of E3 2007 Winners". Kotaku. July 31, 2007. . Retrieved 2007-08-12. A number of third-party exclusives were also shown, including the highly anticipated Metal Gear Solid 4: Guns of the Patriots,Hatfield, Daemon (2007-07-11). "Haze now Fully PS3 Exclusive, 360 & PC Dropped". Gamespot. . Retrieved 2007-08-11. alongside other high-profile third-party titles such as Grand Theft Auto 4, Call of Duty 4: Modern Warfare, Assassin's Creed, Devil May Cry 4 and Resident Evil 5. Two other important titles for the PlayStation 3, Final Fantasy XIII and Final Fantasy Versus XIII, were shown at Tokyo Game ShowTGS 2007 in order to appease the Japanese market. "E308:No Changes on Final Fantasy Versus XIII Being PS3 Exclusive". Kotaku. 2008-07-14. . Retrieved 2008-11-29.Gibson, Ellie (2007-07-11). "E3: Square Enix's John Yamamoto". GamesIndustry.biz. . Retrieved 2007-08-11.Sony have since launched their budget range of PlayStation 3 titles, known as the List of Sony Greatest Hits gamesGreatest Hits range in North America, "PS3 Greatest Hits Launch Today". Blog.us.playstation.com. 2008-07-28. . Retrieved 2009-08-15. the Platinum range in Europe and Australia "PS3 Platinum range in UK from

August". Computerandvideogames.com. 2008-07-17. Archived from the original on 2008-07-17. . Retrieved 2009-08-15. and The Best range in Japan. "PlayStation 3 the best". Jp.playstation.com. . Retrieved 2009-08-15. Among the titles available in the budget range include Resistance: Fall of Man, MotorStorm, Uncharted: Drakes Fortune, Rainbow Six: Vegas, Call Of Duty 3, Assassin's Creed and Ninja Gaiden Sigma. As of October 2009 Metal Gear Solid 4: Guns of the Patriots, Ratchet & Clank Future: Tools of Destruction, Devil May Cry 4, Army of Two, Battlefield: Bad Company and Midnight Club: Los Angeles have also joined the list. When they are put on the "List of Sony Greatest Hits gamesGreatest Hits" list the new unused copies retail for $30 USD and are re-shipped in a new red case.As of September 30, 2010, there have been 350.6 million games sold for the PlayStation 3. "PLAYSTATION3 Worldwide Software Unit Sales". Sony Computer Entertainment Inc.. . Retrieved 2010-05-23.Stereoscopic 3D In December 2008 the Chief technology officerCTO of Blitz Games announced that they would bring stereoscopystereoscopic 3D gaming and movie viewing to the Xbox 360 and PlayStation 3 with their own technology. "Blitz Games Introduces True Stereoscopic 3D For Xbox 360 And PS3". Cinemablend.com. 2008-12-01. . Retrieved 2009-08-15. This technology was first demonstrated publicly on the PS3 in January 2009 at the Consumer Electronics Show. Journalists were shown Wipeout HD and Gran Turismo 5 Prologue in 3D as a demonstration of how the technology might work if it is implemented in the future. "Sony teases with high-quality PS3 HD". Ars Technica. 2009-01-08. . System software update 3.30 has prepared the PS3 for stereoscopic 3D gaming, while 3.50 prepared it for 3D films. "PS3 3.30 System Software Update". PlayStation.Blog. April 21, 2010. . Firmware update 3.30 officially allows PS3 titles to be played in 3D, requiring a compatible TV for use. "Sony dates PS3 3D update". MCV. June 1, 2010. . While the game itself must be programmed to take advantage of the 3D technology, titles may be patched to add in the functionality retroactively. Titles with such patches include Wipeout HD, Pain (video game)Pain and Super Stardust HD.by JC Fletcher on May 31st 2010 3:15PM (2010-05-31). "First PS3 3D game updates available in Japan on June 10". Joystiq. . Retrieved 2010-08-25.Homebrew In August 2010 PS3 Jailbreak, a USB device that allows execution of unsigned code (such as backup games and Homebrew (video games)homebrew) on the PlayStation 3, was released. "PS3 Jailbreak is Finally Here". Techie Buzz. 2010-08-20. . Retrieved 2010-10-06. The device included a piece of software called Backup Manager, allowing users to copy original games from the Blu-ray to either the internal HDD or an external HDD (FAT32 formatted).The original device was soon reverse engineered and many clones, such as PS3 Key and PS3 Break, have since been released. "New PS3 Break PS3 Jailbreak Copy – USB Break is coming soon". Press Release Point. 2010-09-17. . Retrieved 2010-10-06. An open source implementation known as PS Groove was also released, which allows the same functionality to be achieved using various external devices, such as calculators and portable media players, via a USB connection. "PS3 Jailbreak Code Hits Internet, No Stopping It Now". Kotaku. 2010-09-01. . Retrieved 2010-10-06. An open source clone of Backup Manager, known as Open Manager, which mimics and expands upon the original's features has also been released. "Open Manager 1.0 PS3" (in spanish). Todo Soluciones. 2010-10-01. . Retrieved 2010-10-06.Sales and production costs Region List of best-selling game consolesUnits sold First available Canada "about 1.5 million" as of 6 October 2010Peter Nowak (October 6, 2010). "Sony aims for PS3 holiday sales boost". Canadian Broadcasting CorporationCBC. . Retrieved October 31, 2010. November 17, 2006 Europe(May include UK & other PAL regions) 16 million as of 17 August 2010Shaun McInnis (2010-08-17). "New Ratchet and Clank, Resistance headline Sony conference". GameSpot. . Retrieved 2010-08-17. March 23, 2007 Japan 5 million as of 13 April 2010 "How Many PS3s Have Been Sold In Japan?". Famitsu. Kotaku. 2010-04-13. . Retrieved 2009-01-05. November 11, 2006 United Kingdom 3 million as of 26 January 2010Richard Mitchell (2010-01-25). "UK PS3 sales surpass 3 million". Joystiq. . Retrieved 2010-02-04. March 23, 2007 United States nearly 12 million as of 14 April 2010Ben Reeves (2010-04-13). "Yakuza 4 One Of Japan's Best Selling PS3 Games". Game Informer. . Retrieved 2010-04-14. November 17, 2006 Worldwide41.6 million as of 30 September 2010November 11, 2006 The PlayStation 3's initial production cost is estimated to have been United States dollarUS$805.85 for the 20 GB model and US$840.35 for the 60 GB model.Goldstein, Hilary (2006-11-16). "Sony Losing Almost $250 per Console". IGN PlayStation 3. . Retrieved 2006-11-17. However, they were priced at US$499 and US$599 respectively,Brendan Sinclair (2006-05-09). "E3 06: PS3 launches 11/17--$499 for 20 GB, $599 for 60 GB".

Gamespot. . Retrieved 2007-07-06. meaning that every unit was sold at an estimated loss of $250, contributing to Sony's games division posting an operating loss of ¥232.3 billion (US$1.97 billion) in the fiscal year ending March 2007. "PS3 launch hits Sony profits". GamesIndustry.biz. May 16, 2007. . Retrieved 2007-08-31. In April 2007, soon after these results were published, Ken Kutaragi, President of Sony Computer Entertainment, announced plans to retire. Various news agencynews agencies, including The TimesSabbagh, Dan; Kennedy, Siobhan (2007-04-27). "PlayStation boss pays the price of weak sales". London: The TimesTimes Online. . Retrieved 2007-04-27. and The Wall Street JournalChristopher Grant (2007-04-26). "Sony's Ken Kutaragi announces plans to retire". Joystiq. . Retrieved 2007-07-03. reported that this was due to poor sales, whilst SCEI maintains that Kutaragi had been planning his retirement for six months prior to the announcement.In January 2008, Kaz Hirai, chief executive officerCEO of Sony Computer Entertainment, suggested that the console may start making a profit by early 2009, stating that, "the next fiscal year starts in April and if we can try to achieve that in the next fiscal year that would be a great thing" and that "[profitability] is not a definite commitment, but that is what I would like to try to shoot for". "Sony's Hirai eyes PS3 profit as costs decline". Reuters. 2008-01-07. . Retrieved 2008-04-22. However, market analysts Nikko Citigroup have predicted that the PlayStation 3 could be profitable by August 2008. "PS3 profitable by August, say Nikko Citigroup analysts". GamesIndustry.biz. 2008-04-21. . Retrieved 2008-04-22. In a July 2008 interview, Hirai stated that his objective is for the PlayStation 3 to sell 150 million units by its ninth year, surpassing the PlayStation 2's sales of 140 million in its nine years on the market.Chris Nuttall (2008-07-20). "Sony sets 150m sales target for PS3". Financial Times. . Retrieved 2008-08-02. In January 2009 Sony announced that their gaming division was profitable in Q3 2008.nofi (2009-01-29). "Sony’s Game Division In Profit". TheSixthAxis. . Retrieved 2009-03-03.Since the system's launch, production costs have been reduced significantly as a result of phasing out the Emotion Engine chip and falling hardware costs. "Sony cuts PS3 production costs in half". psu.com. 2008-01-11. . Retrieved 2008-01-22. "PlayStation 3 manufacturing costs to go down, way down". ps3fanboy.com. 2007-02-08. . Retrieved 2007-07-15. The cost of manufacturing Cell microprocessors has fallen dramatically as a result of moving to the 65 nanometer65 nm production process, "IBM Shrinks Cell Broadband Engine to 65nm Process". dailytech.com. 2007-03-13. . Retrieved 2007-07-15. and Blu-ray Disc diodes have become cheaper to manufacture. "PlayStation 3 Production Costs Drop". gameinformer.com. 2007-05-07. Archived from the original on 2007-05-09. . Retrieved 2007-07-15. As of January 2008, each unit cost around $400 to manufacture; "Sony's Blu-Ray Breakthrough". BusinessWeek. 2008-01-08. . Retrieved 2008-01-14. "PS3 production costs halved, says analyst.". www.gamesindustry.biz. 2008-01-14. . Retrieved 2008-01-14. by August 2009, Sony had reduced costs by a total of 70%, meaning it only costs Sony around $240 per unit. "PS3 70 percent cheaper to make". www.gamersyndrome.com. 2009-08-01. . Retrieved 2009-08-09.Kat Bailey (2009-08-22). "PlayStation 3 Production Costs Slashed 70 Percent". 1up. . Retrieved 2009-07-31.Brian Ashcraft (2009-08-22). "Sony: PS3 Manufacturing Costs Down 70 Percent". Kotaku. . Retrieved 2009-07-31.ReceptionOriginal model Early PlayStation 3 reviews soon after launch were critical of its high price and lack of quality launch games, but commended the system's hardware capabilities and potential.Riyad Emeran (2007-03-23). "Sony PlayStation 3". Trustedreviews.com. . Retrieved 2007-07-10.Danny Allen (2007-03-01). "First review: PlayStation 3". PC Advisor. . Retrieved 2007-07-10. However, after a series of price revisions, Blu-ray's victory over HD DVD,Toshiba (2008-02-19). "Toshiba Announces Discontinuation of HD DVD Businesses". Press release. . Retrieved 2008-08-31. and the release of several well received titles, the system received better reviews. IGN judged the PlayStation 3 to have the best game line-up of 2008, based on their review scores in comparison to those of the Wii and Xbox 360.Shea, Cam. "IGN: Aussie Console Showdown 08: PS3 vs. Wii vs. 360". Ps3.ign.com. . Retrieved 2009-08-07.The PS3 was given the number-eight spot on PC World (magazine)PC World magazine’s list of "The Top 21 Tech Screwups of 2006," where it was criticized for being "Late, Expensive and Incompatible".Tynan, Dan (2006-12-20). "The Top 21 Tech Screwups of 2006". PC World. . Retrieved 2007-02-03. GamesRadar ranked the PS3 as the top item in a feature on game-related Public relationsPR disasters, asking how Sony managed to "take one of the most anticipated game systems of all time and — within the space of a year — turn it into a hate object reviled by the entire internet", but added that despite its problems the system has "untapped potential".Reparaz, Mikel (2007-03-21). "The Top 7... PR

disasters". GamesRadar. . Retrieved 2007-03-21. Business Week summed up the general opinion by stating that it was "more impressed with what [the PlayStation 3] could do than with what it currently does".Cliff Edwards (2006-11-16). "PS3: Soon to Be a Great System". Business Week. . Retrieved 2007-07-10.Developers have also found the machine difficult to program for. In 2007, Gabe Newell of Valve CorporationValve said "The PS3 is a total disaster on so many levels, I think it's really clear that Sony lost track of what customers and what developers wanted". He continued "I'd say, even at this late date, they should just cancel it and do a do over. Just say, 'This was a horrible disaster and we're sorry and we're going to stop selling this and stop trying to convince people to develop for it'".Bishop, Stuart (2007-01-15). "Valve: PS3 a "total disaster on so many levels"". computerandvideogames.com. . Retrieved 2007-01-15. Doug Lombardi VP of Marketing for Valve has since stated that they are interested in developing for the console and are looking to hire talented PS3 programmers for future projects. "Valve open to work with PS3 development". Qj.net. "2009-07-05". . He later restated Valve's position, "Until we have the ability to get a PS3 team together, until we find the people who want to come to Valve or who are at Valve who want to work on that, I don't really see us moving to that platform".Guttridge, Luke (2009-07-03). "Valve dodge PS3 development". play.tm. . Retrieved 2009-07-13. The next year, at Sony's 2010 E3 2010 press conference, Newell made a live appearance, recanting his previous statements in wake of the system's recent success, Sony's moves to make the system more developer friendly, as well as media and fan backlash for the comments, and to announce that Valve would be developing Portal 2 for the system. He had also claimed that the inclusion of Steamworks (Valve's system to automatically update their software independently) would help to make the PS3 version of Portal 2 the best console version on the market.Activision Blizzard CEO Bobby Kotick has criticized the PS3's high development costs and inferior attach rate and return to that of the Xbox 360 and Wii. He believes these factors are pushing developers away from working on the console. In an interview with The Times Kotick stated "I'm getting concerned about Sony; the PlayStation 3 is losing a bit of momentum and they don't make it easy for me to support the platform."Sabbagh, Dan (2009-06-19). "Sony should beware — Activision chief is not simply playing games". London: timesonline.co.uk. . Retrieved 2009-07-13. He continued, "It's expensive to develop for the console, and the Wii and the Xbox are just selling better. Games generate a better return on invested capital on the Xbox than on the PlayStation." Kotick also claimed that Activision Blizzard may stop supporting the system if the situation is not addressed. "[Sony has] to cut the [PS3's retail] price, because if they don't, the attach rates are likely to slow. If we are being realistic, we might have to stop supporting Sony."Crossley, Rob (2009-06-19). "Kotick slams PS3 for 'high' dev costs". develop-online.. . Retrieved 2009-07-13. Kotick received heavy criticism for the statement, notably from developer Bioware who questioned the wisdom of the threatened move, and referred to the statement as "silly." "BioWare: Activision PS3 comment "silly and biased towards what is popular."". .In an interview, Kazuo Hirai, Chairman of Sony Computer Entertainment argued for the choice of a complex architecture. "Hirai: We're the "official" industry leader". Eurogamer. 2009-01-20. . Retrieved 2009-10-31. "We don't provide the easy to program for console that [developers] want, because easy to program for means that anybody will be able to take advantage of pretty much what the hardware can do, so then the question is what do you do for the rest of the nine-and-a-half years?"Despite the initial negative press, several websites have given the system very good reviews. CNET United Kingdom praised the system saying, "the PS3 is a versatile and impressive piece of home-entertainment equipment that lives up to the hype [...] the PS3 is well worth its hefty price tag."Carnoy, Dave (March 2007). "PS3 Reviewed". CNet.co.uk. Archived from the original on 2007-03-28. . Retrieved 2007-04-21. CNET awarded it a score of 8.8 out of 10 and voted it as its number one "must-have" gadget,CNET Staff (2006-11-21). "Top 10 Must-haves". CNET. . Retrieved 2007-02-22. praising its robust graphical capabilities and stylish exterior design while criticizing its limited selection of available games.Carnoy, David (2006-11-14). "Sony PlayStation 3 (60 GB) Reviews". CNET. . Retrieved 2007-02-03.In addition, both Home Theater Magazine and Ultimate AV have given the system's Blu-ray playback very favorable reviews, stating that the quality of playback exceeds that of many current standalone Blu-ray Disc players.Chiarella, Chris (December 2006). "Sony PlayStation 3". Home Theater Magazine. Primedia Magazines, Inc.. . Retrieved 2007-02-22.Buettner, Shane C. (December 2006). "PlayStation3 Blu-ray Disc Player". Primedia Magazines, Inc.. pp. 4 of 6. . Retrieved 2007-02-22.Hexus Gaming reviewed the PAL version and summed

the review up by saying, "as the PlayStation 3 matures and developers start really pushing it, we'll see the PlayStation 3 emerge as the console of choice for gaming."Haywood, Nick (2007-03-23). "Review : Sony PlayStation 3". HEXUS.gaming. pp. 6 of 6. . Retrieved 2007-04-25. At Game Developers ConferenceGDC 2007, Shiny Entertainment founder David Perry (game developer)Dave Perry stated, "I think that Sony has made the best machine. It's the best piece of hardware, without question".Gibson, Ellie (2007-03-07). "GDC: What's Next for PS3?". GamesIndustry.biz. . Retrieved 2007-04-25. A second review of the PS3 by Ars Technica in June 2008 gave the console an overall mark of 9/10, while the original launch review marked only 6/10.Kuchera, Ben (2008-06-04). "They say it got smart: a 2008 review of the PS3". Ars Technica. . Retrieved 2008-06-10. In September 2009, IGN named the PlayStation 3 the 15th best gaming console of all time, behind both of its competitors: the Wii (10th) and Xbox 360 (6th). "PlayStation 3 is number 15". IGN Entertainment. . Retrieved 15-Oct-2009.Slim model and rebranding The PlayStation 3 Slim has received extremely positive reviews as well as a boost in sales; less than 24 hours after its announcement the PS3 Slim took the number-one bestseller spot on Amazon.com in the video games section for fifteen consecutive days. It regained the number-one position again one day later. "PS3 Slim gets back Bestseller top spot on Amazon". qj.net. September 1, 2009. . Retrieved 3 September 2009. The PS3 Slim also received praise from PC World giving it a 90 out of 100 praising its new repackaging and the new value it brings at a lower price as well as praising its quietness and the reduction in its power consumption. This is in stark contrast to the original PS3's launch in which it was given position number-eight on their "The Top 21 Tech Screwups of 2006" list. "Priced right, Sony's slim-line PlayStation 3 (120GB) bundles the top-notch features of the earlier PlayStation 3 into a smarter, sleeker package.". PC World (magazine)PC World. September 2, 2009. . Retrieved 3 September 2009.CNET awarded the PS3 Slim four out of five stars praising its Blu-ray capabilities, 120 GB hard drive, free online gaming service and more affordable pricing point, but complained about the lack of backward compatibility for PlayStation 2 games. "Sony PlayStation 3 Slim - 120GB Review". CNET. August 19, 2009. . Retrieved 3 September 2009. TechRadar gave the PS3 Slim four and a half stars out of five praising its new smaller size and summed up its review stating "Over all, the PS3 Slim is a phenomenal piece of kit. It's amazing that something so small can do so much". They criticized the exterior design of the PS3 Slim, calling it "ugly" and described the build quality as "cheap" compared to the original PS3. "Sony PlayStation 3 Slim 120GB review". TechRadar. September 1, 2009. . Retrieved 3 September 2009.ReferencesExternal linksOfficial websites Asia Australia Canada New Zealand North America United KingdomAuxiliary sites by Sony Hardware press images User's guideDirectories PlayStation 3 at the Open Directory Project

Wii

Wii console with Wii Remote

Developer	Nintendo
Manufacturer	Foxconn
Type	Video game console
Generation	Seventh generation
Release date	• NA November 19, 2006 • JP December 2, 2006 • AUS December 7, 2006 • EU December 8, 2006
Retail availability	November 19, 2006 (details)
Units shipped	Worldwide: 75.90 million (as of September 30, 2010) (details)
Media	12 cm Wii Optical Disc 8 cm Nintendo GameCube Game Disc
CPU	IBM PowerPC-based[1] "Broadway"
Storage capacity	512 MB Internal flash memory SD card, SDHC card Nintendo GameCube Memory Card
Graphics	ATI "Hollywood"
Controller input	Wii Remote (Plus), Wii Balance Board, Nintendo GameCube controller, Nintendo DS[2]
Connectivity	Wi-Fi Bluetooth 2 × USB 2.0[3] LAN Adapter (via USB)
Online services	Nintendo Wi-Fi Connection, WiiConnect24, Wii Shop Channel
Best-selling game	*Wii Sports* (pack-in, except in Japan and South Korea) 67.71 million (as of September 30, 2010)[4] *Wii Play*, 26.71 million (as of December 31, 2009)[5]

Backward compatibility	Nintendo GameCube
Predecessor	Nintendo GameCube

The **Wii** (pronounced /ˈwiː/, like the pronoun *we*) is a home video game console released by Nintendo on November 19, 2006. As a seventh-generation console, the Wii primarily competes with Microsoft's Xbox 360 and Sony's PlayStation 3. Nintendo states that its console targets a broader demographic than that of the two others.[6] As of November 2010, the Wii leads the generation over the PlayStation 3 and Xbox 360 in worldwide sales,[7] and in December 2009 broke the record for best-selling console in a single month in the United States.[8]

A distinguishing feature of the console is its wireless controller, the Wii Remote, which can be used as a handheld pointing device and detects movement in three dimensions. Another distinctive feature of the console is WiiConnect24, which enables it to receive messages and updates over the Internet while in standby mode.[9]

The Wii is Nintendo's fifth home console, the direct successor to the Nintendo GameCube, and able to play all official GameCube games. Nintendo first spoke of the console at the 2004 E3 press conference and later unveiled the system at the 2005 E3. Nintendo CEO Satoru Iwata revealed a prototype of the controller at the September 2005 Tokyo Game Show.[10] At E3 2006, the console won the first of several awards.[11] By December 8, 2006, it had completed its launch in four key markets.

History

The console was conceived in 2001, as the Nintendo GameCube was first seeing release. According to an interview with Nintendo's game designer Shigeru Miyamoto, the concept involved focusing on a new form of player interaction. "The consensus was that power isn't everything for a console. Too many powerful consoles can't coexist. It's like having only ferocious dinosaurs. They might fight and hasten their own extinction."[12]

Two years later, engineers and designers were brought together to develop the concept further. By 2005, the controller interface had taken form, but a public showing at that year's Electronic Entertainment Expo (E3) was withdrawn. Miyamoto stated that, "[W]e had some troubleshooting to do. So we decided not to reveal the controller and instead we displayed just the console."[12] Nintendo president Satoru Iwata later unveiled and demonstrated the Wii Remote at the September Tokyo Game Show.[10]

The Nintendo DS is said to have influenced the Wii design. Designer Ken'ichiro Ashida noted, "We had the DS on our minds as we worked on the Wii. We thought about copying the DS's touch-panel interface and even came up with a prototype." The idea was eventually rejected, with the notion that the two gaming systems would be identical. Miyamoto also expressed that, "[...] if the DS had flopped, we might have taken the Wii back to the drawing board."[12]

Name

The console was known by the code name of "**Revolution**" until April 27, 2006, immediately prior to E3.[13] The Nintendo Style Guide refers to the console as "simply Wii, not Nintendo Wii", making it the first home console Nintendo has marketed outside of Japan without the company name featured in its trademark. While "Wiis" is a commonly used pluralization of the console, Nintendo has stated that the official plural form is "Wii systems" or "Wii consoles."[14] Nintendo's spelling of "Wii" with two lower-case "i" characters is meant to resemble two people standing side by side, representing players gathering together, as well as to represent the Wii Remote and Nunchuk.[15] The company has given many reasons for this choice of name since the announcement; however, the best known is:

> “Wii sounds like 'we', which emphasizes that the console is for everyone. Wii can easily be remembered by people around the world, no matter what language they speak. No confusion. No need to abbreviate. Just Wii.[15] ”

Despite Nintendo's justification for the name, some video game developers and members of the press reacted negatively towards the change. They preferred "Revolution" over "Wii"[16] and Forbes expressed fear "that the name would convey a continued sense of 'kidiness' [*sic*] to the console."[17] The BBC reported the day after the name was announced that "a long list of puerile jokes, based on the name," had appeared on the Internet.[18] Nintendo of America's president Reggie Fils-Aime acknowledged the initial reaction and further explained the change:

> Revolution as a name is not ideal; it's long, and in some cultures, it's hard to pronounce. So we wanted something that was short, to the point, easy to pronounce, and distinctive. That's how 'Wii,' as a console name, was created.[19]

Nintendo of America's then-Vice President of Corporate Affairs Perrin Kaplan defended its choice of "Wii" over "Revolution" and responded to critics of the name by stating, "Live with it, sleep with it, eat with it, move along with it and hopefully they'll arrive at the same place."[20]

Launch

Wii retail display boxes

On September 14, 2006, Nintendo announced release information for Japan, North and South America, Australasia (Oceania), Asia and Europe, including dates, prices, and projected unit distribution numbers. It was announced that the majority of the 2006 shipments would be allotted to the Americas, and that 33 titles would be available in the 2006 launch window.[21] The Wii was launched in the United States on November 19, 2006 at $249.99.[22] It was later launched in the United Kingdom on December 8, 2006 at £179.[23] The UK suffered a widespread shortage of console units as many high-street and online stores were unable to fulfill all pre-orders when it was released.[24] The Wii was launched in South Korea on April 26, 2008 and in Taiwan on July 12, 2008.[25] [26]

System sales

Life-to-date number of units shipped, millions

Date	Japan	Americas	Other	Worldwide
2006-12-31[27]	1.14	1.25	0.80	**3.19**
2007-03-31[28]	2.00	2.37	1.47	**5.84**
2007-06-30[29]	2.95	3.81	2.51	**9.27**
2007-09-30[30]	3.67	5.46	4.04	**13.17**
2007-12-31[31]	4.99	8.85	6.30	**20.13**
2008-03-31[32]	5.90	10.61	7.94	**24.45**
2008-06-30[33]	6.43	13.11	10.08	**29.62**
2008-09-30[34]	6.91	15.19	12.45	**34.55**
2008-12-31[35]	7.80	20.40	16.76	**44.96**
2009-03-31[36]	7.96	23.54	18.89	**50.39**
2009-06-30[37]	8.17	24.42	20.03	**52.62**
2009-09-30[7]	8.68	25.99	21.48	**56.14**

2009-12-31[38]	9.72	32.02	25.71	**67.45**
2010-03-31[39]	10.34	33.40	27.19	**70.93**
2010-06-30[40]	10.52	35.20	28.24	**73.97**
2010-09-30[4]	10.79	35.91	29.20	**75.90**

Since its launch, the monthly sales numbers of the console have been higher than its competitors across the globe. According to the NPD Group, the Wii sold more units in the United States than the Xbox 360 and PlayStation 3 combined in the first half of 2007.[41] This lead is even larger in the Japanese market, where it currently leads in total sales, having outsold both consoles by factors of 2:1[42] to 6:1[43] nearly every week from launch until November 2007.[44] In Australia, the Wii exceeded the record set by the Xbox 360 to become the fastest-selling game console in Australian history.[45]

On September 12, 2007, it was reported by the *Financial Times* that the Wii had surpassed the Xbox 360, which was released one year previously, and had become the market leader in home console sales for the current generation, based on sales figures from Enterbrain, NPD Group, and GfK.[46] This was the first time a Nintendo console had led its generation in sales since the Super Nintendo Entertainment System.[46]

On July 11, 2007, Nintendo warned that the Wii would remain in short supply throughout that calendar year.[47] In December 2007, Reggie Fils-Aimé revealed that Nintendo was producing approximately 1.8 million Wii consoles each month.[48] Some UK stores still had a shortage of consoles as of March 2007,[49] demand still outpaced supply in the United States as of June 2007,[50] and the console "selling out almost as quickly as it hits retail shelves" in Canada as of April 2008.[51] [52] In October 2008, Nintendo announced that between October and December 2008 the Wii would have its North American supplies increased considerably from 2007's levels,[53] while producing 2.4 million Wii units a month worldwide, compared to 1.6 million per month in 2007.[54]

In 2007, the Wii was the second best-selling game console (behind the Nintendo DS) in the US and Japan with 6.29 million and 3,629,361 units sold respectively, according to the NPD Group and Enterbrain.[55] [56] [57] [58] [57] During the same year, the Wii had outsold the PlayStation 3 by 3:1 in Japan, while the Xbox 360 had sold 257,841 units in that region that year, according to Enterbrain.[59] [60] In Europe, the Wii sold 0.7 million units in 2006 and 4.8 million in 2007 according to estimates by Electronic Arts.[61] [62] In 2008, the Wii was the best-selling home console in Japan with 2,908,342 units sold, according to the Enterbrain.[57] [63] [64] Prior to the release of the NPD Group's video game statistics for January 2008, the Wii had been ahead of the Xbox 360 and PS3 in US sales in most months since the Wii and PS3 were released, according to data by the NPD Group.[65] In the United States, the Wii had sold 10.9 million units by July 1, 2008, making it the leader in current-generation home console sales, according to the NPD Group, surpassing the Xbox 360 which was released a year prior to the Wii.[66] [67] [68] As of November 1, 2008, the Wii had sold 13.4 million units in the US, almost two million more than Xbox 360 and over twice the number of PlayStation 3 units sold, according to the NPD Group.[69]

In Japan, the Wii had surpassed the number of Nintendo GameCube units sold by January 2008;[57] the Wii had sold 7,526,821 units as of December 28, 2008, according to Enterbrain.[63] [70] According to the NPD Group, the Wii surpassed the Xbox 360 to become the best-selling "next generation" home video game console in Canada with 813,000 units sold by April 1, 2008, and had been the best-selling home console for 13 of the previous 17 months.[51] [52] In the first six months of 2008, the Wii had sold 318,000 units in Canada, outselling its nearest competitor, the PlayStation 3, almost 2:1.[71] According to the NPD Group, the Wii had sold a total of 1,060,000 units in Canada as of August 1, 2008, making it the first current generation home console to surpass the million unit mark in that country. In the first seven months of 2008, the Wii outsold the PS3 and the Xbox 360 combined with 376,000 units sold in Canada.[72] In the United Kingdom, the Wii leads in current generation home console sales with 4.9 million units sold as of January 3, 2009, according to GfK Chart-Track.[73] [74] On March 25, 2009, at the Game Developers Conference, Satoru Iwata said that worldwide shipments of Wii had reached 50 million.[75]

While Microsoft and Sony have experienced losses producing their consoles in the hopes of making a long-term profit on software sales, Nintendo reportedly has optimized production costs to obtain a significant profit margin with each Wii unit sold.[76] On September 17, 2007, the *Financial Times* reported that this direct profit per Wii sold may vary from $13 in Japan to $49 in the United States and $79 in Europe.[77] On December 2, 2008, Forbes reported that Nintendo makes a $6 operating profit per Wii unit sold.[78]

Nintendo reported on May 7, 2009 increases in operating profits for its fiscal year (April 1, 2008—March 31, 2009), and a rise in sales—setting record earnings compared to the previous year. Kenji Hall of *BusinessWeek* called the company "a bright spot in an otherwise dismal Japanese tech sector" citing the unique qualities of the Wii and DSi.[79] However, Nintendo's financial forecasts until March 2010 had investors and analysts questioning if the company cannot keep its streak from ending. The Japanese market, which tends to serve as an leading indicator for global markets, saw Wii sales drop by 47% when comparing Nintendo's fiscal year of 2008—2009, to the previous year. While analysts predicted that game console sales in general will fall in 2009, Hall argued "Nintendo's big advantages are disappearing" amid price reductions of the Xbox 360 and rumors of Sony unveiling a motion-sensing wireless controller.[79]

On September 23, 2009, Nintendo announced its first price drops for the console. In Japan, the price dropped from ¥25,000 to ¥20,000, effective October 1, 2009.[80] In the United States, the price was reduced by $50 resulting in a new MSRP of $199.99, effective September 27, 2009.[81] In Europe (excepting non-eurozone nations), the price of a Wii console dropped to €199 from €249.[82] Nintendo sold more than three million Wii consoles in the U.S. in December 2009, setting a regional record for the month and ending 9 months of declining sales, as a result of the price cut and software releases such as *New Super Mario Bros. Wii*.[83] [84] As of the end of that month, the Wii is the best selling home video game console produced by Nintendo with sales of over 67 million units, surpassing that of the original Nintendo Entertainment System.[38] As of March 31, according to Nintendo, the Wii has sold 70.93 million units worldwide,[39] selling 20.53 million units within 2009-2010 fiscal year.

Demographic

Nintendo hopes to target a wider demographic with its console than that of others in the seventh generation.[6] At a press conference for the then-upcoming Nintendo DS game *Dragon Quest IX: Sentinels of the Starry Skies* in December 2006, Satoru Iwata insisted "We're not thinking about fighting Sony, but about how many people we can get to play games. The thing we're thinking about most is not portable systems, consoles, and so forth, but that we want to get new people playing games."[85]

This is reflected in Nintendo's series of television advertisements in North America, directed by Academy Award winner Stephen Gaghan, as well as Internet ads. The ad slogans are *"Wii would like to play"* and *"Experience a new way to play*." These ads ran starting November 15, 2006 and had a total budget of over US$200 million throughout the year.[86] The productions are Nintendo's first broad-based advertising strategy and include a two-minute video clip showing a varied assortment of people enjoying the Wii system, such as urban apartment-dwellers, country ranchers, grandparents, and parents with their children. The music in the ads is from the song "Kodo (Inside the Sun Remix)" by the Yoshida Brothers.[87] The marketing campaign has proved to be successful: pensioners as old as 103 have been reported to be playing the Wii in the United Kingdom.[88] A report by the British newspaper *The People* also stated that Queen Elizabeth II of the United Kingdom has played using the console.[89]

Successor

A few years after the Wii was released, speculations were raised about Nintendo's eighth-generation home console. Initial beliefs were that the new console would be an enhanced version of the Wii, named the "Wii HD" and would have high-definition video output along with a Blu-ray Disc drive built in with a release in 2011.[90] However, Satoru Iwata later stated that he sees "no significant reason" to include HD for the current Wii console, and that such an addition would be better suited for a successor.[91] Shigeru Miyamoto also expressed Nintendo's interest in

working with HD graphics, but clarified that the company is primarily focused on the gameplay experience.[92] Reggie Fils-Aime commented that he felt "confident the Wii home entertainment console has a very long life in front of it" and declared that a successor would not be launched in the near future.[93]

At the E3 2010 presentation, Iwata revealed to the BBC that they would begin announcing a new console once Nintendo ran "out of ideas with the current hardware and cannot give users any more meaningful surprises with the technology [they] have."[94] Later, at an investors meeting, he disclosed that they were "of course studying and developing the next console to Wii", but they were simultaneously keeping its concepts secret because it was "really important for [his] business to positively surprise people."[95]

Hardware

The Wii is Nintendo's smallest home console to date; it measures 44 mm (1.73 in) wide, 157 mm (6.18 in) tall and 215.4 mm (8.48 in) deep in its vertical orientation, slightly larger than three DVD cases stacked together. The included stand measures 55.4 mm (2.18 in) wide, 44 mm (1.73 in) tall and 225.6 mm (8.88 in) deep. The system weighs 1.2 kg (2.7 lb),[96] which makes it the lightest of the three major seventh generation consoles. The console can be placed either horizontally or vertically. The prefix for the numbering scheme of the system and its parts and accessories is "RVL-" after its code name of "Revolution".[97] The console also features a recurring design theme: the console itself, SD cards, the power supply and all the sockets have one of their corners chipped off in a triangular fashion.

The Wii (top) compared in size to the GCN, N64, North American SNES and NES

The front of the console features an illuminated slot-loading optical media drive that accepts both 12 cm Wii Optical Discs and Nintendo GameCube Game Discs. The blue light in the disc slot illuminates briefly when the console is turned on and pulsates when new data is received through WiiConnect24. After the update that includes System Menu 3.0, the disc slot light activates whenever a Wii disc is inserted or ejected. When there is no WiiConnect24 information, the light stays off. The disc slot light remains off during gameplay or when using other features. Two USB ports are located at its rear. An SD card slot hides behind the cover on the front of the console.

The Wii launch package includes the console, a stand to allow the console to be placed vertically, a circular clear stabilizer for the main stand, one Wii Remote, one Nunchuk attachment, one Sensor Bar, a removable stand for the bar, one external main power adapter, two AA batteries, one composite AV cable with RCA connectors, a SCART adapter in European countries (component video and other types of cables are available separately), operation documentation, and, in all regions except Japan and South Korea, a copy of the game *Wii Sports*.

The disc reader of the Wii does not play DVD-Video or DVD-Audio discs. A 2006 announcement had stated a new version of the Wii capable of DVD-Video playback would be released in 2007;[98] however Nintendo delayed its release to focus on producing the original console to meet demand.[99] Nintendo's initial announcement stated that it "requires more than a firmware upgrade" to implement and that the functionality could not be made available as an upgrade option for the existing Wii model.[98] Despite this assertion, third parties have used Wii homebrew to add DVD playback to the original unmodified Wii units.[100] The Wii also can be hacked to enable an owner to use the console for other activities than those intended by Nintendo.[101] Several brands of modchips are available for the Wii.

Although Nintendo showed the console and the Wii Remote in white, black, silver, lime green, and red before it was released,[102] [103] it had only been available in white for its first two and a half years of sales. Black systems were made available in Japan in August 2009,[104] [105] in Europe in November 2009,[106] and in North America on May 9, 2010.[107] A red Wii system bundle was made available in Japan on November 11, 2010, commemorating the 25th anniversary of *Super Mario Bros.*[108] The UK version of the limited edition red Wii was released on October 29, 2010, preloaded with the original *Donkey Kong* game. It also featured the Wii Remote Plus, which is a new version of the controller with integrated Wii Motion Plus technology.[109] The red Wii bundle was released in North America on November 7, 2010 bundled with *New Super Mario Bros. Wii* and the Wii Remote Plus.[110]

On July 11, 2007, Nintendo revealed the Wii Balance Board at E3 2007 along with *Wii Fit*.[111] It is a wireless balance board accessory for the Wii that contains multiple pressure sensors used to measure the user's center of balance. Namco Bandai produced a mat controller, a simpler less sophisticated competitor to the balance board, that connects to the GameCube controller port.

Wii Remote


A Nunchuk, Wii Remote and strap shown in hand

The Wii Remote is the primary controller for the console. It uses a combination of built-in accelerometers and infrared detection to sense its position in 3D space when pointed at the LEDs within the Sensor Bar. This design allows users to control the game using physical gestures as well as traditional button presses. The controller connects to the console using Bluetooth and features rumble as well as an internal speaker. The Wii Remote can connect to expansion devices through a proprietary port at the base of the controller. The device bundled with the Wii retail package is the Nunchuk unit, which features an accelerometer and a traditional analog stick with two trigger buttons. In addition, an attachable wrist strap can be used to prevent the player from unintentionally dropping or throwing the Wii Remote. Nintendo has also since offered a stronger strap and the Wii Remote Jacket to provide extra grip and protection. The Wii MotionPlus was announced as a device that connects to the Wii Remote to supplement the accelerometer and Sensor Bar capabilities and enable actions to be rendered identically on the screen in real time. Nintendo also revealed the Wii Vitality Sensor, a fingertip pulse oximeter sensor that connects through the Wii Remote.

Memory storage

The Wii console contains 512 megabytes of internal flash memory and features an SD card slot for external storage. An SD card can be used for uploading photos as well as backing up saved game data and downloaded Virtual Console and WiiWare games. To use the SD slot for transferring game saves, an update must be installed. An installation can be initiated from the Wii options menu through an Internet connection, or by inserting a game disc containing the update. Virtual Console data cannot be restored to any system except the unit of origin.[112] An SD card can also be used to create customized in-game music from stored MP3 files, as first shown in *Excite Truck*, as well as music for the slideshow feature of the Photo Channel. Version 1.1 of the Photo Channel removed MP3 playback in favor of AAC support.

At the Nintendo Fall Press Conference in October 2008, Satoru Iwata announced that Wii owners would have the option to download WiiWare and Virtual Console content directly onto an SD card. The option would offer an alternative to "address the console's insufficient memory storage". The announcement stated that it would be available in Japan in the spring of 2009.[113] Nintendo made the update available on March 25, 2009. In addition to the previously announced functionality, it lets the player load Virtual Console and WiiWare games directly from the SD card. The update allows the use of SDHC cards, increasing the limit on SD card size from 2 GB to 32 GB.[114]

Technical specifications

Nintendo has released few technical details regarding the Wii system, but some key facts have leaked through the press. Though none of these reports has been officially confirmed, they generally point to the console as being an extension or advancement of the Nintendo GameCube architecture. More specifically, the reported analyses state that the Wii is roughly 1.5 to 2 times as powerful as its predecessor.[1] [115] Based on the leaked specifications, the Wii is the least powerful of the major home consoles in its generation.

Processors:

- CPU: PowerPC-based "Broadway" processor, made with a 90 nm SOI CMOS process, reportedly† clocked at 729 MHz[116]
- GPU: ATI "Hollywood" GPU made with a 90 nm CMOS process,[117] reportedly† clocked at 243 MHz[116]
- Starlet, reportedly comes with a NEC ARM9 core[118] operating up to 470 MHz equipped with a 32-bit instruction set and 128K of cache[119]

Memory:

- 88 MB main memory (24 MB "internal" 1T-SRAM integrated into graphics package, 64 MB "external" GDDR3 SDRAM)[120]
- 3 MB embedded GPU texture memory and framebuffer.

Storage:

- 512 MB built-in NAND flash memory
- Expanded storage via SD and SDHC card memory (up to 32 GB)
- Nintendo GameCube Memory Card (required for GameCube game saves)

IBM's Wii "Broadway" CPU

Ports and peripheral capabilities:

- Up to 16 Wii Remote controllers (10 in Standard Mode, 6 in One Time Mode,[121] connected wirelessly via Bluetooth)
- Nintendo GameCube controller ports (4)
- Nintendo GameCube Memory Card slots (2)
- SD memory card slot (supports SDHC cards as of System Menu 4.0)
- USB 2.0 ports (2)
- Sensor Bar power port
- Accessory port on bottom of Wii Remote
- Optional USB keyboard input in message board, Wii Shop Channel, and the Internet Channel (as of 3.0 and 3.1 firmware update)[122]
- Mitsumi DWM-W004 WiFi 802.11b/g wireless module[123]
- Compatible with optional USB 2.0 to Ethernet LAN adaptor
- 'AV Multi Out' port (See 'Video' section right)

Built-in content ratings systems:

- BBFC, CERO, ESRB, ACB, OFLC (NZ), PEGI, USK

ATI's Wii "Hollywood" GPU

- Slot-loading disc drive compatible with 8 cm Nintendo GameCube Game Disc and 12 cm Wii Optical Disc
- Mask ROM by Macronix[124]

Video:

- Custom 'AV Multi Out' port supporting composite video,[125] component video,[126] S-Video (NTSC only)[127] and RGB SCART (PAL only)[128]
- 480p (PAL/NTSC), 480i (NTSC) or 576i (PAL/SECAM), standard 4:3 and 16:9 anamorphic widescreen[129]

Audio:

- Main: Stereo – Dolby Pro Logic II-capable[130]
- Controller: Built-in speaker

Power consumption:

- 18 watts when switched on[131]
- 9.6 watts in standby with WiiConnect24 standby connection[131]
- 1.3 watts in standby[131]

†None of the clock rates have been confirmed by Nintendo, IBM, or ATI.

Technical issues

The first Wii system software update via WiiConnect24 caused a very small portion of launch units to become completely unusable. This forced users to either send their units to Nintendo for repairs (if they wished to retain their saved data) or exchange it for a free replacement.[132]

With the release of dual-layer Wii Optical Discs, Nintendo of America has stated that some Wii systems may have difficulty reading the high-density software due to a contaminated laser lens. Nintendo is offering a free repair for owners who experience this issue.[133] [134]

The Wii Remote can lose track of the Wii system that it has been set to, requiring that it be reset and resynchronized. Nintendo's support website provides instructions for this process, and to troubleshoot related issues.[135]

Legal issues

Interlink Electronics filed a patent-infringement lawsuit against Nintendo over the pointing functionalities of the Wii Remote, claiming "loss of reasonable royalties, reduced sales and/or lost profits as a result of the infringing activities" of Nintendo.[136] Law firm Green Welling LLP filed a class action lawsuit against Nintendo for its "defective wrist straps".[137] A Texas-based company called Lonestar Inventions has also sued Nintendo, claiming that the company copied one of Lonestar's patented capacitor designs and used it in the Wii console.[138]

Anascape Ltd, a Texas-based firm, also filed a lawsuit against Nintendo for patent infringements regarding Nintendo's controllers.[139] A July 2008 verdict found that a ban would be issued preventing Nintendo from selling the Classic Controller in the United States. Nintendo is free to continue selling the Classic Controller pending an appeal to the U.S. Court of Appeals for the Federal Circuit.[140] On Thursday, April 22, 2010, the Federal Circuit reversed the verdict that Nintendo had infringed Anascape's patented controller.[141]

On August 19, 2008 Hillcrest Laboratories Inc. filed a complaint against Nintendo with the U.S International Trade Commission. The complaint alleges that the Wii Remote infringes on three of its patents. A fourth Hillcrest patent for graphical interfaces displayed on television screens is also alleged to have been violated. Hillcrest therefore sought a ban on Wii consoles imported to the U.S.,[142] but on August 24, 2009, Nintendo and Hillcrest reached a settlement, though the terms have not been publicly disclosed.[143]

The trademark application for "Wii Remote" was given an initial rejection by the United States Patent and Trademark Office. The USPTO claimed that the word *remote* is commonly used and therefore should not be trademarked. The USPTO will accept Nintendo's trademark filing if the company disclaims exclusive rights to the word *remote* in the term.[144]

Features

The console contains a number of internal features made available from its hardware and firmware components. The hardware allows for extendibility through expansion ports while the firmware and some other pieces of software can receive periodic updates via the WiiConnect24 service.

Wii Menu

The Wii Menu interface is designed around the concept of television channels. Separate channels are graphically displayed in a grid and are navigated using the pointer capability of the Wii Remote. Except for the Disc Channel, it is possible to change the arrangement by holding down the A and B buttons to grab channels and move them around. There are six primary channels: the Disc Channel, Mii Channel, Photo Channel, Wii Shop Channel, Forecast Channel, and News Channel. The latter two were initially unavailable at launch, but activated through updates. The Wii + Internet Video Channel was installed with consoles manufactured in October 2008 or later.[145] Additional channels are available for download from the Wii Shop Channel through WiiWare and also appear with each Virtual Console title. These include the Everybody Votes Channel, Internet Channel, Check Mii Out Channel, and the Nintendo Channel. As of October 18, 2010 Wii owners can download the Netflix Channel from the Wii shop Channel.[146]

Wii Menu


Nintendo GameCube ports on the top of the Wii unit

Backward compatibility

The Wii console is backward compatible with all official Nintendo GameCube software, as well as Nintendo GameCube Memory Cards and controllers. Compatibility with software is achieved with the slot-loading drive's ability to accept Nintendo GameCube Game Discs.

The console supports progressive-scan output in 480p-enabled GameCube titles. Peripherals can be connected via a set of four GameCube controller ports and two Memory Card slots concealed by removable flip-open panels.[1] The console therefore retains connectivity with the Game Boy Advance and e-Reader through the Game Boy Advance Cable, which is used in the same manner as it was used with the GameCube. This feature can only be accessed on those select GameCube titles that previously utilized it. The Wii for release in South Korea lacks GameCube backward compatibility.[147]

A Wii console running a GameCube disc is restricted to GameCube functionality. As such, a GameCube controller is required to play GameCube titles, as neither the Wii Remote nor the Classic Controller functions in this capacity. A Nintendo GameCube Memory Card is also necessary to save game progress and content, as the Wii internal flash memory will not save GameCube games.

Backward compatibility is limited in some areas. Online and LAN-enabled features for Nintendo GameCube titles are unavailable on the Wii, as the console lacks serial ports for the Nintendo GameCube Broadband Adapter and Modem Adapter. The console uses a proprietary port for video output and is therefore incompatible with all Nintendo GameCube audio/video cables (composite video, S-Video, component video and RGB SCART). The console also lacks the GameCube footprint and high-speed port needed for Game Boy Player support.

Nintendo DS connectivity

The Wii system supports wireless connectivity with the Nintendo DS without any additional accessories. This connectivity allows the player to use the Nintendo DS microphone and touchscreen as inputs for Wii games. The first example Nintendo has given of a game using Nintendo DS-Wii connectivity is that of *Pokémon Battle Revolution*. Players with either the *Pokémon Diamond* or *Pearl* Nintendo DS games are able to play battles using their Nintendo DS as a controller.[2] *Final Fantasy Crystal Chronicles: Echoes of Time*, released on both the Nintendo DS and Wii, features connectivity in which the two games can advance simultaneously. Nintendo later released the Nintendo Channel, which allows Wii owners to download game demos or additional data to their Nintendo DS in a process similar to that of a DS Download Station.[148] The console is also able to expand Nintendo DS games.[2]

Online connectivity

The Wii console is able to connect to the Internet through its built-in 802.11b/g Wi-Fi or through a USB-to-Ethernet adapter, with both methods allowing players to access the established Nintendo Wi-Fi Connection service.[1] Wireless encryption by WEP, WPA (TKIP/RC4) and WPA2 (CCMP/AES) are supported.[149] AOSS support was discreetly added in System Menu version 3.0.[150] Just as for the Nintendo DS, Nintendo does not charge fees for playing via the service[6] [151] and the 12 digit Friend Code system controls how players connect to one another. Each Wii also has its own unique 16 digit Wii Code for use with Wii's non-game features.[151] [152] This system also implements console-based software including the Wii Message Board. One can also connect to the internet with third-party devices.[153]

The service has several features for the console including the Virtual Console, WiiConnect24, Internet Channel, Forecast Channel, Everybody Votes Channel, News Channel and the Check Mii Out Channel. The console can also communicate and connect with other Wii systems through a self-generated wireless LAN, enabling local wireless multiplayer on different television sets. *Battalion Wars 2* first demonstrated this feature for non-split screen multiplayer between two or more televisions.[154]

On April 9, 2008, the BBC announced that its online BBC iPlayer would be available on the Wii via the Internet Channel browser; however, some users experienced difficulties with the service. On November 18, 2009, BBC iPlayer on the Wii was relaunched as the BBC iPlayer Channel,[155] [156] which is free to download from the Wii Shop Channel.[157] The service is only available to people in the United Kingdom.

On December 26, 2008, Nintendo announced that it will launch a new video channel for the Wii.[158] [159]

As of October 18, 2010 American and Canadian Wii owners can watch Netflix instantly as a channel without requiring a disc.[146]

Parental controls

The console features parental controls, which can be used to prohibit younger users from playing games with content that would be considered unsuitable for their age level. When one attempts to play a Wii or Virtual Console game, it reads the content rating encoded in the game data; if this rating is greater than the system's set age level the game will not load without a correct override password. The parental controls can also restrict Internet access, which blocks the Internet Channel and system update features. Since the console is restricted to Nintendo GameCube functionality when playing Nintendo GameCube Game Discs, GameCube software is unaffected by Wii parental control settings.

European units mainly use the PEGI rating system,[160] whereas North American units use the ESRB rating system.[161] The Wii unit supports the native rating systems of many countries, including CERO in Japan, the USK in Germany, both the PEGI and BBFC in the United Kingdom, the ACB in Australia and the OFLC in New Zealand.

Homebrew developers have reverse-engineered the function that Nintendo uses to recover lost parental control passwords and created a simple script to obtain parental control reset codes.[162]

Software library

Wii Optical Disc in case

Retail copies of games are supplied on proprietary, DVD-like Wii Optical Discs packaged in a keep case along with instruction information. On European releases, these retail boxes have a triangle printed at the bottom corner of the paper insert sleeve side. The hue of the triangle can be used to identify which region the particular title is intended for and which manual languages are included. The console supports regional lockout.[163]

New games representing Nintendo's flagship franchises, including *The Legend of Zelda*, *Super Mario*, *Pokémon*, and *Metroid*, have been released, or are in development for Wii, in addition to many original titles and third party developed games. Nintendo has received strong third party support from prominent companies like Ubisoft, Sega, Square Enix, Activision Blizzard, Electronic Arts, and Capcom, with more games being developed exclusively for Wii than for the PlayStation 3 or Xbox 360.[164] Nintendo also launched the New Play Control! line, a selection of enhanced GameCube games for the Wii featuring updated controls.[165]

The Virtual Console service allows Wii owners to play games originally released for the Nintendo Entertainment System, Super Nintendo Entertainment System and Nintendo 64, as well as Sega's Mega Drive/Genesis and SG-1000 Mark III/Sega Master System,[166] NEC's TurboGrafx-16/PC Engine, SNK's Neo Geo console, the Commodore 64, and a selection of arcade games.[167] Virtual Console games are distributed over broadband Internet via the Wii Shop Channel, and are saved to the Wii internal flash memory or to a removable SD card. Once downloaded, Virtual Console games can be accessed from the Wii Menu as individual channels, or directly from an SD card via the SD Card Menu. There is also a Wii homebrew community dedicated to creating and playing content that does not receive Nintendo endorsement.

The game development suite Unity can be used to create official Wii games.[168] The developer must however be authorized by Nintendo to develop games for the console. Games must also be submitted to and accepted by Nintendo in order to be sold.

Over 509.66 million Wii games were sold worldwide as of December 2009, with 54 titles surpassing the million-unit mark.[38] The most successful game is *Wii Sports*, which comes bundled with the console in most regions, and has

sold 67.71 million copies worldwide as of September 30, 2010,[4] and surpassed *Super Mario Bros.* as the best-selling game of all time.[169] The best-selling unbundled game is *Wii Play*, with 26.71 million units.[5]

Reception

The system was well received after its exhibition at E3 2006. At the event, Nintendo's console won the Game Critics Awards for Best of Show and Best Hardware.[11] In the December 2006 issue of *Popular Science*, the console was awarded with the Grand Award Winner in Home Entertainment.[170] Spike TV's Video Games Award also granted the console the award in breakthrough technology.[171] GameSpot chose the console as the Best Hardware on their Best and Worst 2006 awards show.[172] The system was also chosen as one of *PC World* magazine's 20 Most Innovative Products of the Year.[173] The console received a Golden Joystick for Innovation of the Year 2007 at the Golden Joystick Awards.[174] In the category of Engineering & Technology for Creation and Implementation of Video Games and Platforms, Nintendo was awarded an Emmy for Game Controller Innovation by The National Academy of Television Arts and Sciences.[175]

The worldwide success of the Wii has caught third party developers by surprise, leading to some apologizing for the quality of their early games. In an interview with German news magazine *Der Spiegel*, Ubisoft's Yves Guillemot and Alain Corre admitted that they had made a mistake in rushing out their launch titles, promising to take future projects more seriously.[176] Take-Two Interactive, who released few games for the Nintendo GameCube, changed its stance on Nintendo by placing a higher priority on the Wii.[177]

At the same time, criticism of the Wii Remote and the Wii hardware specifications has surfaced. Former GameSpot editor and Giantbomb.com founder Jeff Gerstmann stated that the controller's speaker produces low-quality sound,[178] while Factor 5 President Julian Eggebrecht criticized the hardware audio as being substandard for a console of its generation.[179] U.K.-based developer Free Radical Design stated that the Wii hardware lacks the power necessary to run the software it had scheduled for release on other seventh generation consoles.[180] The online connectivity of the Wii was subject to criticism, as Matt Casamassina of IGN compared it to the "entirely unintuitive" service provided for the Nintendo DS.[181]

An executive for Frontline Studios expressed that major publishers are wary of releasing exclusive titles for the console due to the perception that third-party companies are not strongly supported by consumers.[182] In his blog, 1UP.com editor Jeremy Parish stated that Nintendo was the biggest disappointment for him in 2007. Commenting on the lack of quality third-party support, he stated that "the Wii landscape is bleak. Worse than it was on N64. Worse than on GameCube...the resulting third-party content is overwhelmingly bargain-bin trash."[183]

Game designer and *The Sims* creator Will Wright shared his thoughts on the Wii within the context of the current console generation: "The only next gen system I've seen is the Wii – the PS3 and the Xbox 360 feel like better versions of the last, but pretty much the same game with incremental improvement. But the Wii feels like a major jump – not that the graphics are more powerful, but that it hits a completely different demographic."[184]

Using the Wii is often seen as being more physically demanding than other game consoles.[185] Some Wii players have occasionally experienced a form of tennis elbow referred to as "Wiiitis."[186] A study published in the *British Medical Journal* states that Wii players use more energy than they do playing sedentary computer games. It is however indicated that while this energy increase may be beneficial to weight management, it is not an adequate replacement for regular exercise.[187] A case study published in the American Physical Therapy Association's journal *Physical Therapy* focused on use of the Wii for rehabilitation of a teen with cerebral palsy. It is believed to be the first published research showing the physical therapy benefits resulting from use of the gaming system. Researchers say the gaming system complements traditional techniques.[188] In May 2010 the American Heart Association (AHA) endorsed the Wii to encourage sedentary people to take the first step toward fitness. The AHA heart icon covers the console itself along with two of its more active games, Wii Fit Plus and Wii Sports Resort.[189] [190]

In 2009, IGN named the Wii the 10th greatest console of all time, in a field of 25.[191]

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External links

- Global and general Wii site (http://www.wii.com/)
- Wii (http://www.dmoz.org/Games/Video_Games/Console_Platforms/Nintendo/Nintendo_Wii/) at the Open Directory Project
- Wii System Software

Zeebo

Manufacturer	Zeebo Inc.
Product family	Zeebo
Type	Video game console
Generation	Seventh generation era[1] [2] [3]
Retail availability	June 25, 2009 (Brazil) November 10, 2009 (Mexico) TBA 2010 (Russia & India) TBA 2011 (China)
Media	digital distribution
CPU	ARM11 clocked at 528Mhz
Storage capacity	1 GB NAND flash
Graphics	ATI Imageon
Controller input	6-button dual analog gamepad
Connectivity	1 SD card slot 3 USB 2.0 ports 3G HSUPA 2.5G EDGE 2G GPRS
Online services	ZeeboNet on Claro 3G (Brazil) Telcel (Mexico)

Zeebo is a 3G-enabled entertainment and education system from Zeebo Inc. It not only enables users to play video games, but also connect to the Internet, communicate on line and run educational applications. The Zeebo is targeted at developing markets such as Brazil, Mexico, Russia, India and China (BRIC).[4] [5] [6] Zeebo Inc. says that the Zeebo brings "the fun and excitement of interactive entertainment and education to those who—until now—have had little or no access to such technology."[7]

Overview

The company's stated intention was to create an affordable console with inexpensive games and educational content delivered via wireless digital distribution to circumvent piracy.[8] There are no DVDs and cartridges; games and other content are downloaded wirelessly over broadband cellular networks.[9] In addition to games, the Zeebo system also provides Internet connectivity, enabling users to access educational and information content, communicate via e-mail and do social networking (this capability is currently supported in Brazil and Mexico).[10] [11] [12]

Zeebo has attracted a growing list of content from companies such as Activision, Capcom, Digital Chocolate, Disney Interactive Studios, Electronic Arts, Fishlabs, Flying Tiger, Gamevil, G-Mode, Glu, id Software, Limbic Software, Namco, Polarbit, Popcap, Twelve Interactive and Vega Mobile.[13] [14] [15] [16] [17]

Future launches

The Zeebo is currently available in Brazil and Mexico. Reports indicate that the Zeebo will be available in India later this year, and China by 2011.[18] [19]

History

The Zeebo System with Keyboard and Gamepad

The Zeebo was first announced in November 2008 in Rio de Janeiro, Brazil and went on sale there in limited quantities on June 1, 2009 with a suggested retail price of R$ 499,00 (Brazilian reals).[6] [20] In September of the same year the price was cut to R$ 399,00,[21] and the price was reduced again in November to R$299,00 (~170USD).[22] The console was distributed nationwide in Brazil in December 2009. By August, 2010, there were approximately 40 games launched for Zeebo in Brazil. On September 1, 2010, Zeebo announced that it was adding new capabilities and accessories to the Zeebo in Brazil, including Internet connectivity, a keyboard and new more ergonomic gamepad. The new Brazilian system configuration is priced identical to the previous one: R$299 (~170USD). The company announced that Brazilian owners of previous system configurations can upgrade to the new one for free.[23] [24]

The Zeebo was launched in Mexico in November 2009. It shipped to national retailers across the country on 4 November 2009, with a suggested price of 2,499 Mexican pesos (approximately $205 US). The Mexican system configuration is similar to that introduced in September, 2010 and includes Internet connectivity, a keyboard and ergonomic gamepad.[25] The price was cut to 2249 pesos (approx. $184 US) in April 2010.[26]

Wireless capabilities

The Zeebo system was developed by Zeebo Inc. with the participation of 12 companies, mainly Qualcomm and Tectoy. It is manufactured and distributed by local partners in target countries (e.g., Tectoy in Brazil).[27] The console uses a Qualcomm BREW mobile gaming chipset similar to that in mobile phones. Players are able to buy and download games and other content wirelessly through 3G or Edge.[28] [29] The user is always connected to the wireless network without any subscription fee. Purchases are made through an online store using a virtual currency, Z-Credits. Zeebo's gaming delivery system reduces costs (with no discs or cartridges needed) and overcomes piracy barriers – two elements that have hindered sales of game consoles in developing markets.[30] [31] Z-Credits are purchased by bank transfer, credit card, bank debit or prepaid cards. Games cost from about 500 to 2500 credits.

The console's wireless connectivity also allows users to browse web sites, send and receive e-mail and take part social networking activities via the wireless network. The Zeebo can also perform "over-the-air" (OTA) updates to the console's firmware—delivering new content, features and bug fixes.[32] [33]

Accessories

Z-Pad

The standard Zeebo "Z-Pad" controller includes a total of 7 buttons, a D-Pad and two analog sticks. On the right side, there are four buttons (numbered 1–4); two shoulder buttons rest on the top, called ZL and ZR; at the center, there's a "Home" button, which takes the user back the start screen of the Zeebo interface, while functioning as a typical "Pause" button during games. Directly below this button are the two analog sticks, whereas the D-Pad is located at the leftmost side.[34]

Boomerang

The Boomerang, sold by Tectoy in Brazil, is a wireless controller with a built-in accelerometer, using motion-sensing technology to play games with actual physical gestures.[35] It has a D-Pad, two buttons (labeled 1–2) on the top-left side, a "Home" button, a sliding on-off switch and a wrist strap. It requires two AA batteries as a power supply.

Official Boomerang controller for Zeebo.

Keyboard

The Zeebo also includes an external keyboard, used with the system's web-browsing, email and social networking functions.[36]

Games

The Zeebo features remade versions of games from mobile phones and other consoles, such as *FIFA 09*, *Resident Evil 4*, *Crash Bandicoot Nitro Kart 3D*, *Galaxy on Fire* and *Rally Master Pro*.[37] [38] There are also a number of original game titles developed specifically for the Zeebo, including "Zeebo Extreme" racing games, "Boomerang Sports" games, Zeebo "Football Club" games and *Un Juego de Huevos* (known as *Um Jogo de Ovos* in Brazil), an action-adventure game based on the hit Mexican animated film "Una Película de Huevos" from Huevocartoon.[39] [40] In March 2010, Zeebo began releasing a series of classic arcade games. These games were originally created in the 1980s and 1990s by Data East Corp. in Japan and have been modified to run on the Zeebo system. The titles include *Caveman Ninja* (originally known as Joe & Mac), *Spinmaster*, *Super Burger Time* and *Dark Seal* (also known as *Gate of Doom*).[41]

In June, 2010, in advance of the World Cup, Zeebo released the first of its *Football Club* ("F.C") titles, *Zeebo F.C. Foot Camp*, developed by Zeebo Interactive Studios in Brazil. It includes four mini-games, each emphasizing a particular soccer skill, such as dribbling, juggling and goal-kicking. Along with *Zeebo F.C. Foot Camp*, the company released *Zeeboids*, an application that enables users to create personal characters ("avatars") to be used with the *Football Club* games.[42] Also in June, Zeebo announced a variety of forthcoming games from independent developers such as Digital Chocolate, Fishlabs, Limbic Software, Twelve Interactive and Vega Mobile.[16]

In Brazil, the Zeebo is sold with three free games embedded – *FIFA 09*, *Need for Speed Carbon: Own the City* and *Brain Challenge* (known in Portuguese as "Treino Cerebral").[37] Three other games, all in Portuguese, are available for free download with new systems: *Prey Evil*, *Zeebo Extreme Rolimã* and *Zeebo Extreme Jetboard*. More 30 other titles are available for purchase (via Z-Credits) and download.[40]

On September 1, 2010 Zeebo announced a number of new games and educational applications to be launched in 2010 and 2011. They include a new *Zeebo Football Club* game, called *Zeebo F.C. Super League*; a series of titles from Disney Interactive Studios, including *Disney All Star Cards*, *Alice in Wonderland* and *Jelly Car 2*; and a series of titles based on the popular *Monica's Gang* ("*Turma da Monica*") comic books in Brazil from cartoonist Mauricio de Sousa.[23] [43] [44]

In Mexico, the console includes five free embedded game titles (*Crash Bandicoot Nitro Kart 3D*, *Pac Mania*, *Tekken 2*, *Zenonia* and *Zeebo Family Pack*). More than a dozen games were available for wireless purchase at the time of the Mexican launch in November, 2009. More than a dozen more have since been introduced, all in Spanish.[45] Zeebo has also announced that the English language teaching company Interlingua will be developing entertainment and education applications for the console.[46] [47]

In addition to games and educational content, the console provides access to more than 50 web sites, grouped in subject categories, called "Z-Channels."[25] [48]

Recent developments

Zeebo Inc. announced an agreement with AT&T in March, 2010. The company stated that "The agreement gives us access to AT&T's international roaming network, allowing us to carry out rapid trials of the Zeebo platform in new geographic areas as we establish longer-term agreements with local carriers for deployment of the system. It will also give us a chance to explore opportunities in the US market in the future."[49]

Technical specifications

- ARM11 / QDSP-5 running at 528 Mhz
- ATI Imageon (renamed to Adreno by Qualcomm after buying ATIs Imageon Designteam & Chipdesign)
- 1 GB NAND Flash
- 160 MB RAM, 128 MB DDR SDRAM + 32 MB stacked DDR SDRAM in MSM7201A
- VGA (640×480) – 4:3 aspect ratio
- 3G (scaling back to 2.5G or 2G where necessary)
- 3 USB ports 2.0 Standard A (for accessories)
- SD Card Slot / Interface
- Interface: USB HID
- Power: AC adapter 5V 3A
- Consumption: 15 W max.
- Graphics: 4 million triangles / second
- Audio: 8 channels simultaneous MP3, ADPCM, MIDI
- Resolution: 640×480
- Size: W × D × H – 157 × 215.4 × 44 mm
- Weight: 1.3 kg (3 lb)
- Sensitivity: <- 106 dBm (in UMTS)

Operating conditions:

- Temperature: −20 °C to 55 °C (−4 °F to 131 °F)
- Humidity: 95% (40 °C / 104 °F)

Development

Content for the Zeebo is based on the BREW platform and is created using the Zeebo SDK, downloadable from the Zeebo Inc. website. Gamepad peripherals are made possible by a BREW extension. The Zeebo system supports OpenGL ES 1.0/1.1. Applications are downloaded wirelessly over-the-air and commonly range in size from 5-25MB.[50]

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External links

- Official Corporate Website (http://www.zeeboinc.com/) (International)
- Official Brazilian Website (http://www.zeebo.com.br/) (Brazilian Portuguese)
- Official Mexican Website (http://www.zeebo.com.mx/) (Spanish)
- Official Zeebo Inc. Blog (http://zeeboinc.com/blog/) (English)
- Official Zeebo Inc. Twitter Feed (http://twitter.com/zeebo_news) (English)
- Official Zeebo Inc. Facebook Page (http://www.facebook.com/pages/Zeebo-Inc/181038904518) (English)
- Official Zeebo Brazil Blog (http://blog.zeebo.com.br/)(Brazilian Portuguese)
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Four Decades of Video Entertainment

1980s in video gaming

1970s · **1980s in video gaming** · 1990s
Other events: 1980s · Games timeline

The **1980s** in video gaming were a decade of some notable events and releases such as the crash of 1983. The decade was dominated by both Nintendo and Sega and their consoles.

Consoles of the 1980s

Third generation consoles

Starting in 1983 the third generation began with the Japanese release of the Family Computer (later known as the Nintendo Entertainment System in the rest of the world). Although the previous generation of consoles had also used 8-bit processors, it was at the end of this generation that home consoles were first labeled by their "bits". This also came into fashion as 16-bit systems like the Mega Drive/Genesis were marketed to differentiate between the generations of consoles. In the United States, this generation in gaming was primarily dominated by the NES/Famicom.

Fourth generation consoles

Starting in 1987 and ending in 1996, the fourth generation of video game consoles consisted primarily of games and systems programmed for the 16-bit era. During this generation, 2D graphics had improved over the previous generation and experimentation began to occur with 3D graphics, although 3D games were more prevalent on the PC at the time. The fourth generation also was the first time Compact Discs were considered a viable port for video game retail sales with the CD-i. Some of the most notable systems released during this generation were the Super Nintendo Entertainment System (1990), the Sega Mega Drive/Genesis (1988), and the Neo Geo (1990).[1] Nintendo's Game Boy was also released during the fourth generation, which would later become the most popular series of handheld gaming systems during the 1990s.[2] A rivalry between Sega and Nintendo occurred during this generation, starting the first ever console war.

Video game crash of 1983

The North American video game crash of 1983 brought an abrupt end to what is considered the second generation of console video gaming in the English-speaking world. It almost destroyed the then-fledgling industry and led to the bankruptcy of several companies producing home computers and video game consoles in North America. It lasted about two years, and many business analysts of the time expressed doubts about the long-term viability of video game consoles. The video-game industry was revitalized a few years later.

See also

- History of video games
- List of years in video games

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1990s in video gaming

1980s · **1990s in video gaming** · 2000s
Other events: 1990s · Games timeline

The **1990s** were a decade of marked innovation **in video gaming**. It was a decade of transition from pixels to full fledged 3D graphics and it gave rise to several genres of video games including, but not limited to, the first person shooter, real time strategy, survival horror, and MMO. Handheld gaming began to become more popular throughout the decade, thanks in part to the release of the Game Boy. Arcade games, although still relatively popular in the early 1990s, begin a decline as home consoles become more common.

Consoles of the 1990s

Fourth generation consoles

Starting in 1987 and ending in 1996, the fourth generation of video game consoles consisted primarily of games and systems programmed for the 16-bit era. During this generation, 2D graphics had improved over the previous generation and experimentation began to occur with 3D graphics, although 3D games were more prevalent on the PC at the time. The fourth generation also was the first time Compact Discs were considered a viable port for video game retail sales with the CD-i. Some of the most notable systems released during this generation were the Super Nintendo Entertainment System (1990), the Sega Mega Drive/Genesis (1988), and the Neo Geo (1990).[1] Nintendo's Game Boy was also released during the fourth generation, which would later become the most popular series of handheld gaming systems during the 1990s.[2] A rivalry between Sega and Nintendo occurred during this generation, starting the first ever console war.

Fifth generation consoles

Approximately starting in 1993 and ending in 2002, the fifth generation of video games are most widely known to be the 32/64 bit era and for being the transition period for video games to evolve into the third dimension. The Nintendo 64 (1996), PlayStation (1995), and Sega Saturn (1995) are considered to be the big three gaming systems of this generation. With the introduction of the PlayStation and Saturn, compact discs (CDs) began to replace cartridges however the Nintendo 64 remained loyal to them due to the load times on CDs at the time and became one of the last cartridge based systems in mass production.

Early sixth generation console

The sixth generation was initiated by the release of the Dreamcast in 1999.[3] It introduced several innovations including Internet gaming as a standard feature through its built-in modem, and a web browser. It was also the first home console to always display full SD resolution. Despite its early success, the Dreamcast was discontinued prematurely as sales slowed following the release of the PlayStation 2 in 2000.

Technological innovation

Introduction of 3D environments and polygons

Said to be one of the most revolutionary video games, *Super Mario 64* was praised for how it took to 3D environments of wide open spaces and graphics at the time.[4] Many games that moved onto 3D also tried to mimic Mario's success. Instead of pixels, polygons became a standard sight to be in video games from then on as they

looked more lifelike when programmed into the right shapes.

Lara Croft of the *Tomb Raider* series became the first video game sex symbol, becoming a recognizable figure in the entertainment industry throughout the late 1990s.

Optical disc storage

Nearly every system released in the mid-late 1990s began to move to the new CD-ROM technology, with the Nintendo 64 being the last major home video game console to use ROM cartridges. Also appealing to publishers was the fact that CDs could be produced at significantly less expense and with more flexibility (it was easy to change production to meet demand), and they were able to pass the lower costs onto consumers. In particular, the fifth generation marked a turning point for optical-based storage media. As games grew more complex in content, sound, and graphics, the CD proved more than capable of providing enough space for the extra data. The cartridge format, however, was pushed beyond the limits of its storage capacity. Consequently, many game developers shifted their support away from the Nintendo 64 to the PlayStation.

Memory cards

Due to CD-ROMs lacking the built-in memory of ROM Cartridges, the Sony PlayStation introduced the use of memory cards to store saved game data. This became the standard for video game consoles until it was replaced by the use of hard drives and built-in flash memory during the seventh generation in the late first decade of the 21st century.

Game controllers

The Super Nintendo Entertainment System game controller introduced a more rounded dog-bone like design and added two more face buttons, "X" and "Y", arranging the four in a diamond formation. Another addition was the "L" and "R" shoulder buttons, which have been imitated by most controllers since.

The PlayStation controller was the first standard operating device for a home console to use two handle-bars at the bottom of the controller whereas previously this feature had been relegated to niche specialist controllers. This has been standard in most game controllers since, until the Wii appeared.

The Virtual Boy controller was a controller which utilized dual joypads similar to how analog sticks functioned in later "dual control" sixth-generation systems. The presence of two pads was an effort to control objects in a 3D environment (one pad controlling pitch and turning while the other controlling forward movement and strafing).

Analog stick

In 1996 Nintendo introduced the first analog thumbstick on the Nintendo 64 controller. It was subsequently followed in the industry during the fifth generation by the Sega Analog controller (packaged with *Nights into Dreams...*), the Sony Dual Analog gamepad which introduced the use of two analog sticks, and the Sony DualShock. Since then, all major video game console controllers have included two analog thumbsticks.

Force feedback

The optional Rumble Pak for the Nintendo 64 controller introduced the use of haptic force feedback technology in gaming. It was later followed by the DualShock controller for the PlayStation which had built-in haptic feedback. Since then, built-in force feedback has become standard for most game controllers.

Pressure-sensitive button

The use of pressure-sensitive buttons was introduced by the Sega DreamCast in 1999. It has trigger-like shoulder buttons, similar to the earlier Nintendo 64 controller, but the main difference being that DreamCast controller's shoulder buttons are pressure-sensitive. Since then, most game controllers have included pressure-sensitive buttons.

Online gaming

Online gaming, which in previous generations had been the exclusive domain of PC games, became prominent in video game consoles starting in the late 1990s. The Dreamcast initiated this change in 1999 with its built in modem, internet browsing software, and ability to play certain games online. Nearly all consoles since released then have had support for online gaming.

Genre innovation

Many technically innovative and genre-defining games were developed during the 1990s, largely due to the impact of 3D graphics allowing three-dimensional environments as well as optical discs which allowed much greater storage capacity.

Fighting games

The release of *Street Fighter II* in 1991 is often considered a revolutionary moment in the fighting game genre. Yoshiki Okamoto's team developed the most accurate joystick and button scanning routine in the genre thus far. This allowed players to reliably execute multi-button special moves, which had previously required an element of luck. The game was also highly successful because its graphics took advantage of Capcom's CPS arcade chipset, with highly detailed characters and stages. Whereas previous games allowed players to combat a variety of computer-controlled fighters, *Street Fighter II* allowed players to play against each other. The popularity of *Street Fighter II* surprised the gaming industry, as arcade owners bought more machines to keep up with demand.[5]

Although *Street Fighter II* (1991) popularized and established the gameplay conventions of the fighting game genre.

SNK released *Fatal Fury: King of Fighters* a few months later,[6] adding a two-plane system where characters could step into the foreground or background. Meanwhile, Sega experimented with *Dark Edge*, an early attempt at a 3D fighting game where characters could move in all directions. Sega however, never released the game outside of Japan because it felt that unrestrained 3D fighting games were unenjoyable. Several fighting games achieved greater commercial success, including SNK's *Art of Fighting* and *Samurai Shodown* as well as Sega's *Eternal Champions*. Nevertheless, *Street Fighter II* remained the most popular,[7] spawning a special *Champion Edition* that improved game balance and allowed players to use additional characters.[5] The popularity of *Street Fighter II* led it to be released for home game consoles and allowed it to define the template for fighting games.[5] [7]

Virtua Fighter (1993) is rendered in 3D, but is typical of most fighting games in that most action takes place in a 2D plane of motion. Here, one player ducks the other's attack.

Sega began to attract attention with the 1993 release of *Virtua Fighter* in arcades. It was the first fighting game with 3D polygon graphics and a viewpoint that zoomed and rotated with the action. Despite the graphics, players were confined to back and forth motion as seen in other fighting games. By the time the game was released for the Sega Saturn in Japan, the game and system were selling at almost a one-to-one ratio.[7] In 1994, SNK released *The King of Fighters '94* in arcades, where players choose from teams of three characters to eliminate each other one by one.[8] A

follow-up to *Street Fighter II*, *Street Fighter Alpha*, was released in 1995 but was unable to match the popularity of its predecessor.[5] Throughout this period, the fighting game was the dominant genre in competitive video gaming, with enthusiasts popularly attending arcades in order to find human opponents.[9]

The fighting game genre continued to evolve as several strong 3D fighting games emerged in the late 1990s. Namco's *Tekken* (released in arcades in 1994 and on the PlayStation in 1995) proved critical to the PlayStation's early success, with its sequels also becoming some of the console's most important titles.[10] The *Soul* series of weapon-based fighting games also achieved considerable critical success, beginning with 1997's *Soul Edge*.[11] [12] Tecmo's *Dead or Alive* (released in 1996 in Japanese arcades and 1998 on the PlayStation) spawned a long-running franchise, known for its fast paced control system and innovative counter attacks. The series again included titles important to the success of their respective consoles.[13] [14] [15]

First-person shooters

The first-person shooter (FPS) typically features the player as the protagonist. Most often the player does not see the face of who they are playing, but will always see the weapon of choice located in the players hand in the lower left or right hand corner. FPSs are usually violent and feature blood and gore, which has sparked controversy from parent groups.

With the introduction of the fifth generation of games, 3-D graphics become the standard by end of decade. Although FPSs had been some of the first games to become 3-D.

Doom (1993) bursts onto the world scene and instantly popularizes the FPS genre, and even how games are played, as Doom is among the first games to feature multiplayer capabilities. It is not until *Quake* (1996), however, that game developers begin to take multiplayer features into serious consideration when making games. *Quake II* (1997), *Unreal* (1998) and *Half-Life* (1998) feature the next evolutionary step in the genre with continual progression of the game (no levels in the traditional sense) and an entirely in-person view, and become one of the most popular computer games in history.

Interactive movies

In the early-to-mid 1990s, several video game developers experimented with plot twists and providing alternative storylines and endings into their games. They even went as far as to film live action scenes and scripted popular actors to play the parts. *Night Trap*, released in 1992, was highly acclaimed for implementing live action scenes into video games and later the Wing Commander series dove into live action as well. *Wing Commander IV: The Price of Freedom* was given an unheard of budget of US$12 million and starred Mark Hamill of *Star Wars* fame. The *Wing Commander* series was known for providing several alternate endings depending on how the player followed the story and interacted with the characters.

Platform games

The platform game genre evolved through several distinct phases throughout the 1990s. The first was an evolutionary step during the fifth generation in the early 1990s, followed by a complete transformation of the genre during the sixth generation in the late 1990s.

Second-generation side-scrollers

The advent of 16-bit home consoles in the early 1990s marked an evolutionary step for the genre. By the time the Mega Drive and Super Nintendo Entertainment System launched, platform games were the most popular genre in home console gaming and were seen as vital for winning the console war. There was a particular emphasis on having a flagship platform title exclusive to a format, featuring a "mascot" character. Sega's *Alex Kidd in the Enchanted Castle* (1989) was only modestly successful, and Sega realized it needed a stronger mascot to move Genesis units. In 1990, Hudson Soft released *Bonk's Adventure* featuring a character that would be positioned as NEC's mascot.[16]

Sonic the Hedgehog showed what new technology could do for the genre

1990 marked the release of the Super NES, along with the much awaited *Super Mario World*. In order to fend off the new competition, Sega released *Sonic the Hedgehog*.[17] [18] Whereas Nintendo's offering featured a conservative design, true to the *Mario* tradition, *Sonic* showcased a new style of design made possible by a new generation of hardware. *Sonic* featured large fields that scrolled effortlessly in all directions, as well as all manner of uneven terrain, curved hills, and a complex physics system that allowed players to rush through its levels with well-placed jumps and rolls. It proved to be a massive hit, was a successful pack-in with new systems, and cemented the view that platform games would make or break a console.

The Sonic character was also seen as a new model for mascots in the early 1990s, particularly for his perceived "attitude," which characterized him as a rebel from the status quo. This "attitude" would soon become the status quo, as companies attempted to duplicate Sonic's success with their own brightly-colored anthropomorphisms.[19] Very frequently these were characterized by impatience, sarcasm, and frequent quipping to give them personality. These mascots, which included the likes of Gex, Bug!, and Bubsy, have mostly faded from relevance.

Another notable platform game from this time period include *Prince of Persia* which featured an unprecedented level of animation. Frequently, console games based on film, television, and comic book licenses would be platformers, such as those based on *Aladdin*, *Jurassic Park*, *James Bond*, and *Mickey Mouse*.

3D platformers

In 1996, Nintendo released *Super Mario 64*. Until this time there had been no established archetype for bringing platform games into 3D. *Mario 64* set a new standard and would be imitated by many 3D platformers to follow. Its gameplay allowed players to explore open 3D environments with greater freedom than any previous attempt at a 3D platform game. To aid this, Nintendo incorporated an analog control stick to their standard Nintendo 64 controller, something which had not been included in a standard console controller since the Vectrex (and since incorporated into the DualShock among

Super Mario 64 replaced the linear obstacle courses of traditional platform games with vast worlds.

other controllers). This allowed for the finer precision needed for a free perspective. Players no longer followed a linear path to the ends of levels, either, with most levels providing objective-based goals. There were, however, a handful of "boss" levels that offered more traditional platforming, and showed what a more direct conversion to 3D might have been like.

Some argue that many modern 3D platformers, especially those influenced heavily by *Super Mario 64*, are not platformers at all, or at least are not really an extension of 2D platformers.[20] *Super Mario 64* brought a change in the goals of some platformers. In most 2D platformers, the player only had to reach a single goal to complete a level, but in many 3D platformers, each level had to be combed for collectible items such as puzzle pieces (*Banjo-Kazooie*) or stars (*Super Mario 64*). This allowed for more efficient use of large 3D areas and rewarded the player for thorough exploration, but they also often involved more elements of action-adventure games, and less jumping on platforms.

Racing games

In 1992, Sega produced *Virtua Racing*, one of the first games with full 3D graphics. It was able to combine the best features of games at the time, along with multiplayer machine linking and clean 3D graphics to produce a game that was above and beyond the arcade market standard of its time. Also, Nintendo broke new ground by introducing the Mario Kart series on the SNES with Super Mario Kart. Using the familiar characters from the Mario franchise, the game not only departed from the realism paradigm by using small karts for the players to drive, but also featured bright, colourful environments and allowed the players to pick up power-ups to improve performance or hamper other racers. This franchise also spawned multiple sequels.

Virtua Racing (1992), one of the first full 3D games.

In 1993, Namco struck back with *Ridge Racer*, and thus began the polygonal war of driving games. Sega struck back in 1994 with Daytona USA, while Midway introduced Crusin' USA. Atari didn't join the 3D craze until 1997, when it introduced San Francisco Rush. In 1996, Konami introduced GTI Club which allowed free roaming of the environment - something of a revolution that had only been done in 3D before in Hard Drivin'.

Gran Turismo was considered the most realistic racing simulation in its time.

In 1997, *Gran Turismo* was released for the PlayStation. It was considered the most realistic racing simulation game in its time, combined with playability, enabling players of all skill levels to play. The *Gran Turismo* series has since become one of the most popular racing franchises ever, with the series selling more than 50 million copies worldwide. Colin McRae Rally was introduced in 1998 to the PC world, and was a successful semi-simulation of the world of rally driving (previously only available in Sega's less serious Sega Rally Championship). Motorhead, a PC game, was later adapted back to arcade.

1999 marked a change of games into more "free form" worlds. *Midtown Madness* allows the player to explore a simplified version of the city of Chicago using a variety of vehicles and any path that they desire. In the arcade world, Sega introduced *Crazy Taxi*, where you are a taxi driver that needed to get the client to the destination in the shortest amount of time. A similar game also from Sega is *Emergency Ambulance Driver*, with almost the same gameplay (pick up patient, drop off at hospital, as fast as possible).

Role-playing games

The 1990s saw the emergence of several distinct subgenres of the role-playing game genre.

Action role-playing games

1990 would see the release of *Crystalis* for the NES and also *Golden Axe Warrior* for the Master System. Both games featured *Zelda*-like gameplay blended with genuine RPG elements, such as experience points, statistics-based equipment, and a magic-casting system. In 1991, Squaresoft released *Seiken Densetsu* for the Game Boy, also known as *Final Fantasy Adventure* in the West. Like *Crystalis*, the action in *Seiken Densetsu* bore a strong resemblance to that of *Zelda*, but added more RPG elements. *Seiken Densetsu 2*, also known as *Secret of Mana*, implemented an innovative multiplayer function, and further developed its combat with more diverse weaponry and spell-casting.

Secret of Mana (1993) introduced cooperative multiplayer gameplay into the RPG genre.

Unique among video games are Capcom's *Dungeons & Dragons: Tower of Doom* (1993) and *Dungeons & Dragons: Shadow over Mystara* (1996). These games were released for the arcades, and featured a blending of beat 'em up and RPG characteristics. The games were later released for the Sega Saturn together as the *Dungeons & Dragons Collection* (1999). Several later beat 'em ups followed this same formula, including Guardian Heroes, Castle Crashers and Dungeon & Fighter.

In Japan on Super Famicom, *Tales of Phantasia* was released in Japan in 1995, featuring real-time side-scrolling combat mode and an exploration mode similar to classic console RPGs. In 1996, Star Ocean was released that also has real-time combat and classic exploration but features bird's eye view. Namco and Enix did not publish these two revolutionary titles in America, even though sequels in the two series would become wildly popular on future generations of consoles in the US. Fifth generation era saw several popular action RPGs, such as *Tales of Eternia*, *Brave Fencer Musashi* and *Legend of Oasis*.

Console role-playing games

It was in the early 1990s that the console RPG genre distinguished itself greatly from computer RPGs, with the *Final Fantasy* series playing an instrumental role. *Final Fantasy III* introduced the "job system", a character progression engine allowing the player to change a character's class, as well as acquire new and advanced classes.[21] [22] *Final Fantasy IV* (1991) was one of the first role-playing games to feature a complex, involving plot,[23] placing a much greater emphasis on character development and pioneering "the whole concept of dramatic storytelling in an RPG."[24] It also introduced a new battle system: the "Active Time Battle" system, developed by Hiroyuki Ito,[25] where the time-keeping system does not stop.[26] Square Co., Ltd. filed a United States patent application for the ATB system on March 16, 1992, under the title "Video game apparatus, method and device for

Final Fantasy VII (1997) is one of the biggest-selling RPGs to date and remains very popular among RPG fans.

controlling same" and was awarded the patent on February 21, 1995. On the battle screen, each character has an ATB meter that gradually fills, and the player is allowed to issue a command to that character once the meter is full.[27] The fact that enemies can attack or be attacked at any time is credited with injecting urgency and excitement into the combat system.[26] Both the "job system" and the ATB system were fully developed in *Final Fantasy V* (1992) and continued to be used in later *Final Fantasy* games [28] as well as other Square games such as *Chrono Trigger* (1995). *Final Fantasy VI* (1994) and the *Megami Tensei* series were some of the first RPGs to move away from the typical medieval setting, with *Final Fantasy VI* instead being set in a steampunk environment [29] and the *Megami Tensei* games set in modern-day Japan.

The *Pokémon* franchise is the best selling RPG series involving monster battles.

The next major revolution came in the late 1990s, which saw the rise of optical disks in fifth generation consoles. The implications for RPGs were enormous—longer, more involved quests, better audio, and full-motion video. This was first clearly demonstrated by *Final Fantasy VII* (1997). The explosion of *Final Fantasy VII*'s sales and the ascendance of the PlayStation were proof of this and represented the dawning of a new era of RPGs. Backed by a clever marketing campaign, *Final Fantasy VII* brought the first taste of CRPGs to many of the new gamers brought in by the PlayStation gaming console.[30] [31] Subsequently, CRPGs, previously a niche genre, skyrocketed in popularity.

In 1997, a new Internet fad began, influenced by the popularization of console RPGs. A large group of young programmers and aficionados began creating and sharing independent CRPG games, emulating the gameplay and style of the older SNES and Sega Genesis games. The majority of such games owe their achievement to simplistic software development kits such as the Japanese *RPG Maker* series.

MUDs and MMORPGs

1989 and the early 1990s saw the release and spread of the MUD codebases DikuMUD and LPMud, leading to a tremendous increase in the proliferation and popularity of MUDs. Before the end of the decade, the evolution of the genre continued through "graphical MUDs" into the first massively multiplayer online role-playing games (MMORPGs),[32] a term coined by Richard Garriott in 1997.[33] That genre, as currently defined, began with *Meridian 59* in 1995, but first truly came into its own with *Ultima Online* in 1997, a game that provided a core idea of what later MMORPGs would become, featuring a massive continent on which players could interact with others from around the world, fight mythical creatures, and cast spells. After earlier games broke ground, widespread popularity for MMORPGs arrived with the debut of *EverQuest* and *Asheron's Call* in 1999. MMORPGs would become a common form of social interaction in the 2000s.[34]

Tactical role-playing games

In 1990, Nintendo released and published the first tactical RPG, *Fire Emblem: Ankoku Ryū to Hikari no Tsurugi* for the Nintendo Entertainment System (NES), created and developed by Intelligent Systems. Released in Japan in 1990, *Fire Emblem* was an archetype for the whole genre, establishing gameplay elements that are still used in tactical CRPGs today (although some of these elements were influenced by *Ultima III*). Combining the basic console RPG concepts from games like *Dragon Quest* and simple turn-based strategy elements, Nintendo created a hit, which spawned many sequels and imitators.

Fire Emblem: Ankoku Ryū to Hikari no Tsurugi (1990) is regarded as the first tactical RPG.

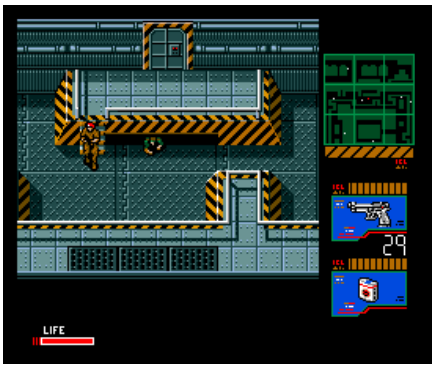
Among the first imitators was *Langrisser* by NCS/Masaya, first released for the Mega Drive/Sega Genesis in 1991. It was translated for North American release and retitled *Warsong*. The *Langrisser* series differed from *Fire Emblem* in that it used a general-soldier structure instead of controlling main characters. *Master of Monsters* was a unique title by SystemSoft. Where *Langrisser* and *Fire Emblem* used a square-based grid, *Master of Monsters* used a hexagonal grid. Players could choose one of four different Lords to defend their Towers and areas on the grid by building an army of creatures to destroy the opposing armies.

The first game in the long-running *Super Robot Wars* series is another early example of the genre, released for the Game Boy in 1991. Another influential early tactical RPG was Sega's *Shining Force* for the Sega Genesis, which was released in 1992. *Shining Force* used even more console RPG elements than earlier games, allowing the player to walk around towns and talk to people and buy weapons. One game released solely in Japan for the Super Nintendo Entertainment System (SNES), *Bahamut Lagoon*, began Squaresoft's (now Square Enix) famous line of tactical RPGs.

Ogre Battle: The March of the Black Queen was released for the SNES and is more of a real-time strategy game in which the player forms computer role-playing game-like character parties that are moved around a map in real-time. When two parties meet, the combat plays out with minimal user interaction. A later release, *Tactics Ogre: Let Us Cling Together*, was originally a SNES game that was later ported to the PlayStation. *Tactics Ogre* is a much more direct influence on the sort of tactical RPGs that gamers recognize today such as *Final Fantasy Tactics* and *Disgaea: Hour of Darkness*. It was also the first to bear the name "Tactics" in the title, a term gamers would come to associate with the genre. Not only are characters moved individually on a grid, but the view is isometric, and the order of combat is calculated for each character individually. The game defined the genre in many ways.

Stealth games

While stealth elements have been present in video games as far back as *005*, a 1981 arcade game by Sega,[35] [36] [37] it was in the 1990s that the stealth game genre was established. Hideo Kojima's *Metal Gear 2: Solid Snake* was released in 1990 for the MSX2 and was a major improvement over its predecessor, *Metal Gear* (1987). *Metal Gear 2: Solid Snake* improved on the first game in many ways, including improved graphics, more player abilities (such as crouching, crawling into hiding spots, disguising in enemy uniforms and cardboard boxes, and distracting guards by knocking on surfaces), improved enemy AI (such as a greater field of vision, the ability to detect various noises, and a three-level security alert), and additions such as a radar, as well as a complex storyline.[38] [39] The game was only released for the MSX2 in Japan, however, which limited its accessibility to gamers in the US.[40] An alternative *Metal Gear* sequel named *Snake's Revenge* was released for the Nintendo Entertainment System in the US instead, also in 1990. Kojima was not involved in the game's development, which was instead conducted by another Konami team. The result was a more action based game than previous installments, and which is not part of the *Metal Gear* canon.[40]



The ability to crawl under tight spaces and hide from enemies was introduced in *Metal Gear 2: Solid Snake* (1990).

Metal Gear Solid (1998) was responsible for popularizing the stealth game genre.

1998 is seen as a turning point in gaming history because of the release of *Metal Gear Solid*, as well as *Tenchu: Stealth Assassins* and *Thief: The Dark Project*.[41] [42] The ninja-themed game *Tenchu: Stealth Assassins* was released several months before *Metal Gear Solid*, making it the first 3D stealth based-game.[43] The highly anticipated *Metal Gear Solid* transformed its modestly successful franchise into a large mainstream success. The increased power of the PlayStation console over previous platforms allowed for greater immersion in terms of both story and game environment.[40] *Metal Gear Solid* has been credited with popularizing the stealth genre.[44] [45] The core elements of these games, such as avoiding confrontation, minimizing noise, and attacking antagonists from "the shadows", influenced many future stealth game series.[46]

Survival horror

While elements of the survival horror genre can be traced back to the 1989 Capcom game *Sweet Home*, which served as a major influence on the genre,[47] it was in the 1990s that survival horror was established as a genre. Another precursor appeared in 1992 when Infogrames released *Alone in the Dark*, which is also considered a forefather of the genre.[48] The game featured a lone protagonist against hordes of monsters, and made use of traditional adventure game challenges such as puzzle-solving and finding hidden keys to new areas. Graphically, *Alone in the Dark* utilized static prerendered camera views that were cinematic in nature. Although players had the ability to fight monsters as in action games, players also had the option to evade or block them.[49]

The term "survival horror" was first used by Capcom to market their 1996 release, *Resident Evil*, thus establishing it as a genre.[50] [51] The game was influenced by Capcom's *Sweet Home*, released seven years earlier.[47] *Resident Evil* also adopted several features seen in *Alone in the Dark*, including puzzle-solving challenges and fixed cinematic camera angles.[49] The control scheme in *Resident Evil* also became a staple of the genre, and future titles would imitate its challenge of rationing highly limited resources and items.[52] The game's commercial success is credited with helping the PlayStation become the dominant game console,[49] and also led to a series of *Resident Evil*

films.[53] Many games have tried to replicate the successful formula seen in *Resident Evil*, and every subsequent survival horror game has arguably taken a stance in relation to it.[53]

Silent Hill (1999) drew heavily from *Resident Evil* while using realtime 3D environments in contrast to *Resident Evil*'s pre-rendered graphics.[54] The game was praised for moving away from B movie horror elements to the psychological style seen in art house or Japanese horror films,[53] due to the game's emphasis on a disturbing atmosphere rather than visceral horror.[55] The original *Silent Hill* is considered one of the scariest games of all time.[56]

Best-selling video games of the 1990s

Video game platforms

GB	Game Boy
GBC	Game Boy Color
Mac	Macintosh / Mac OS

N64	Nintendo 64
PS1	PlayStation / PSone
Sat	Sega Saturn

SMD	Sega Mega Drive / Genesis
SNES	Super NES / Super Famicom
Win	Microsoft Windows

This is a list of video games that were released in the 1990s and have sold over five million copies.

- *Pokémon Red*, *Blue*, and *Green* (GB, 1996 – 20.08 million approximately: 10.23 million in Japan,[57] 9.85 million in US)[58]
  - *Pokémon Red* (4.83 million in US)[58]
  - *Pokémon Blue* (5.02 million in US)[58]
- *Super Mario World* (SNES, 1990 – 20 million)[59]
- *Pokémon Gold* and *Silver* (GBC, 1999 – 14.51 million approximately: 7.6 million in US,[58] 6.91 million in Japan)[57]
  - *Pokémon Gold* (7.15 million approximately: 3.75 million in US,[58] 3.4 million in Japan)[57]
  - *Pokémon Silver* (7.36 million approximately: 3.85 million in US,[58] 3.51 million in Japan)[57]
- *Super Mario 64* (N64, 1996 – 11 million)[60]
- *Gran Turismo* (PS1, 1997– 10.85 million shipped)[61] [62]
- *Final Fantasy VII* (PS1, 1997 – 9.8 million, includes *Final Fantasy VII International*)[63]
- *StarCraft* (Win, 1998 – 9.5 million, may include *StarCraft: Brood War*)[64]
- *Gran Turismo 2* (PS1, 1999 – 9.37 million shipped)[61] [62]
- *Mario Kart 64* (N64, 1996 – 8.47 million approximately: 6.23 million in US and PAL region,[65] 2.24 million in Japan)[57]
- *Pokémon Yellow: Special Pikachu Edition* (GB, 1998 – 8.26 million approximately: 5.1 million in US,[58] 3.16 million in Japan)[57]
- *Donkey Kong Country* (SNES, 1994 – 8 million)[66]
- *GoldenEye 007* (N64, 1997 – 8 million)[60] [67] [68]
- *Half-Life* (Win, 1998 – 8 million)[69]
- *Super Mario Kart* (SNES, 1992 – 8 million)[60]
- *Tomb Raider II* (PS1, 1997 – 8 million)[60]
- *The Legend of Zelda: Ocarina of Time* (N64, 1998 – 7.6 million)[70]
- *Metal Gear Solid* (PS1, 1998 – 7 million)[71]
- *Tomb Raider* (PS1, 1996 – 7 million)[72]

- *Crash Bandicoot* (PS1, 1996 – 6.8 million)[73]
- *Street Fighter II* (SNES, 1991 – 6.3 million)[74]
- *The Legend of Zelda: Link's Awakening* (GB/GBC, 1993/1998 – 6.05 million approximately: 3.83 million,[70] 2.22 million for the *DX* version)[70]
- *Final Fantasy VIII* (PS1, 1999 – 6 million)[75]
- *Myst* (Mac and Win, 1993 – 6 million)[76]
- *Sonic the Hedgehog 2* (SMD, 1998 – 6 million)[77]
- *Crash Bandicoot 3: Warped* (PS1, 1998 – 5.7 million)[78]
- *Crash Bandicoot 2: Cortex Strikes Back* (PS1, 1997 – 5.17 million approximately: 3.87 million in US,[58] 1.3 million in Japan)[57]

Other

- Fighting games like Capcom's *Street Fighter II*, Sega's futuristic *Virtua Fighter* and the more violent *Mortal Kombat* from Acclaim prompted the video game industry to adopt a game rating system, and hundreds of knock-offs are widely popular in the mid-to-late 1990s.
- The real-time strategy (RTS) genre is introduced in 1992 with the release of *Dune II*. *Warcraft: Orcs & Humans* (1994) popularizes the genre, with *Command & Conquer* and *Warcraft II: Tides of Darkness* in 1995 sets up the first major real-time strategy competition and popularizes multiplayer capabilities in RTS games. *StarCraft* in 1998 becomes the second best-selling computer game of all time. It remains among the most popular multiplayer RTS games to this day, especially in South Korea. *Homeworld* in 1999 becomes the first successful 3d RTS game. The rise of the RTS genre is often credited with the fall of the turn-based strategy (TBS) genre, popularized with *Civilization* in 1991. The *Civilization* franchise is the only TBS franchise that remains popular.
- *Final Fantasy* first debuted (in North America) in 1990 for the NES, and remains among the most popular video game franchises, with 12 new titles to date, with another in development, plus numerous spin-offs, sequels, movies and related titles. *Final Fantasy VII*, released in 1997, especially popularized the series.
- Pokémon entered the world scene with the release of the original Game Boy *Pokémon Red* and *Pokémon Green* games in Japan in 1996, later changed to *Pokémon Red* and *Pokémon Blue* for worldwide release in 1998. It soon becomes popular in the U.S. and is adapted into a popular children's anime series and trading card game, among other media forms. Its popularity remains well into the first decade of the 21st century with several new games and spin-offs.
- Sonic Adventure was a launch title for the dreamcast, it had realistic graphics, 6 storys and the fast gameplay, this was the best selling Dreamcast game selling 2.5 million units.

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2000s in video gaming

1990s · **2000s in video gaming** · 2010s
Other events: 2000s · Games timeline

The **2000s in video gaming** was a decade that had been primarily dominated by Sony, Nintendo, the newcomer Microsoft, and their respective systems. Sega, being Nintendo's main rival in the 1980s and 1990s, left the console market in 2002 in favor of returning to the third party company they once were. Overall the decade has seen the last of the low resolution three dimensional polygons of the 1990s and has entered the realm of High Definition games, and has often focused on developing immersive and interactive environments, implementing realistic physics, and improving artificial intelligence.[1] [2]

Consoles of the 2000s

Sixth generation consoles

The sixth generation of video games officially began in 1998 with the introduction of the short-lived Dreamcast, which was discontinued in 2001. Sega announced that they would no longer produce video game consoles after two straight underperforming consoles and became a third-party developer. The PlayStation 2 was released in 2000 and became the best-selling video game console of all time. The console is still produced. Microsoft entered the home console market with the Xbox. Although initially expected to struggle, it vaulted into a solid second place behind the PS2 on the strength of the launch title *Halo: Combat Evolved*. The Nintendo GameCube, launched in 2001 alongside the Xbox, fell into third place, a first for Nintendo. The Game Boy Advance was launched as a replacement for the Game Boy Color in 2001.

The sixth generation improved on the 3D graphics of the fifth generation consoles as an era of many sixth generation games. Some of the new features in the consoles included built-in DVD players and hard drives.[3] [4] Internet play on consoles, pioneered by the Dreamcast, became commercially viable with the Xbox Live system, which was launched in November 2002, one year after the console's release. It featured a broadband connection and downloadable content and was a major success.

Seventh generation consoles

The seventh generation of consoles began with the release of the Xbox 360 in 2005. This was followed by the Wii and the PlayStation 3 in 2006. The seventh-generation featured widespread implementation of HD-ready graphics, media centers, and wireless game controllers, as well as complete online service for all consoles. The PS3 also has Blu-ray Disc compatibility. The Wii implemented an innovative game controller that features full motion sensitivity and is wielded like a remote, with limited button interaction. In response, the PS3 features tilt-sensitive controllers. The Wii's motion sensitive controls and focus on family-friendly games, while alienating some hardcore gamers, has helped the Wii to become by far the best-selling console of the current generation. The high price of the PS3 has kept it in 3rd place, but it has slowly increased in popularity, allowing it to remain competitive with the 360.

Nintendo continued to dominate the handheld console market with the release of the dual-screen Nintendo DS in 2004. One of the screens is a touchscreen. The PlayStation Portable, released in 2005 by Sony, was the first serious competitor to Nintendo's handheld gaming consoles and is by far the best-selling non-Nintendo handheld. The seventh generation is the current generation of video gaming.

Games of the 2000s

3D gaming

At the beginning of the decade, the only genres of gaming that were predominantly 3-dimensional were role-playing games (RPGs) and first-person shooters (FPSs). The real-time strategy (RTS) genre had seen its first successful 3D release, *Homeworld*, in 1999, although it wasn't until the 2002 releases of *Warcraft III: Reign of Chaos* and *Age of Mythology* that 3D became the standard for the genre.

Computer games

The Sims, released by Maxis in 2000, sold more than 6.3 million copies worldwide by March 22, 2002, to become the best-selling PC game in history, surpassing *Myst*.[5] After Electronic Arts bought Maxis, the company produced numerous expansions, turning *The Sims* franchise, which has sold more than 100 million copies worldwide as of April 16, 2008,[6] into the best-selling PC franchise in history as of March 19, 2008.[7]

Interactive gaming

Nintendo has led the market in console interactivity. The handheld Nintendo DS, released in 2004, features a touchscreen. Game interactivity took a major step forward with the introduction of the motion-sensitive Wii Remote with the Nintendo Wii in 2006. The PS3 introduced a tilt-sensitive controller on its release as well.

The 2000s has also seen the implementation of physics engines and increasing in-game interactivity into video gaming. *Red Faction*, a first-person shooter (FPS) released in 2001 for the PS2 and the PC, features one of the earliest examples of destructible environments in video gaming through its use of "Geo-Mod" technology. Certain sections of walls could be destroyed to provide alternate pathways or reveal hidden locations. *Half-Life 2*, released in 2004, is widely considered to have revolutionized physics in gaming with its Havok engine, which allowed for what was at the time widespread interactivity with objects in the environment of the game, although very little of the environment was destructible. The Havok engine brought realistic physics implementations to real-time strategy (RTS) with *Age of Empires III* in 2005. *Black*, a console FPS released in early 2006, allowed the player's weapons to extensively damage the environment. The PC games *Company of Heroes* (an RTS), released in late 2006, and *Crysis* (an FPS), released in 2007, both extended the implementation of physics in video gaming, featuring environments that were nearly entirely destructible and interactive. Since the use of physics engines has greatly increased since around 2004, so has the level of interactivity and destructibility in video games.

Rhythm games

The rhythm game genre took off in the late 1990s with *Beatmania* in 1997 and *Dance Dance Revolution* in 1998. Although beginning their lives in arcades, they made the move to the home console market and each spawned a number of sequels and spinoffs. The popularity of rhythm games accelerated in the mid-2000s, led primarily by *Guitar Hero*, which was released in 2005 and featured a guitar-like controller and licensed soundtracks. Initially available only for the PS2, its sequels have expanded the franchise to include all consoles. The developer of the first two Guitar Hero games went on to create *Rock Band* in 2007, which expanded the concept to include drums and vocals. *Guitar Hero World Tour*, released in 2008, added drums and vocals as well, largely in an effort to compete with Rock Band. The independent game *Audiosurf*, released in 2008, allows the user to play their own mp3 files and maneuver a spaceship-like object across a track to hit the music "notes".

MMORPGs

Although massively multiplayer online role-playing games (MMORPGs) began in the 1990s with such titles as *Ultima Online* (1997), *Everquest* (1999), and *Asheron's Call* (1999), during the 2000s, MMORPGs became a dominant genre among PC gaming. *Phantasy Star Online*, released on the Dreamcast in 2000 and later ported to the Xbox, GameCube, and PC, popularized MMORPGs for consoles, although it remains a PC-dominated genre. MMORPGs feature persistent worlds, player-driven economies, frequent content updates, and massive servers that contain thousands of players. Most MMOs also feature monthly fees to help with the massive costs required to maintain and continually upgrade the games. The MMO genre has gained much of its success by cashing in on previous popular titles (such was the case with Ultima Online and Phantasy Star Online) with such titles as *Final Fantasy XI* (2002), *Star Wars Galaxies: An Empire Divided* (2003), *World of Warcraft* (2004), *The Lord of the Rings Online: Shadows of Angmar* (2007), *Age of Conan: Hyborian Adventures* (2008), *Warhammer Online: Age of Reckoning* (2008), and the in-development titles *Star Trek Online*, *Warhammer 40,000 Online*, and *Star Wars: The Old Republic*. *World of Warcraft*, released in 2004, has established itself as one of the most popular games on the PC and set what are now the generally-accepted standards for the genre. *Lineage II* has established a large market outside of the United States, particularly in Asia, and is the second-most popular MMO worldwide. MMOs free of monthly charge, including *MapleStory* (2003), and *Guild Wars* (2004) have also proven to be popular.

MMOFPSs have also been developed, although they have not gained nearly the popularity that MMORPGs have. Perhaps the two most successful games of this genre have been *World War II Online* (2001) and *PlanetSide* (2003).

Browser-based and Independent Games

By the early 2000s, the Internet was viable as the sole distribution platform for game developers, which enabled a smaller scale of commercial development than in the past. New markets formed around these newer, cheaper publishing methods, with the primary methods used being downloadable and browser-based games.

Independent games were at first associated with the emerging market for casual games, because of the perceived low budget of most casual games, but over the course of the decade, casual games rapidly grew into capital-intensive productions, with titles such as Bookworm Adventures costing over half a million USD to produce. Today, independent games are more often associated with art games.

Games as downloadable computer programs were not a new concept in this decade; however, gaming within the browser, using HTML, Java, Javascript, and Flash, became increasingly viable over the course of the 2000s as the browser and computer technology improved. Browser-based games have mostly avoided packaged-goods-for-sale business models in favor of advertising/sponsorship, subscription, and microtransactions.

Controversial mature-content in gaming

The *Grand Theft Auto* series, notable for many violent and sexual plotlines, was a best-seller of the 2000s. The series' popularity sparked a fad of several Mature-rated video games based on including gang warfare, drug use, and perceived "senseless violence" into the gameplay. The Hot Coffee controversy, a sex mini-game, was discovered in *Grand Theft Auto: San Andreas*, and caused widespread controversy and have fueled efforts to ban the sale of Mature-rated games to minors. The effort has been spearheaded by mothers, lawmakers, and activists (such as Jack Thompson), although all such efforts to pass any laws concerning this have been firmly struck down. *Grand Theft Auto: San Andreas* was originally an M-rated game, but due to much controversy was later turned into an AO-rated game.[8] However, the game was changed and was re-released as an M-rated game.

Best-selling video games of the 2000s

Video game platforms

GB	Game Boy
GBA	Game Boy Advance
Mac	Macintosh / Mac OS

NDS	Nintendo DS
PS2	PlayStation 2
Wii	Wii

Win	Microsoft Windows
X360	Xbox 360

This is a list of video games that were released in the 2000s and have sold over ten million copies.

- *Wii Sports* (Wii, 2006 – 21.56 million,[9] packaged with system in all regions except Japan)
- *Nintendogs* (NDS, 2005 – 18.67 million)[9]
- *Grand Theft Auto: Vice City* (PS2, 2002 – 17.5 million,[10] includes Windows and Xbox versions)
- *The Sims* (PC, 2000 – 16 million shipped)[11]
- *Gran Turismo 3: A-Spec* (PS2, 2001 – 14.89 million shipped)[12]
- *Pokémon Diamond* and *Pearl* (NDS, 2006 – 14.77 million)[9]
- *Pokémon Gold* and *Silver* (GB, 1999 – 14.51 million approximately, 7.6 million in US,[13] 6.91 million in Japan)[14]
- *Grand Theft Auto III* (PS2, 2001 – 14.5 million,[10] includes Windows and Xbox versions)
- *New Super Mario Bros.* (NDS, 2006 – 14.16 million)[9]
- *Lineage II* (PC, 2003 – 14 million customers)[15]
- *Grand Theft Auto IV* (PC, Xbox 360, PS3, 2008 - 13 million)[16]
- *Pokémon Ruby* and *Sapphire* (GBA, 2002 – 13 million)[17]
- *The Sims 2* (PC, 2004 – 13 million)[18]
- *Brain Age: Train Your Brain in Minutes a Day!* (NDS, 2005 – 12.98 million)[9]
- *Grand Theft Auto: San Andreas* (PS2, 2004 – 12 million)[19]
- *Pokémon FireRed* and *LeafGreen* (GBA, 2004 – 11.82 million)[9]
- *Wii Play* (Wii, 2006 – 11.51 million)[9]
- *World of Warcraft* (PC, 2004 – 11 million subscribers)[20]
- *Brain Age 2: More Training in Minutes a Day!* (NDS, 2005 – 10.83 million)[9]
- *Mario Kart DS* (NDS, 2005 – 10.45 million)[9]
- *Gran Turismo 4* (PS2, 2004 – 10.06 million shipped)[12]

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Chronology by Year

1972 in video gaming

List of years in video gaming (table)
… 1962 · 1963 · 1964 · 1965 · 1966 · 1967 · 1968 … 1969 1970 1971 **-1972-** 1973 1974 1975 … 1976 · 1977 · 1978 · 1979 · 1980 · 1981 · 1982 …
Related time period or subjects
… 1969 · 1970 · 1971 - **1972** - 1973 · 1974 · 1975 … … 1940s · 1950s · 1960s -**1970s**- 1980s · 1990s · 2000s … 19 century · **20 century** · 21 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- *Pong* was the first commercially successful video arcade game, as well as the first video game to be subject to a lawsuit
- Following the poor sales of *Computer Space*, Nolan Bushnell leaves Nutting Associates to move his coin-op engineering and design firm with Ted Dabney in to a full fledged company. When officially incorporating, Bushnell discovers that a roofing company had already been using their name (syzygy). In its place, the new corporation is named "Atari."[1]
- On 24 May, Magnavox unveils the Odyssey, the first video game console, at a Burlingame, California convention. Nutting Associates, manufacturer of *Computer Space*, sends Nolan Bushnell to observe the launch. Bushnell reports back that he found the device underwhelming, and expresses no concern over the competition.[1] Later that year, Magnavox files suit against Atari over *Pong*, claiming that Atari founder Nolan Bushnell appropriated the concept from *Tennis*, one of the games available for the Odyssey, after having witnessed it at the Odyssey's unveiling. Before the court could find against Atari, Nolan and company agree to license the game from Magnavox and Sanders for a one time fee of $700,000.[2]

Notable releases

- Magnavox begins to sell the Odyssey through its retail stores.[1]
- Atari releases its first arcade game, Al Alcorn's Pong.[1]
- Gregory Yob programs *Hunt the Wumpus*, an early progenitor of the interactive fiction genre, in BASIC for mainframe computers.[3]
- Don Daglow programs *Star Trek* on a PDP-10 mainframe computer at Pomona College. Note that this is a different game from the *Star Trek game of 1971*[4]
- *Civilization* (not related to the Sid Meier *Civilization* games) written on the HP2000 minicomputer at Evergreen State College. A rewrite of this game would come be to known as *Empire Classic*.[5]

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1973 in video gaming

List of years in video gaming (table)
… 1963 · 1964 · 1965 · 1966 · 1967 · 1968 · 1969 … 1970 1971 1972 **-1973-** 1974 1975 1976 … 1977 · 1978 · 1979 · 1980 · 1981 · 1982 · 1983 …
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… 1970 · 1971 · 1972 - **1973** - 1974 · 1975 · 1976 … … 1940s · 1950s · 1960s -**1970s**- 1980s · 1990s · 2000s … 19 century · **20 century** · 21 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- On 19 March, Kagemasa Kozuki establishes Konami Industry Co., Ltd.[1] Formerly the owner of a jukebox repair/rental business in Osaka, Japan, Kozuki launches Konami to manufacture amusement machines for video arcades.[2]
- In May, Hudson Soft Ltd. is established in Sapporo, Japan for the purpose of marketing telecommunications devices and art photographs.[3]
- Though, not a big hit in reality, the Computer Space game make appearances in the films *Soylent Green* and *Sleeper*.
- Mazewar is developed for the Imlac PDS-1 computer. Mazewar is perhaps the first First Person Shooter and one of the earliest examples of a network game.
- Empire versions I, II and III are developed for the PLATO system by John Daleske. Possibly the first team game ever, the first fifty-player game ever, and numerous other innovations.
- Silas Warner takes over PLATO Empire version I and renames it Civilization.
- Lemonade Stand is developed for the first time.

Notable releases

- Midway Manufacturing Co. licenses *Pong* from Atari to produce *Winner*,[4] their first video game arcade game.[1]
- Atari releases *Gotcha*, the first commercial maze game, to video arcades.[1]
- Atari releases *PONG Doubles* to video arcades. A variation on the wildly successful *PONG*, *PONG Doubles* is the first video arcade game to include four player gameplay.[5]
- Williams Electronics releases *Paddle Ball*, an unlicensed duplicate of *Pong*, as their first arcade game.[6]
- BASIC Computer Games was first published. It included 101 games written in BASIC.

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1974 in video gaming

List of years in video gaming (table)
… 1964 · 1965 · 1966 · 1967 · 1968 · 1969 · 1970 … 1971 1972 1973 **-1974-** 1975 1976 1977 … 1978 · 1979 · 1980 · 1981 · 1982 · 1983 · 1984 …
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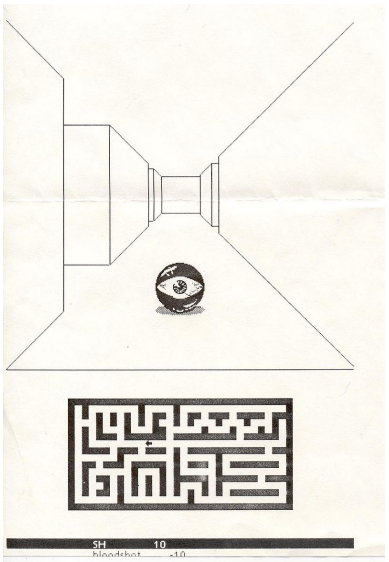
Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- The number of copies of *Pong* (or commercial clones of *PONG*) exceeds 100,000 units. Approximately 10,000 of these units were manufactured by Atari, the original developer of the title.[1]
- H.R. "Pete" Kaufman leaves Ramtek to found Exidy, Inc.[1]
- Namco acquires the Japanese division of Atari, Inc. and formally enters the video arcade game market.[1]
- Atari acquires Kee Games as a "marketing ploy." Atari will continue to use the "Kee Games" title as a brand name until 1978.[1]
- Royal Philips Electronics N.V. acquires Magnavox, which becomes "Philips Consumer Electronics."[2]
- On 25 March, the United States division of Service Games changes its name to Sega.[1]



Maze War, one of the earliest first-person shooters, was ported to a number of computer systems. The above image was created from a version of the game written for the Xerox Star 8010 in 1985.

Notable releases

- *Play Meter*, the first magazine devoted to coin-operated amusements (including arcade games), publishes its first issue.[1]
- Magnavox reissues the Odyssey and releases it in Australia, Belgium, the United Kingdom, France, West Germany, Greece, Israel, Italy, Switzerland, the Soviet Union, and Venezuela.[3]
- Prior to their acquisition by Atari, Kee Games releases *Tank* to video arcades.[1]
- Atari releases *Gran Trak 10*, the first racing game, to video arcades.[4]
- The earliest first-person shooter video games are released:
  - Steve Colley, Howard Palmer, and Greg Johnson develop *Maze War* on the Imlac PDS-1 at the NASA Ames Research Center in California.[5]
  - Jim Bowery develops *Spasim* for the PLATO system. Two versions are release, the first in March and the second in July.[6]
- Rusty Rutherford develops *pedit5*, the first dungeon crawl game, for the PLATO system.[7]
- Gary Whisenhunt and Ray Wood develop *dnd*, the first game with a Boss, and arguably the first computer role-playing game, for the PLATO system.[8] Development continued into 1975; it is unclear at what point the game became playable.

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Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- In Fall, Magnavox discontinues the original Odyssey video game console.[1]

Notable releases

- Atari and Tele-Games (a division of Sears, Roebuck and Company) release the first official home version of *Pong* through Sears department stores.[2]
- Magnavox releases two new models of their Odyssey console: the Odyssey 100 and the Odyssey 200.[1]
- Horror Games, founded by Nolan Bushnell, publishes its only game, *Shark Jaws*, intended to cash-in on the popularity of Steven Spielberg's film *Jaws*.[3]
- Midway releases *Gun Fight*, the first microprocessor-based video game and the first video arcade game licensed from Japan for release in the United States.[4] Taito developed the original Japanese version of the game, *Western Gun*, using TTL-based hardware: Dave Nutting Associates ported the game to the Intel 8080 microprocessor for its American release.[5]
- Don Daglow develops *Dungeon*, an early computer role-playing game, for the PDP-10.[6]
- William Crowther develops *Adventure* (also known as *Colossal Cave* and *ADVENT*), the first interactive fiction game, for the PDP-10.[7]
- dnd, the first video game to include a boss, and arguably the first computer role playing game, wrapped up initial development. Some sources list the game as 1974; it is unclear exactly when it became playable.

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Events

- In October, Warner Communications acquires Atari from Nolan Bushnell for $28 million USD. Bushnell stays on as chairman.[1]

Notable releases

- Atari releases F-1 and Night Driver
- In April, Atari releases *Breakout* (whose prototype was designed by Apple Computer cofounders Steve Jobs and Steve Wozniak) to video arcades.[1]
- In August, Fairchild Semiconductor releases the Video Entertainment System (later known as the Channel F), the first cartridge-based video game console.[2]
- Exidy releases *Death Race*, a racing game based on the film *Death Race 2000*, to video arcades. The game sparks a public outcry over violence in video games, and is banned in many areas.[3]
- Coleco releases the Telstar, a console clone of *Pong* based on General Instrument's AY-3-8500 microchip.[4]
- Radofin releases the 1292 Advanced Programmable Video System video game console in Europe.[5]
- While working at the Stanford Artificial Intelligence Lab, Don Woods discovers and expands Will Crowther's *Adventure*. Later in the year, James Gillogly ports Woods's version of the interactive fiction title from Fortran to the C programming language for Unix-based computers.[6]

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1977 in video gaming

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Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- Agnes Kim opens the first Electronics Boutique, a kiosk at the King of Prussia Mall in King of Prussia, Pennsylvania selling transistor radios and calculators.[1]
- Atari opens the first Pizza Time Theater (later Chuck E. Cheese's), a combination video arcade/pizzeria conceived by Atari co-founder Nolan Bushnell. In June, Bushnell purchases the rights to Pizza Time Theater back from Atari for $500,000 USD.[2]
- Sega acquires Gremlin Industries, a major developer of coin-operated "wall games."[3]
- Nakamura Manufacturing Ltd. formally changes its name to Namco (which it has employed as a brand name since 1971), and establishes Namco Enterprises Asia Ltd. in Hong Kong, its first subsidiary based outside of Japan.[4]

Notable releases

Video game consoles

The Atari Video Computer System was the most successful video game console of the second-generation era.

- Atari develops the Game Brain (model C-700), a dedicated console and the first Atari system to utilize cartridges. Only a handful of Game Brain prototypes are produced, and none are released commercially.[5]
- Coleco releases a number of new models of the Telstar console: the Telstar Alpha, the Telstar Colormatic, the Telstar Regent, the Telstar Ranger, the Telstar Galaxy, and the Telstar Combat. Most of these systems feature only minor variations on the original Telstar model, such as new controller types (for example, the Ranger featured a light gun, while the Galaxy included joysticks).[5]
- Nintendo releases the Color TV Game 6 dedicated console, featuring six variations of *Light Tennis* (a *Pong* clone). Nintendo's partner, Mitsubishi, produces most of the system's hardware components.[6]
- Bally releases the Bally Home Library Computer video game console through mail order retailer JS&A National Sales Group. Delays in production of the system, however, mean that none of the units will actually ship until the following year.[7]
- In January, RCA Corporation releases the Studio II video game console.[8]
- In October, Atari releases the Video Computer System (later known as the Atari 2600) video game console alongside nine launch titles.[9]

Games

- Cinematronics releases Larry Rosenthal's *Space Wars*, the first vector graphics arcade game.[10]
- Mattel releases *Missile Attack*, the first handheld electronic game to feature a light-emitting diode (LED) display.[11]
- Tim Anderson, Marc Blank, Bruce Daniels, and Dave Lebling, the future founders of Infocom, develop the first version of *Zork* on a PDP-10 at the Massachusetts Institute of Technology Laboratory for Computer Science.[12]
- While studying for a Ph.D. at the University of Virginia, Kelton Flinn begins developing a text-based aerial combat game called *Air*, an early precursor to 1987's *Air Warrior*, the first massively multiplayer online game.[13]

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1978 in video gaming

List of years in video gaming (table)
… 1968 · 1969 · 1970 · 1971 · 1972 · 1973 · 1974 … 1975 1976 1977 **-1978-** 1979 1980 1981 … 1982 · 1983 · 1984 · 1985 · 1986 · 1987 · 1988 …
Related time period or subjects
… 1975 · 1976 · 1977 - **1978** - 1979 · 1980 · 1981 … … 1940s · 1950s · 1960s -**1970s**- 1980s · 1990s · 2000s … 19 century · **20 century** · 21 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Events

Notable releases

- June - Taito Corporation releases the *Space Invaders* arcade game in Japan.
- October - Namco releases their first arcade game, Gee Bee in Japan.
- Cinematronics releases the *Space Wars* vector graphics arcade game.
- Konami Corporation releases their first arcade game, The *Block Game*.
- One of the first sim games, *Killer Shrews*, based on the cult movie *The Killer Shrews*, is programmed on the PDP-10 mainframe at Claremont Graduate University by Don Daglow.[1]
- BASIC Computer Games, microcomputer edition, was released to capitalize on gaming for home computers.

Hardware

- APF Electronics, Inc. releases the APF-M1000 home console.
- Bally/Midway releases the Bally Professional Arcade home console.
- Elektor releases the TV Games Computer.
- Entreprex releases the Apollo 2001 home console.
- Interton releases the VC 4000 home console.
- Magnavox releases the Odyssey² (G7000 Videopac) home console.
- Nintendo releases the Color TV Game 15 home console and the *Computer Othello* arcade game.
- Warner Communications' Atari introduces the trak-ball controller on the arcade game *Football*; releases the Pinball Game System home console.

Business

- SNK founded.

1979 in video gaming

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… 1969 · 1970 · 1971 · 1972 · 1973 · 1974 · 1975 … 1976 1977 1978 **-1979-** 1980 1981 1982 … 1983 · 1984 · 1985 · 1986 · 1987 · 1988 · 1989 …
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Art · Archaeology · Architecture · Literature · Music · Science +...

Events

Notable releases

- Richard Garriott creates *Akalabeth*, a computer role-playing game for the Apple IIe. It launches Garriott's career and is a precursor to his highly successful *Ultima* series.
- Namco releases *Bomb Bee*, the sequel to *Gee Bee*, *Galaxian*, the first true color arcade game, and *Cutie Q*, the second sequel to *Gee Bee*.
- Cinematronics releases the *Warrior* arcade game.
- Atari releases the *Lunar Lander* and Ed Logg & Lyle Rains' *Asteroids* arcade games.
- Atari programmer Warren Robinett releases *Adventure (Atari 2600)* for the Atari 2600. It is recognized as the first visual adventure game and has one of the first known Easter Eggs in any video game.
- Richard Bartle and Roy Trubshaw create what is commonly recognized as the first playable MUD. (Note: Many say that this happened in 1978, though Bartle has stated 1979.[1])
- October - subLOGIC releases *Flight Simulator* for the Apple II. It is later released by Microsoft (1982).

Hardware

- Mattel test markets the Intellivision console in Fresno, California. It is released throughout the United States in 1980.
- Milton Bradley Company releases the Microvision handheld.
- Texas Instruments releases the TI-99/4 home computer.
- Warner Communications' Atari creates the Cosmos handheld (unreleased).

Business

- New companies:
  - Activision
  - Capcom Inc.
  - Infocom
  - Strategic Simulations, Inc.
  - Edu-Ware Services, Inc.

1980 in video gaming

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Art · Archaeology · Architecture · Literature · Music · Science +...

Events

Notable releases

- Namco releases Navalone, Kaitei Takara Sagashi, SOS, Pac-Man, which is their biggest selling game of all time, King and Balloon, which is the first game to feature synthesized voices, Tank Battalion and Rally-X, which is the first game to feature a bonus round.
- *Rogue* is written by Michael Toy, Glenn Wichman, and Ken Arnold, spawning the category of roguelike games.
- Nintendo releases the *Radar Scope* arcade game and the Game & Watch handheld LCD game by Gunpei Yokoi.
- Stern Electronics (a subsidiary of Universal Research Laboratories) releases the *Berzerk* arcade game.
- Warner Communications' Atari releases the *Missile Command* arcade game, and the *Battlezone* arcade game (it was later enhanced for the US Army for military training) – albeit relying on specialized vector graphics hardware.
- Williams Electronics releases the *Defender* arcade game.
- Warner Communications' Atari releases the *Centipede* (by Ed Logg & Dona Bailey) and *Warlords* arcade games and also the *Tempest* color vector arcade game.
- Universal release the arcade game *Space Panic*, often cited as the first platform game.
- Edu-Ware releases *The Prisoner*, loosely based upon the 1960s TV series of the same name. Programmed by David Mullich, it became a classic of the Apple II platform.
- Infocom releases Zork I, the first Zork game and the first Infocom game.

Hardware

- Mattel releases the Intellivision video game console.
- Sinclair Research releases the ZX80 home computer and Acorn Computers release the Atom, the first 'domestic' computers to play games in the UK.

Business

- New companies: Mindscape, Inc., Sierra On-Line.
- Mattel creates the original five-programmer Intellivision game design team, nicknamed the Blue Sky Rangers by a magazine writer when the company keeps their names secret in a TV Guide interview.

1981 in video gaming

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Events

- November -
  - The British video game magazine Computer and Video Games (C&VG) starts.
  - Game & Watch - released in Sweden.
- Arnie Katz and Bill Kunkel found *Electronic Games*, the first magazine on video games and generally recognized as the beginning of video game journalism.

Notable releases

- Midway releases *Gorf*, *Wizard of Wor*, and *Ms. Pac-Man* arcade games
- Sega releases the Turbo and the *Frogger* video game, which was developed by Konami
- Namco releases *New Rally-X*, *Warp and Warp*, *Galaga*, and *Bosconian*, which is the first game to have a continue feature.
- Nelsonic releases the *Space Attacker* watch LCD game
- Nintendo releases Shigeru Miyamoto's *Donkey Kong* arcade game
- Williams Electronics releases Eugene Jarvis's *Stargate* arcade game
- IBM and Microsoft include the game *DONKEY.BAS* with the IBM PC, arguably the first IBM PC compatible game.
- *Ultima* and *Wizardry* are released, starting two of the most successful lines of CRPGs
- *President Elect*, the first commercially published political simulation game, was released by Strategic Simulations.
- Muse Software releases Silas Warner's *Castle Wolfenstein* computer game
- Atari releases *Pac-Man* for the Atari 2600. It was a total flop and as a result was a major contributor to the North American Video Game Crash of 1983 due to all the hype it caused.

Hardware

- Astrovision Inc. distributes the Bally Computer System after buying the rights from Bally/Midway
- Acorn Computers Ltd releases the BBC Micro home computer, which brought the game *Elite* to prominence
- Coleco Industries releases the Total Control 4 home console
- Commodore Business Machines releases the Commodore VIC-20 home computer
- SEGA test markets the SG-1000 home console in Japan
- Sinclair Research releases the ZX81 home computer in the UK. Shortly, J. K. Greye Software publishes *3D Monster Maze* written by Malcolm Evans – the first computer game featuring real-time 3D graphics without using specialized vector graphics hardware

Business

- APF Electronics, Inc. goes defunct

1982 in video gaming

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Events

- December 27 - Starcade, a video game television game show, debuts on TBS in the United States.

Notable releases

*Q*bert*

- October 13 - Mystique releases the *Custer's Revenge* adult video game for the Atari 2600 home console.
- Activision releases *Barnstorming* and *Megamania* by Steve Cartwright for the Atari 2600.
- Bally/Midway releases the *Tron* arcade game before the movie
- Gottlieb releases the *Q-Bert* arcade game.
- Atari releases *E.T. the Extra-Terrestrial*, possibly the biggest flop in video game history and one of two major video game releases (along with the Atari 2600 version of *Pac-Man*) that helped spark the video game crash of 1983.
- Mattel releases *Utopia* by Don Daglow for Intellivision; *Utopia* was the first sim game.
- Namco releases *Dig Dug*, *Pole Position*, *Super Pac-Man*, *Pac-Man Plus* and *Xevious*.
- Nintendo releases Shigeru Miyamoto's *Donkey Kong Jr.* arcade game.
- SEGA releases the *Zaxxon* arcade game.
- Starpath releases Dragonstomper by Stephen Landrum (the only RPG for the Atari 2600) and Escape From The Mindmaster also for the Atari 2600.
- Warner Communications' Atari releases the *Quantum* arcade game.
- Williams Electronics releases the arcade games *Joust* (designed by Barry Oursler, art by Constantino Mitchell) and *Robotron: 2084* (designed by Eugene Jarvis).
- Parker Brothers releases *Star Wars: The Empire Strikes Back* (Atari 2600 and Intellivision), the first *Star Wars* video game.
- Edu-Ware releases *Prisoner 2* for the Apple II, Atari, and IBM PC.
- Sir-tech Software, Inc. releases *Wizardry II: The Knight of Diamonds*, the second scenario in the *Wizardry* series

Hardware

- Atari releases the Atari 5200 home console.
- Astrocade Inc. (formerly Astrovision) releases the Astrocade console.
- Coleco Industries releases the Gemini home console, an Atari 2600 clone.
- Commodore Business Machines releases the Commodore 64 home computer, which would become the best selling computer of all time.
- Emerson releases the Arcadia 2001 home console.
- Entrex releases the Adventure Vision home console.
- General Consumer Electronics releases the Vectrex home console.
- Sinclair Research releases the ZX Spectrum home computer, which would become the most popular gaming computer of its generation in the UK.
- Coleco releases the ColecoVision home console.

Business

- New companies: Electronic Arts Inc., Lucasfilm Games, MicroProse Software, Inc., Enix Corporation.
- Ultimate Play The Game (later to be known as Rare) is founded.

1983 in video gaming

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Events

- A major shakeout of the video game industry begins. By 1986, total video games sales will decrease from US$3.2 billion to US$0.1 billion.[1]
- MCA Universal files suit against Nintendo, claiming that the latter company's video arcade hit *Donkey Kong* violated Universal's copyright on King Kong. After a brief trial, the judge determined that the rights to the original Kong had passed into the public domain. The case was dismissed, and MCA Universal paid $1.8 million USD in damages to Nintendo.[2]
- Atari files suit against Coleco, claiming violation of Atari's patents on the Atari 2600 video game console. The previous year, Coleco released a peripheral device that made it possible for Atari 2600 game cartridges to be run on the ColecoVision console.[3]
- Infogrames Entertainment SA is established by Bruno Bonnell and Christophe Sapet in Lyon, France.[4]
- Origin Systems is founded by Robert, Richard, and Owen K. Garriott and Chuck Bueche in Austin, Texas; Richard will become better known by the name of his fictional character, *Lord British*.[5]
- Interplay Productions is founded by Brian Fargo in southern California.[6]
- Navarre Corporation is founded.[7]
- Amusement Developing Section 8 (later known as Sega-AM2), a research and development department of Sega, is established under the supervision of Yu Suzuki in Tokyo, Japan.[8]
- According to Nintendo, total video game sales for 1983 are $3.2 billion USD.[1]

Notable releases

Arcade games

- Bally/Midway releases *Spy Hunter*, an action/racing game.[9]
- Cinematronics releases Advanced Microcomputer Systems's *Dragon's Lair*, the first laserdisc video game.[10]
- Atari releases *Star Wars*, a vector graphics-based game based on the popular film franchise.[11]
- Konami releases *Gyruss* in Japan. Centuri distributes the game in North America.[12]
- Namco releases *Mappy*, *Pac & Pal*, *Phozon*, *Libble Rabble* and *Pole Position II*.
- Nintendo releases arcade games *Mario Bros.* and *Donkey Kong Jr. Math*

Personal computer and console games

- Mattel Electronics publishes *World Series Baseball* by Don Daglow and Eddie Dombrower, the first video game to use multiple camera angles, for the Intellivision.[13]
- Origin Systems publishes *Ultima III: Exodus* by Richard Garriott, better known as Lord British. *Ultima III* was the first computer role-playing game to feature tactical, turn-based combat, for the Apple II, Atari 800, Commodore 64, and IBM PC.[5]
- Electronic Arts publishes Dan Bunten's *M.U.L.E.*, an influential multiplayer strategy game, for the Commodore 64.[14]
- Electronic Arts publishes Bill Budge's *Pinball Construction Set*, the first example of the "builder" (or "construction set") computer and video game genre, for the Apple II, Atari 800, and IBM PC.[15]
- Bug-Byte releases Matthew Smith's *Manic Miner*, an influential early platform game, for the ZX Spectrum.[16]
- Ultimate Play The Game, later known as Rare, releases its first video games, *Jetpac* and *Atic Atac*, for the ZX Spectrum.[17]

[18]

Hardware

- Sega releases the SC-3000 personal computer and the SG-1000 console in Japan.[19]
- Nintendo releases the Family Computer console in Japan. Shortly after its release, complaints begin to surface about rampant system instability, prompting Nintendo to issue a product recall and to rerelease the machine with a new motherboard.[1]
- Coleco releases the Adam home computer.[20]
- Mattel Electronics releases the Aquarius home computer, originally designed by Radofin Electronics Far East.[21]
- Acorn Computers release the Acorn Electron, a cut down version of their BBC Micro to compete in the under £200 home computer market. Problems in manufacture see only 1 in 8 presales being delivered for the Christmas market.

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North American video game crash of 1983

The **North American video game crash of 1983** (sometimes known as the **Atari Debacle** or the **video game crash of 1983 and 1984** because it was in that year that the full effects of the crash became apparent to consumers) brought an abrupt end to what is considered the second generation of console video gaming in North America. It almost destroyed the then-fledgling industry and led to the bankruptcy of several companies producing home computers and video game consoles in North America. It lasted about two years, and many business analysts of the time expressed doubts about the long-term viability of video game consoles. The video-game industry was revitalized a few years later, mostly due to the widespread success of the Nintendo Entertainment System (NES), which was released in North America in 1985 and became extremely popular by 1987.[1]

There were several reasons for the crash, but the main cause was supersaturation of the market with hundreds of mostly low-quality games.

Causes and factors

The American video game console crash of 1983 was caused by a combination of factors. Although some were more important than others, all played a role in saturating, and then imploding, the video game industry.

Plethora of games and consoles

At the time of the US crash, there were numerous consoles on the market, including the Atari 2600, the Atari 5200, the Bally Astrocade, the ColecoVision, the Coleco Gemini (a 2600 clone), the Emerson Arcadia 2001, the Fairchild Channel F System II, the Magnavox Odyssey^2, the Mattel Intellivision (and its just-released update with several peripherals, the Intellivision II), the Sears Tele-Games systems (which included both 2600 and Intellivision clones), the TandyvisioN (an Intellivision clone for Radio Shack), and the Vectrex.

Each one of these consoles had its own library of games, and many had large third-party libraries. Likewise, many of these same companies announced yet another generation of consoles for 1984, such as the Odyssey3, and Atari 7800.[2]

Adding to the industry's woes was a glut of poor titles from hastily financed startup companies. These games, combined with weak high-profile Atari 2600 games, such as the video game version of the hit movie *E.T. the Extra-Terrestrial* and an infamous port of the popular arcade game *Pac-Man*, seriously damaged the reputation of the industry. Finally, Atari's market-leading 2600, now in its sixth year, was starting to approach saturation.

Competition from personal computers

Until the late 1970s, personal computers had primarily been sold in specialty computer stores at a cost of more than USD $1,000 ($3300 in 2009 dollars). However, by the early 1980s, many companies released PCs that could connect to a TV set and offered color graphics and improved sound. The first of these systems were the Atari 400 and 800, but many competing models vied for consumer attention. By 1982, the TI 99/4A and the Atari 400 were both at $349 USD ($800 in 2009 dollars), Radio Shack's Color Computer sold at $379 USD ($800 in 2009 dollars), and Commodore had just reduced the price of the Commodore VIC-20 to $199 USD and the Commodore 64 to $499 USD ($400 and $1100 in 2009 dollars).[3] [4] [5]

Because these and other home computers generally had more memory available, and better graphic and sound capabilities than a console, they permitted more sophisticated games and could also be used for tasks such as word processing and home accounting. Also, their games were often much easier to copy, since they came on floppy disks or cassette tapes instead of ROM modules (though many of them continued to use ROM modules extensively). The use of a writable storage medium also allowed players to save games in progress, a feature useful for the increased complexity of computer games, and one not available on the consoles of the era.

In a strategy that directly affected its home computer arch-rival Atari, Commodore explicitly targeted video game players in its advertising by offering trade-ins toward the purchase of a Commodore 64 and suggesting that college-bound children would need to own computers, not video games. Ironically the Commodore 64 considered the best selling machine in history with 20-30 million units reputedly sold along with its stablemates: the Commodore Vic-20, Commodore Plus/4(disaster) Commodore 128, the Commodore (65/C64DX)(rare) had a Cartridge slot (ROM) in the back of the home computers equipped with "auto-start". This Cartridge expansion slot for edge connector with 6510 CPU address/data bus lines and control signals, as well as GND and voltage pins; was used for program modules and memory expansions enabling the units specifically to play video games. The manufacture even cited that..."If writing your own programs was daunting, and loading software from cassettes or floppies was 'just too much' for you, you could just **jam a cartridge in the back of the unit** and like magic your machine was doing whatever you wanted it to. They reinforced this by producing the purpose built and rare 1990 Commodore 64 Games System (C64GS)and ultra rare Commodore Max Machine which had cartridge slots as one of their key items.

Loss of publishing control

Activision was founded by Atari programmers who left the company in 1979 because Atari did not allow credits to appear on the games and did not pay employees a royalty based on sales. At the time, Atari was owned by Warner Communications, and the developers felt that they should receive the same recognition that musicians, directors, and actors got from Warner's other divisions. After Activision went into business, Atari quickly sued to block sales of Activision's products, but never won a restraining order and ultimately lost the case in 1982. This court case legitimized third-party development, encouraging companies such as Quaker Oats (with their US Games division) to rush to open video-game divisions, hoping to impress both stockholders and consumers. Companies lured away each other's programmers or used reverse engineering to learn how to make games for proprietary systems. Atari even hired several programmers from Mattel's Intellivision development studio, prompting a lawsuit by Mattel against Atari that included charges of industrial espionage.

Despite the lessons learned by Atari in the loss of its programmers to Activision, Mattel continued to try to avoid crediting game designers. Rather than reveal the names of Intellivision game designers, Mattel instead required that a 1981 TV Guide interview with them change their names to protect their collective identities. ColecoVision designers worked in similar obscurity, feeding more departures to upstart competitors.

Unlike Nintendo, Sega, Sony, or Microsoft in later decades, the hardware manufacturers in this era lost exclusive control of their platforms' supply of games. With it, they also lost the ability to make sure that the toy stores were never overloaded with products. Activision, Atari and Mattel all had experienced programmers, but many of the new

companies — rushing to join the market — did not have enough experience and talent to create the games. Titles such as *Chase the Chuck Wagon* (about dogs eating food, bankrolled by the dog food company Purina), *Skeet Shoot*, and *Lost Luggage* were examples of games that companies made in the hopes of taking advantage of the video-game boom. While heavily advertised and marketed, these games were perceived to be of poor quality and did not catch on as hoped, further damaging the industry. As a counterpoint, two of the most successful video game franchises were started in this period: *Mario* and *Pac-Man*.

High-profile disasters

A core cause of the crash was two high-profile titles for the Atari 2600 that were disasters. In 1981, Atari attempted to take advantage of the craze following the arcade game *Pac-Man* by releasing a version for the Atari 2600. However, development was rushed so as to have the game out in time for the 1981 Christmas season. Although the game managed to sell well in terms of absolute numbers, Atari had grossly overestimated the number of sales it would generate. Critics and gamers universally panned the game as being nothing like the lively, colorful original. In the end, Atari only sold a little over half the number of cartridges it produced. Production cost overruns combined with the costs incurred with a big marketing campaign for the game resulted in huge losses for Atari.[6]

The following year, Atari issued its widely advertised *ET* game. Once again, it manufactured millions of units in anticipation of a major hit. Concerned about making the holiday season, Atari again rushed the game to market quickly, after a mere six weeks of development time. The end result was a disaster and it is widely considered to be one of the worst video games ever. To clear their inventory, Atari eventually ended up burying the unsold copies in a landfill in New Mexico, even though this has been disputed by some.[6] Combined with the high costs for the movie license, *ET* became another financial disaster for Atari. Atari was sold two years later as the crash impacted upon the industry.

Fallout effects

Immediate effects

The release of so many new games in 1982 flooded the market. Most stores had insufficient space to carry new games and consoles. As stores tried to return the surplus games to the new publishers, the publishers had neither new products nor cash to issue refunds to the retailers. Many publishers, including Games By Apollo and US Games, quickly folded. Unable to return the unsold games to defunct publishers after Christmas 1982, toy stores marked down the titles and placed them in discount bins and sale tables. By June 1983, the market for the more expensive games had shrunk dramatically and was replaced by a new market of rushed-to-market, low-budget games.

A massive industry shakeout resulted. Magnavox and Coleco abandoned the video game business entirely. Imagic withdrew its IPO the day before its stock was to go public; the company later collapsed. While the largest of the third-party cartridge makers, Activision, survived for several more years[7] on personal-computer platforms (thanks to its then-legal ability to average its income and recover millions of dollars in past tax payments from the IRS), most of the smaller software development houses supporting the Atari 2600 closed.

Additionally, the toy retailers which controlled consumer access to games had concluded that video games were a fad. That fad, they assumed, had ended, and the shelf space would be reassigned to different products; as a result, many retailers ignored video games for several years. This was the most formidable barrier that confronted Nintendo, as it tried to market its Famicom system in the US. Retailers' opposition to video games was directly responsible for causing Nintendo's branding its product an "Entertainment System" rather than a "console", using terms such as "control deck" and "Game Pak", as well as producing a toy robot called R.O.B. to convince toy retailers to allow it in their stores.[8] [9]

Long-term effects

The American video game crash had two long-lasting results. The first result was that dominance in the home console market shifted from the United States to Japan. When the video game market recovered by 1985, the leading player was Nintendo's NES, with a resurgent Atari battling Sega for the number-two spot. But Atari never truly recovered and could not match the success of its 2600 console. It finally stopped producing game systems in 1996 after the failure of the Atari Jaguar.

A second, highly visible result of the crash was the institution of measures to control third-party development of software. Using secrecy to combat industrial espionage had failed to stop rival companies from reverse engineering the Mattel and Atari systems and hiring away their trained game programmers. Nintendo, and all the manufacturers who followed, controlled game distribution by implementing licensing restrictions and a security lockout system. Would-be renegade publishers could not publish for each others' lines, as Atari, Coleco and Mattel had done, because in order for the cartridge to work in the console, the cartridge had to contain the appropriate key chip for the lock inside the console, and the publisher had to also acknowledge its license to Nintendo in the copyright notices. If no key chip was present or if the key chip did not match the lock inside the console, the game would not work.

Although Accolade achieved a technical victory in one court case against Sega, challenging this control, even it ultimately yielded and signed the Sega licensing agreement. Several publishers, notably Tengen (Atari), Color Dreams, and Camerica, challenged Nintendo's control system during the 8-bit era by producing unlicensed NES games. The concepts of such a control system remain in use on every major video game console produced today, even with fewer "cartridge-based" consoles on the market than in the 8/16-bit era. Replacing the security chips in most modern consoles are specially-encoded optical discs that cannot be copied by most users and can only be read by a particular console under normal circumstances.

Nintendo reserved a large part of NES game revenue for itself by limiting most third-party publishers to only five games per year on its systems (some companies tried to get around this by creating additional company labels like Konami's Ultra Games label). It also required all cartridges to be manufactured by Nintendo, and to be paid for in full before they were manufactured. Cartridges could not be returned to Nintendo, so publishers assumed all the risk. As a result, some publishers lost more money due to distress sales of remaining inventory at the end of the NES era than they ever earned in profits from sales of the games. Nintendo portrayed these measures as intended to protect the public against poor-quality games, and placed a golden seal of approval on all games released for the system. Most of the Nintendo platform-control measures were adopted by later manufacturers such as Sega, Sony, and Microsoft.

Effects on world gaming markets

In Europe, the early years of personal computing (1981–1985) were spearheaded by the very aggressive marketing of inexpensive home computers with the theme "Why buy your child a video game and distract them from school when you can buy them a home computer that will prepare them for university?"[10] Marketing research for both the gaming and the home-computer industries tracked the change as millions of consumers shifted their intention to buy choices from game consoles to low-end computers that retailed for similar prices while still playing comparable games.

By 1982, computers such as the BBC Micro, Atari XL, Commodore 64 and Sinclair ZX Spectrum had launched in Europe and were selling extremely well there, dominating the European games market and growing throughout 1983 and 1984. The significantly lower price of computer games (some of which cost just 1% of the price of a computer, due to being stored on inexpensive cassette tapes or floppy disks rather than the ROM chips contained in the plastic cartridges of consoles) strengthened this domination and helped quickly create a mass computer games market. By the time of the 1983 North American crash, the European video game industry was mostly computer-based and most games were made by European publishers. This allowed the European market to thrive despite the crashing American market.

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[3] Consumer Price Index (estimate) 1800–2008 (http://www.minneapolisfed.org/community_education/teacher/calc/hist1800.cfm). Federal Reserve Bank of Minneapolis. Retrieved March 8, 2010.

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[5] The Inflation Calculator (http://www.westegg.com/inflation/infl.cgi)

[6] "Five Million E.T. Pieces" (http://www.snopes.com/business/market/atari.asp). Snopes. 2007-02-02. . Retrieved 2009-02-12.

[7] Activision eventually faded as well; its name and assets were purchased by a new management team led by Bobby Kotick, who built a highly successful, but otherwise unrelated company based on the old brand. This company still exists, and is considered a major video game publisher.

[8] " NES (http://g4tv.com/gamemakers/episodes/4844/NES.html)". *Icons*. G4. 1 December 2005. No. 5010, season 4.

[9] GameSpy Staff (21–25 July 2003). "25 Smartest Moments in Gaming" (http://archive.gamespy.com/articles/july03/25smartest/index22.shtml). GameSpy. p. 22. .

[10] "Commodore Vic20 commercial" (http://www.youtube.com/watch?v=0pYMHm_Y60s&eurl=/). .

Further reading

- DeMaria, Rusel & Wilson, Johnny L. (2003). *High Score!: The Illustrated History of Electronic Games* (2nd ed.). New York: McGraw-Hill/Osborne. ISBN 0-07-222428-2.

External links

- Article at The Dot Eaters (http://www.thedoteaters.com/p3_stage6.php), a chronicle of the Great Videogame Crash
- The Golden Age of Video Game Arcades (http://www.twingalaxies.com/index.aspx?c=17) (a 200-page story contained within Twin Galaxies' Official Video Game & Pinball Book of World Records) by Walter Day (1998), ISBN 1-887472-25-8
- Classic Gaming Expo site (http://www.cgexpo.com/) Biographies and history of the era
- Official Intellivision History Site (http://www.intellivisionlives.com/) by the original programmers
- The History of Computer Games: The Atari Years (http://www.erasmatazz.com/library/JCGD_Volume_5/The_Atari_Years.html) Written by Chris Crawford, a game designer at Atari during the crash
- Detailed C64 Chronology (http://www.islandnet.com/~kpolsson/c64hist/index.htm) Events & Game release dates (1982–1990)
- Armchair Arcade (http://www.armchairarcade.com/neo/node/1947) discusses the crash
- The Great Video Game Crash Of 1983 - Television Tropes & Idioms (http://tvtropes.org/pmwiki/pmwiki.php/Main/TheGreatVideoGameCrashOf1983)

1984 in video gaming

List of years in video gaming (table)
… 1974 · 1975 · 1976 · 1977 · 1978 · 1979 · 1980 … 1981 1982 1983 **-1984-** 1985 1986 1987 … 1988 · 1989 · 1990 · 1991 · 1992 · 1993 · 1994 …
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Events

Notable releases

- Alley Cat is released for IBM PC compatibles.
- *King's Quest* (Sierra, IBM PC), the first animated adventure game, the first in the *King's Quest* series, and the first to use the AGI engine.
- Namco releases *Gaplus*, *Tower of Druaga*, *Pac-Land*, *Grobda*, which is a *Xevious* spin-off, *Super Xevious* and *Dragon Buster*, which is the first game to use a life bar.
- Nintendo releases *Donkey Kong 3*, *Ice Climber*, and *Balloon Fight*.
- *The Ancient Art of War* by Dave Murray and Barry Murray, the first major real-time strategy game, is released by Brøderbund.
- *Paperboy* by David Ralston (Atari, arcade game), later ported to many platforms, featured innovative bike handle steering controller.
- *Elite* by David Braben and Ian Bell is published by Acornsoft, an early and very influential wireframe 3d space trading game offering full six degrees of freedom and a then unique open ended design.
- *Gauntlet* by Donald R. Lebeau is released for the Atari 8-bit computers.
- *Knight Lore* by Ultimate Play The Game is released for the ZX Spectrum (and later ported to the BBC Micro, Amstrad CPC, MSX, and Famicom Disk System). *Knight Lore* is the third title in the Sabreman series but the first to use the innovative isometric Filmation engine.
- *The Lords of Midnight*, a groundbreaking strategy adventure game by Mike Singleton is released.
- Capcom releases *1942*.

Hardware

- RDI Systems releases the Halcyon laserdisc home console.

Business

- New companies: Kemco, Accolade, New World Computing
- Defunct companies: Astrocade Inc., FTL Games (developer and publisher)
- Hasbro, Inc. acquires Milton Bradley Company
- Management Sciences America acquires Edu-Ware Services
- Warner Communications Inc. sells the Consumer Division of Atari, Inc. and creates an entirely new company (Atari Games Corp) out of the retained arcade division.
- Sega and CSK merge to form Sega Enterprises Ltd.

1985 in video gaming

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Events

Notable releases

- Brøderbund releases *Where in the World is Carmen Sandiego?*, the first game of the prolific *Carmen Sandiego* series
- Nintendo releases *Duck Hunt* after the year began and *Super Mario Bros.* on September 13, 1985. Before the year was over *Super Mario Bros.* became the highest selling game of the year, selling 10 million copies, then eventually selling 40 million copies making it the best-selling video game of all time until 2008.[1]
- Namco releases *Dig Dug II*, *Metro-Cross*, *Baraduke*, *Motos*, Battle City, and *Sky Kid*.
- Alexey Pajitnov creates the *Tetris* video game in the USSR. Nintendo released its most popular versions (for the NES and Game Boy) in 1989.
- Atari Games releases *Gauntlet* (by Ed Logg), the first dungeon crawl arcade game.
- *Ghosts 'n Goblins* by Tokuro Fujiwara (Capcom, arcade), one of the most popular arcade games of the year, spawned a series of later games
- *Adventure Construction Set* by Stuart Smith and Racing Destruction Set by Rick Koenig are both released by Electronic Arts and become hits, following on the success of 1982's Pinball Construction Set by Bill Budge.
- Elite Systems UK releases *Roller Coaster*, a platformer in the mould of the previous year's best seller, *Jet Set Willy*. *Roller Coaster* was the first game to ever simulate fairground rides.
- Bubble Bus software release the popular arcade adventure *Starquake* for several 8-bit computers. In later years, it is ported to 16-bit platforms.
- Pete Cooke's ambitious, sprawling science-fiction game *Tau Ceti* is published in the United Kingdom.
- The Learning Company releases the first commercial version of *The Oregon Trail* on the Apple II.
- Micronics releases the Japan-exclusive action game *Onyanko Town*; which has a nonsensical title and fast-paced action

Hardware

- Atari releases the 520ST personal computer
- Commodore releases the Amiga personal computer
- INTV Corp. releases the INTV III home console
- Telegames releases the Dina home console, a ColecoVision clone
- Nintendo does a limited test release of the NES video game console in the United States and the Robotic Operating Buddy (ROB) robot and video game for the NES home console
- Sega's SG-1000 Mark III released in Japan

Business

- New companies: Titus Interactive, Code Masters, Westwood Studios, Inc., Square Co., Ltd., Bethesda Softworks Inc.
- Edu-Ware closes; David Mullich and several other laid-off employees form Electric Transit, which becomes the first company to join Electronic Art's new affiliated publisher program.
- Defunct companies: RDI Systems

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[1] "Guinness World Records Gamer's Edition – Nintendo Records" (http://gamers.guinnessworldrecords.com/records/nintendo.aspx). Guinness World Records. . Retrieved 2008-12-05.

1986 in video gaming

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Events

Notable releases

- Namco releases *Sky Kid Deluxe*, *Hopping Mappy*, *Toy Pop*, *The Return of Ishtar*, which is the sequel to *Tower of Druaga*, *Genpei Tōma Den*, and *Rolling Thunder*.
- August 6 — Nintendo releases *Metroid* by Makoto Kano, the first in the Metroid series.
- February 21 — Nintendo also releases *The Legend of Zelda* (designed by Shigeru Miyamoto for the Nintendo Famicom Disk System), the first in The Legend of Zelda series, a spiritual forerunner of console role-playing games
- Sega releases the *Out Run* arcade game
- *Arkanoid* (Taito, arcade), spawned many sequels and remakes
- *Bubble Bobble* (Taito, arcade), spawned many sequels
- *Space Quest I: The Sarien Encounter* was released in October
- *Dragon Quest* (Enix, Famicom), usually considered the foremost console role-playing game, the first in a series that has been phenomenally successful in Japan

Hardware

- Namco releases the Namco System '86 arcade system board
- Atari releases the Atari 7800 home console two years after its original test market date
- Sega releases the Sega Master System home console in the United States
- Sharp releases the Twin Famicom home console
- Nintendo releases the Famicom Disk System (an add-on for the Famicom) in Japan only

Business

- New companies: Acclaim, Majesco, Ubi Soft
- June 13 - Activision merges with Infocom Inc.
- Activision acquires Gamestar Software
- Sinclair Research Ltd. is acquired by Amstrad

1987 in video gaming

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Events

Notable releases

- Capcom releases the *Street Fighter* arcade game, the first in a long series of games.
- Namco releases *Wonder Momo*, which is their last 8-bit game, *Yokai Douchuuki*, which is their first 16-bit game, *Dragon Spirit*, *Blazer*, *Quester*, *Pac-Mania*, *Galaga '88* and *Final Lap*.
- Konami Corporation releases *Metal Gear* in Japan, as well as *Castlevania* and *Contra*. All three games were the beginning of some of Konami's most popular franchises.
- Nintendo releases *The Legend of Zelda* in America and Europe, the first of one of their longest-running and most popular series of games.
- Nintendo releases Zelda II: The Adventure of Link in January for the Famicom Disk System in Japan only. The game would go unreleased in America for nearly two years afterwards.
- Technos Japan Corp. releases the *Double Dragon* arcade game, which is distributed internationally by the Taito Corporation.
- Taito also releases Operation Wolf in this year.
- Squaresoft's Hironobu Sakaguchi releases *Final Fantasy* for the Famicom in Japan. This was originally intended to be the company's last game, since it was facing bankruptcy, but the game's major success allowed them to turn it into a prolific series ironically titled *Final Fantasy*. It was released in the U.S.A. 3 years later.
- LucasArts releases *Maniac Mansion*, the first game to use the SCUMM engine, innovating the point-and-click interface for the adventure game genre.
- Capcom releases the first *Mega Man* game in the long-standing series for the NES/Famicom.
- FTL Games releases *Dungeon Master*.
- Incentive Software releases *Driller* a milestone in 3D gaming and a precursor to modern first-person 3D games.
- Ocean Software releases *Head Over Heels*, an isometric arcade adventure, to critical acclaim and huge popularity.
- Sega releases *Phantasy Star* on the Sega Master System, it was one of the first RPGs to have a Sci-Fi/Fantasy setting and also the first to bear a female protagonist.
- The Leisure Suit Larry in the Land of the Lounge Lizards adventure is released by Sierra Entertainment.

Hardware

- Namco develops the Namco System 1 arcade system board.
- At the end of the year, Namco also releases the Namco System 2 arcade system board.
- October 30 — NEC releases the PC Engine console in Japan.
- Acorn releases the Acorn Archimedes 32-bit home computer, which brought the game *Zarch* (later known on other platforms as Virus) to prominence.
- Commodore release the Amiga 500, the first 'low-end' Amiga which became a significant gaming machine, particularly in Europe, and would become the best-selling Amiga.
- Atari Corp. releases the XE Game System (XEGS) home console.
- Sega Master System released in Japan.
- The VGA standard developed for IBM's new PS/2 line gave the PC the potential for 256-color graphics.
- AdLib set an early defacto standard for sound cards with its card based on the Yamaha YM3812 sound chip. (This would last until the introduction of Creative Labs' Sound Blaster in 1989.)

Business

- New companies: Maxis, GameTek Inc., Apogee Software, Ltd., Empire Interactive PLC
- Activision acquires Infocom.
- Electronic Arts acquires Batteries Included.
- Electric Transit closes.
- Warner Communications' Atari Games establishes the Tengen division.
- Nintendo of America, Inc. v. Blockbuster Entertainment lawsuit: Nintendo sues Blockbuster for photocopying complete NES manuals for its rental games. Nintendo wins the suit, and Blockbuster includes original manuals with its rentals.
- SSI President Joel Billings acquires the license to the Dungeons and Dragons role playing game, setting the stage for the Gold Box line of D&D games.

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Events

- June — Nintendo releases the last issue (#7) of "Nintendo fun club news";
- July — Nintendo releases the first issue of *Nintendo Power* magazine.

Notable releases

- Konami releases Super Contra.
- Namco releases *World Stadium*, *Assault*, which is the first game to use sprite scaling and massive sprite rotation, *Assault Plus*, *Berabow Man*, *Marchen Maze*, *Bakutotsu Kijuutei*, which is the sequel to *Baraduke*, *Ordyne*, *Metal Hawk*, *World Court*, *Splatterhouse*, which is the first game to get a parental advisory disclaimer, *Mirai Ninja*, *Face Off* and *Phelios*.
- Capcom releases *Mega Man 2* in Japan, the highest-selling installment to date (August 2006) in the entire Mega Man franchise with a total of 1.5 million copies sold. It was honored in Nintendo Power's Top 200 Nintendo Games Ever list, coming in at number 33.
- *Pool of Radiance* (SSI), the first of the "Gold Box" games, the first computer RPG based on *Advanced Dungeons & Dragons*.
- Origin Systems releases *Ultima V: Warriors of Destiny*. This was the first game in the *Ultima* series to implement a time-of-day system with day/night cycles and daily schedules for non-player characters.
- Superior Software release *Exile* on the Acorn Electron and BBC Micro. A complex arcade adventure, the game is credited as the first with a full physics engine and is later ported to Amiga, Atari ST and C64.
- *Altered Beast* (Sega, arcade), later ported to the Mega Drive/Genesis where it was packaged with the console in North America and Europe.
- Sega releases *Phantasy Star* for the Sega Master System, the first in the company's most successful series of RPGs.
- Nintendo revamps *Doki Doki Panic* and releases it as *Super Mario Bros. 2*, for the Nintendo Entertainment System in America and the PAL region. This game would be released in Japan as *Super Mario USA* in 1992.
- Nintendo releases *Super Mario Bros. 3* for the Famicom in Japan.
- Nintendo releases *Zelda II: The Adventure of Link* in December. The game had been released nearly two years earlier in Japan on the Famicom Disk System, before America even saw the first *The Legend of Zelda*.
- Micronics releases *'89 Dennou Kyuusei Uranai* in December; which allows players to predict what their lives will be like in the then-futuristic year of 1989.

Hardware

- October 29 — Sega Mega Drive released in Japan.
- Nintendo buys the rights to Bandai's *Family Trainer* and re-releases it as the Power Pad.

Business

- New companies: Koeo Co., Ltd., Visual Concepts, Stormfront Studios, Walt Disney Computer Software, Eurocom
- Defunct companies: Coleco Industries Inc.
- Activision renamed to Mediagenic.
- Nintendo vs. Camerica Ltd. lawsuit: Nintendo sues Camerica over the clone production of an Advantage joystick controller for the NES console.

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Events

Notable releases

The original Game Boy.

- Bullfrog Productions releases *Populous* on June 5, 1989, which was one of the first commercially successful god games.
- Namco releases *Winning Run*; *Rompers*; *Blast Off*, which is the sequel to *Bosconian*; *Valkyrie No Densetsu*; *Dirt Fox*; *World Stadium '89*; *Finest Hour*; *Burning Force*; *Winning Run Suzuka GP*; *Four Trax*; *Dangerous Seed* and *Marvel Land*.
- Maxis releases Will Wright's *SimCity*, the first of the "Sim" games and a revolutionary real-time software toy.
- Capcom releases *Mega Man 2* in more countries.
- Tengen releases an unlicensed version of the *Tetris* video game, which is recalled after Nintendo sues Tengen.
- Wes Cherry writes *Solitaire* and Robert Donner writes *Minesweeper*, which are bundled with Microsoft Windows starting from version 3.
- Brøderbund releases the *Prince of Persia* game, the first in a series of games, noted for its advancements in animation.
- Nintendo of America introduces Enix's *Dragon Warrior* franchise to North America.
- Techno Soft releases *Herzog Zwei* (Mega Drive/Genesis) in Japan, marking an important development in the real-time strategy genre.
- Psygnosis release *Shadow of the Beast*, demonstrating the capabilities of the Amiga and helping sales of the computer.
- Strategic Studies Group releases *Warlords* on December 6, 1989, which was one of the first fantasy turn-based strategy game.
- Electronic Arts releases *John Madden Football* for the Apple II, starting its highly successful line of American football games. It is also the first major football game to feature full 11-man teams.
- Nintendo releases the Zelda Game & Watch.
- Quixel releases 007:_Licence_to_Kill on April 20, 1989.

Hardware

- Atari Corp. releases the Lynx handheld console.
- Mattel, Inc. releases the Power Glove controller for the NES home console.
- Nintendo releases the Game Boy handheld console, first handheld with cartridges.
- NEC's PC Engine released in North America as the Turbografx-16.
- Sega Mega Drive released in North America as the Sega Genesis.

Business

- Hasbro, Inc. acquires elements of Coleco Industries, Inc.
- Trinity Acquisition Corporation founded (renamed THQ in 1990)
- Nintendo of America, Inc. v. Tengen
  - Nintendo sues Tengen over the *Tetris* video game copyrights. Tengen loses and recalls all its *Tetris* games.
  - November - Nintendo sues Tengen over production of unlicensed Nintendo games. Tengen loses. (Tengen originally sued Nintendo on December 12, 1988 for antitrust violations.)
- Nintendo v. Camerica Ltd. Nintendo sues Camerica over patent violations of the Game Genie for the NES console. Camerica wins the suit.
- Nintendo in business for 100 years.

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Events

- August - Publication of Swedish language video game magazine "Nintendo-Magasinet" begins.

Notable releases

- *Electronic Arts releases James Pond for all platforms.*
- *Bonk's Adventure* is released for NEC's TurboGrafx-16 and is the first US appearance of Bonk, the mascot of the TurboGrafx-16.
- Namco releases *Kyuukai Douchuuki*, *World Stadium '90*, *Final Lap 2*, *Pistol Daimyo no Bouken*, which is a spin-off from *Berabow Man*, *Souko Ban Deluxe*, *Dragon Saber*, *Rolling Thunder 2*, *Steel Gunner* and *Golly! Ghost!* They also develop the unreleased prototype, *Puzzle Club*.
- February 12 — Nintendo releases the NES game *Super Mario Bros. 3* in North America. It sells 17.28 million copies, making it the best-selling stand-alone video game of all time.
- April — Konami releases *Snake's Revenge*, a sequel to *Metal Gear* for the Nintendo Entertainment System in North America. Although developed by a Japanese staff, *Snake's Revenge* was produced specifically for the international market, and developed without the involvement of Hideo Kojima, the game designer of the original MSX2 version of *Metal Gear* (who was not involved in the NES port either). According to Kojima, who initially did not intend on producing a *Metal Gear* sequel, was convinced by a programmer working on *Snake's Revenge* to produce a "proper" sequel. *Metal Gear 2: Solid Snake* for the MSX2 computer, the sequel developed by Kojima's staff, was released exclusively in Japan on July 19. It would be Konami's last major game for the hardware.
- November 21 — Nintendo releases *Super Mario World* and *F-Zero* in Japan as launch titles for the Super Famicom (released for the SNES in North America in August 1991). *Super Mario World* introduced the character, Yoshi.
- July 12 — Nintendo of America publishes *Final Fantasy* for the Nintendo Entertainment System in North America. This game started Square's popular and long-running *Final Fantasy* series.
- November 9— Sierra On-Line releases *King's Quest V* to massive success and acclaim.
- Sega releases the *G-LOC: Air Battle R-360* arcade game, featuring the first 3D - 360° gameplay that physically rotated the real world player. Four years later, they also released *Wing War R-360*.
- Origin releases *Ultima VI: The False Prophet* and the first *Wing Commander* game.
- Sid Meier's *Railroad Tycoon*, the first of the "Tycoon" games, is released by MicroProse.
- December 14 — *Commander Keen* is released as shareware. John Carmack's smooth-scrolling graphics engine helps it become the first major platformer on a PC.

- Capcom releases *Mega Man 3* for NES, introducing the characters Rush and Proto Man, Mega Man's slide, and Capcom's character cameos.
- Nintendo releases *Dr. Mario*
- Infogrames releases *Alpha Waves*, the first 3D platform game.[1]

Hardware

- Camerica releases Codemasters' Game Genie adapter in Canada and the UK (In the USA, it was released by Galoob).
- NEC releases the TurboExpress handheld console.
- Nintendo releases the Super Famicom 16-bit console in Japan.
- SNK releases the Neo Geo Advanced Entertainment System (AES) home console.
- October 6 — Sega Game Gear released in Japan, launched in North America in 1991 and Europe and Australia in 1992.
- November 30 — Sega's Mega Drive released in Europe.
- Amstrad halts production of the ZX Spectrum, formally bringing to an end that platform's 8-year dominance of the UK home computer market.

Business

- Nintendo v. Color Dreams lawsuit: Nintendo sues Color Dreams over unlicensed production of Nintendo video games.
- THQ Inc.: Toy Head-Quarters merges with Trinity Acquisition Corporation.
- New companies: Eidos plc, Team17 Software Limited, Natsume Co., Ltd.

References

[1] http://grenouille-bouillie.blogspot.com/2007/10/dawn-of-3d-games.html

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1991 in video gaming

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Events

Notable releases

- Namco releases *Star Blade*, *Super World Stadium*, *Solvalou*, which is the 3rd title in the *Xevious* series, *Tank Force*, which is the sequel to *Tank Battalion*, *Cosmo Gang the Video*, which uses characters from a popular redemption game released in the previous year, *Steel Gunner 2*, *Winning Run '91* and *Golly! Ghost! 2*.
- Microprose creates *Civilization*, Sid Meier's most successful game as of 2005.
- Electronic Arts releases *James Pond 2* and *Road Rash* for Sega Genesis/Mega Drive, starting a series of games that were popular in the 1990s.
- Capcom releases *Street Fighter II* for arcades. It becomes highly successful and is routinely listed as the grandfather of the fighting game genre.
- Tecmo releases *Tecmo Super Bowl* for NES, which serves as one of the most revolutionary arcade football games of its time.
- AOL, SSI, TSR and Stormfront Studios collaborate and launch *Neverwinter Nights*, the first graphical MMORPG.
- Delphine Software releases Eric Chahi's "Another World" for the Amiga 500, one of the first games to be made using polygons instead of conventional sprites. Also one of the first games to use rotoscoping techniques to create cutscenes and fluid character animations since Prince of Persia.
- February 12 — Attic Entertainment Software releases Spirit of Adventure, a role playing game which contains an early pseudo 3D dungeon crawler.
- February 14 — DMA Design releases Lemmings, a puzzle game that requires the player to lead a group of lemmings through a dangerous environment to an escape portal.
- June 23 — Sega releases *Sonic the Hedgehog (16-bit)* (by AM8, later Sonic Team) for the Sega Genesis/Mega Drive and *Sonic the Hedgehog (8-bit)* (by AM8, later Sonic Team) for the Sega Master System and Sega Game Gear. It introduced the eponymous character, who would go on to become Sega's mascot.
- July 19 — Squaresoft releases *Final Fantasy IV* in Japan, the first *Final Fantasy* game for the Super Famicom (released in November as *Final Fantasy II* in North America).
- August 23 — Nintendo releases *Super Mario World* and *F-Zero* along with the Super Nintendo Entertainment System; Super Mario World was the original pack-in game for the SNES, and one of the most sold games for that system. The game introduces the Yoshi character to the Mario series.
- November 21 — Nintendo releases *The Legend of Zelda: A Link to the Past* for the Super Famicom in Japan.
- Team17 release the first of their popular *Alien Breed* series for the Amiga.

Hardware

- August 23 — Super Nintendo Entertainment System released in North America
- December 1 — Sega releases the Mega CD in Japan
- September — S3 launches with the 86C911, often regarded as the first significant graphics accelerator chip

Business

- New York State v. Nintendo lawsuit: the state attorney general sues Nintendo over the monopoly of the video game industry. Nintendo loses the suit and offers customers a $5 rebate on Nintendo games.
- New companies: Vicarious Visions, Inc, id Software, Bungie Software, Silicon & Synapse (now known as Blizzard Entertainment), The 3DO Company (founded as SMSG, Inc.), Cyberdreams

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Events

Notable releases

Mortal Kombat featured digitized characters rather than typical hand-drawn ones.

- Gremlin Graphics releases Zool on the Commodore Amiga which become the Amiga best selling game and boosted the already popular Computer to be the leading gaming machine in Europe, the character, who would go on to become to Commodore's answer to Nintendo's Mario and Sega's Sonic
- Namco releases *Suzuka 8 Hours*, *Bakuretsu Quiz Ma-Q Dai Bouken*, *Super World Stadium '92*, *Super World Stadium '92 Gekitouban*
- Origin Systems releases *Ultima VII: The Black Gate* for the PC.
- Midway Games releases the *Mortal Kombat* arcade game, which features bloody "fatalities", digitized characters, and started a franchise of games and movies.
- August — Sega releases the *Virtua Racing* arcade game, one of the first 3D polygonal racing games.
- October 8 — *Mortal Kombat* is released to arcades.
- October 15 — Sega releases the controversial *Night Trap* video game for the Mega-CD console.
- Blue Sky Productions releases *Ultima Underworld: The Stygian Abyss*, the first ever first-person 3D CRPG.
- id Software releases *Wolfenstein 3D*, which arguably popularized the first-person shooter genre for the PC.
- Nintendo releases *Kirby's Dream Land* for the Game Boy, the first game featuring the character Kirby.
- Interplay publishes *Alone in the Dark*, widely considered the first survival horror.
- Sega publishes *Sonic the Hedgehog 2* (Sega Mega Drive/Genesis, Master System, Game Gear), which features the first appearance of Super Sonic and Miles "Tails" Prower.
- *Super Mario Kart* (Nintendo, Super Famicom/SNES), the first in the *Mario Kart* series, spawned the mascot/go-kart subgenre of racing games
- *Super Mario Land 2: 6 Golden Coins* was released for the Game Boy, introducing Wario to the Mario series
- *Indiana Jones and the Fate of Atlantis* was released by LucasArts. It was considered one of the most advanced adventure games of the time and was a breakthrough for LucasArts' SCUMM games
- *Dune II* was released by Westwood Studios, creating the template for the modern real-time strategy genre.
- Virgin Games publishes *The 7th Guest*, which becomes a best seller.
- Accolade publishes *Star Control 2*.

- Varie releases *Super F1 Hero* on December 18 of this year. This game was made in collaboration with legendary Japanese Formula One star Satoru Nakajima.
- Domark releases Championship Manager for the Amiga and Atari ST.
- September 24, SNK releases Art Of Fighting for the arcade.

Hardware

- JVC releases the Wondermega console in Japan, a Sega Mega Drive and Sega Mega-CD put into one console (later released as the X'eye in North America)
- Philips releases the CD-i multimedia home console
- Super Nintendo Entertainment System released in Europe and Australasia
- Sega releases the Sega CD (an add-on for the Sega Genesis) in North America, almost a year after the equivalent Japanese launch
- Taito Corporation creates the Wowow home console (unreleased)
- TTI (Turbo Technologies Inc.) releases the TurboDuo home console
- Commodore releases the Amiga 1200 home computer

Business

- Atari Games Corp. v. Nintendo of America, Inc.
- Lewis Galoob Toys, Inc. v. Nintendo of America, Inc.
- Activision (as Mediagenic) files for Chapter 11 bankruptcy protection
- New companies: Wow Entertainment Inc. (AM1), Humongous Entertainment

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Events

- March — In Sweden, the Swedish video game magazine Super PLAY (SP) starts. The original name is *Super Power*.
- Midway Games embroiled in controversy for its game *Mortal Kombat* from 1992 when the game is launched for video game consoles in 1993.
- The first use of motion control photography in video games, used by Stormfront Studios in Eagle Eye Mysteries, produced by Scott Orr and published by Electronic Arts.

Notable releases

- Electronic Arts releases *James Pond 3* for all consoles.
- Microprose releases UFO: Enemy Unknown on December 31.
- Microprose releases the Strategy Game of the Year *Master of Orion*.[1]
- Namco releases *Super World Stadium '93*, *Emeraldia*, *Nettou! Gekitou! Quiztou!!*, *Numan Athletics*, *Ridge Racer*, 'Great Sluggers '93, Final Lap R, Cyber Sled *and* Tinkle Pit.
- Bullfrog releases *Syndicate.*
- 1993 — *Mortal Kombat II* is released to arcades.
- June: Maniac Mansion: Day of the Tentacle is released by Lucasarts as a sequel to Maniac Mansion and is notable for being one of the acclaimed early titles by designer Tim Schafer.
- July: Domark release Championship Manager 93 the second of the series.
- August — Nintendo releases *The Legend of Zelda: Link's Awakening* (Game Boy), which becomes the best-selling handheld game in the series.
- August: Infocom and Activision release Return to Zork.
- September 24 — Broderbund releases the *Myst* computer game, which goes on to become one of the bestselling games of all time.
- December 10 — id Software releases *Doom*, a seminal first-person shooter that advanced 3D graphics for computer games.
- Nintendo releases the game *Star Fox* for the Super Nintendo Entertainment System, the first game to use the Super FX Chip.
- Sega releases the *Virtua Fighter* (by AM2) arcade game, which is later displayed at the Smithsonian Institution.
- Stellar Crisis is released, making it the first free multi-player wargame that is entirely browser based.
- Squaresoft releases *Secret of Mana* for the SNES, the second in a series of role-playing games (the first technically being Final Fantasy Adventure for the Game Boy in 1991).
- Nintendo releases *Kirby's Adventure*, the second Kirby game and the only one for the NES.

- Nintendo releases the game *Super Mario All-Stars* for the Super NES. It features the first 3 Super Mario Bros. games together on one. Also, it's the first time the Japanese version of *Super Mario Bros. 2* is playable in North America.
- March 15 — Sunsoft releases *Blaster Master 2* for the Sega Mega Drive/Genesis.
- Maxis releases *SimCity 2000*, sequel to the tremendously popular *SimCity*.
- December 17 — Sierra On-Line releases *Gabriel Knight: Sins of the Fathers*. It is the first game in the *Gabriel Knight* series and features the voices of Tim Curry, Mark Hamill, Michael Dorn, and Leah Remini.
- Sega releases *Sonic CD*, *Sonic Spinball*, the Alien 3: The Gun arcade game, and *Dr. Robotnik's Mean Bean Machine*.

Hardware

- Atari Corp. releases the Jaguar home console, calling it the first 64-bit video game system
- Commodore Business Machines releases the Amiga CD32 multimedia home console
- Goldstar, Panasonic, and Sanyo release their versions of the 3DO, the first 32-bit home console
- Nintendo releases a smaller redesigned NES, which allows cartridges to now be inserted at the top of the console, instead of the front.
- Pioneer releases the LaserActive multimedia home console
- Sega's Mega CD released in Europe and Australia.
- Tandy releases the Video Information System (VIS) multimedia home console

Business

- Magnavox is acquired by the Carlyle Group
- Microprose Inc. is acquired by Spectrum Holobyte
- New companies: nVidia Corporation, Take-Two Interactive Software Inc., Croteam Ltd.

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[1] Microprose (December 1996). "Master of Orion II: Battle at Antares" (http://www.csoon.com/info/micropro.htm). Press release. . Retrieved 2007-10-05.

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Events

- 1994 — Nintendo calls this year "1994: The Year of the Cartridge".
- March – Online gaming service, VGOL (Video Games On-Line) formed
- April — Interactive Digital Software Association (IDSA) founded (name changed to the Entertainment Software Association in 2003); IDSA founds Entertainment Software Rating Board (ESRB)
- April 28 - Sega and MGM make a venture to create video games, movies, and television programs.
- June 24 — The Computer Game Developers Association is formed by Ernest W. Adams.
- November — Game Zero magazine drops their print format and becomes the first video game news magazine on the web.
- November 10 — William Higinbotham, creator of *Tennis for Two* (1958), dies at 84.

Notable releases

- Gremlin Graphics releases Zool 2, which was to be planned to be the pack-in game with the Amiga CD32 in 1993.
- Namco releases Point Blank.
- Naxat Soft releases Super Gomoku Narabe Renju; one of the classic mahjong games for the Super Nintendo Entertainment System.
- Nintendo Australia Pty. Ltd, the Australian subsidiary of Nintendo Co., Ltd is established and opened by Hiroshi Yamauchi and effectively ends Mattel Australia's distribution of Nintendo's products throughout Australia.
- Sunsoft releases *The Death and Return of Superman* on June 1, 1994
- Namco releases *Ridge Racer 2*.
- February 2 — *Sonic the Hedgehog 3* (Sega, Mega Drive/Genesis), introduced Knuckles the Echidna. *Sonic & Knuckles* was released on October 24, 1994. *Sonic & Knuckles* introduced "lock-on" gaming, allowing a player to connect *Sonic 2* or *3* to the cartridge, which allowed the player to play these games as Knuckles. *Sonic Triple Trouble* was released on November 11, 1994
- March 19 — *Super Metroid* (SNES), distributed on a 24-megabit cartridge (the largest of its time), called the "best game of all time" by *Electronic Gaming Monthly* in 2002.
- December 9 — In an attempt to take on Sega's *Virtua Fighter* series, Namco releases its first 3-D fighting game *Tekken* in the arcade.
- June 9 Shiny Entertainment releases Earthworm Jim
- August 27 Nintendo releases Mother 2 for the Super Famicom in Japan, which was released almost a year later in North America on the Super Nintendo Entertainment System as *EarthBound*.

- Mortal Kombat II is released for home consoles. It is the first Mortal Kombat title to contain blood and gore on Nintendo platforms.
- Nintendo releases Rare's *Donkey Kong Country* (SNES), featuring distinctive 3D pre-rendered graphics. It was followed by several sequels.
- Sierra On-Line releases the computer adventure game King's Quest VII: The Princeless Bride which was the first in the series to use "SVGA" graphics.
- Blizzard Entertainment releases the real-time strategy game *Warcraft*, which spawns a franchise and influences many later games.
- Looking Glass Studios releases System Shock.
- Bungie releases *Marathon*, one of the earliest original (non-ported) first-person shooters for the Macintosh.
- Square Co. releases *Final Fantasy VI* (then known as *Final Fantasy III* in North America) for the SNES on April 2 in Japan and October 11 in North America.
- *Daytona USA* (Sega, arcade game), a highly successful racing game noted for its advanced 3D graphics that included texture mapping
- *Wario's Woods*, the last licensed game released for the NES in North America
- *Killer Instinct* (Rare, arcade), the first arcade game with an internal hard disk, made extensive use of pre-rendered graphics
- *Rise of the Triad* is released.
- Origin Systems releases their most ambitious *Wing Commander* game yet, *Wing Commander III: Heart of the Tiger*, based both around the space simulation gameplay and an interactive movie with big-name actors. They boast about it being the most expensive game developed, with a budget of $4 million USD.
- LucasArts releases *TIE Fighter*. The same year sees the release of *Rebel Assault*, an innovative Star Wars interactive movie game.
- id Software releases *Doom II* and Dave D. Taylor creates a Linux port of the original *Doom*, becoming the first major game for the new operating system.
- Sensible Software releases *Sensible World of Soccer*, regarded as the best Amiga game of all time by British Amiga magazine Amiga Power.
- Epic Games releases Jazz Jackrabbit.
- Sony Imagesoft releases Mickey Mania: The Timeless Adventures of Mickey Mouse.
- MicroProse releases *X-COM: UFO Defense*, the first installment in the *X-COM* series, and *Master of Magic*.
- July 5 - Capcom releases Darkstalkers in an attempt to keep up with the wave of fighters that have come along since Street Fighter II. The game's EX meter, combined with the choice of horror movie monsters as characters, makes it a cult classic.
- Sir-tech Software, Inc. releases turn-based tactics game *Jagged Alliance*, the first installment of *Jagged Alliance* series.
- Raven software releases Heretic.

Hardware

- Aiwa releases the CSD-GLM Mega Drive multimedia home console in Japan only
- Bandai releases the Playdia multimedia home console
- NEC releases the PC-FX multimedia home console
- Sega:
  - introduces the North American cable TV Sega Channel in cooperation with Time Warner (AOL Time Warner); the subscription service provides Sega Genesis games via cable box to customers
  - releases the Sega 32X add-on for the Sega Mega Drive/Genesis in North America and Japan
  - releases the Sega Nomad handheld console in North America, a portable Sega Genesis.
  - releases the Sega Saturn home console in Japan

- SNK releases the Neo Geo CD home console
- Sony releases the PlayStation console in Japan on December 3
- Nintendo releases the Super Game Boy adapter for the SNES home console

Business

- Apogee establishes the 3D Realms Entertainment division.
- Blizzard Entertainment is renamed from Silicon & Synapse.
- Commodore goes out of business.
- SSI sold to Mindscape
- Alpex Computer Corp. v. Nintendo lawsuit: Alpex sues Nintendo over patent infringements. Nintendo loses the case.
  - Nintendo of America, Inc. v. Dragon Pacific Intern
- Neversoft Entertainment is founded.

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Events

- May 11 – Introduction of trade magazine GameWeek (then called Video Game Advisor)
- May 11-16 — The 1st annual Electronic Entertainment Expo (E3) is held in Los Angeles, California.
- November 5 — GameFAQs debuts on the web, as an archive of video game FAQs.

Notable releases

- 1995 — *Ultimate Mortal Kombat 3* is released to arcades.
- 1995 — *MechWarrior 2: 31st Century Combat* (Activision, DOS) is released on the PC.
- February 15 — *Star Wars: Dark Forces* (LucasArts, DOS), the first in a series of Star Wars-based first-person shooters that would take off with *Star Wars Jedi Knight: Dark Forces II* (1997)
- February (December 8 for Europe) — Sega localizes the 1993 Japanese game, *Phantasy Star IV: The End of the Millennium*, for North American audiences, marking the end of the original series.
- March 11 (August 22 for North America) — SquareSoft releases *Chrono Trigger* for SNES, which was their largest game for the system at 32 megabits, and included multiple ways to finish the game.
- March 17 — *Descent* (Parallax Software, DOS), popularized the use of portal rendering technology and provided the player with six full degrees of freedom.
- April 1 — *Mortal Kombat 3* is released to arcades.
- April 30 — LucasArts releases the adventure game *Full Throttle*.
- June 5 — The 1994 Japanese game, *EarthBound* (Nintendo, Ape, Inc.), is localized for the SNES for North American audiences, garnering a cult following in the US.
- July 31 — Sierra Online releases *Phantasmagoria*, a controversial game that strays from Sierra's typically family-oriented adventures to engross the player in a dramatic horror-themed interactive movie.
- July — Softstar releases *The Legend of Sword and Fairy* (仙劍奇俠傳).
- August 5 — *Super Mario World 2: Yoshi's Island* is released, commemorating the 10th anniversary of the *Mario* series.
- August 6 — *BS Zelda no Densetsu* debuts for the Satellaview, becoming the world's first integrated radio-game.
- August 31 — Westwood Studios releases *Command & Conquer*, which becomes one of the first popular real-time strategy games and spawns a franchise.
- August 31 — New World Computing releases *Heroes of Might and Magic: A Strategic Quest*, which becomes the first game in the popular Heroes of Might and Magic turn-based strategy game franchise.
- August 31 — Origin Systems launches *Crusader: No Remorse*, an innovative action title featuring an isometric 3rd-person view of a futuristic soldier out for revenge. Origin also releases *Wing Commander IV: The Price of Freedom*, likely to be the most ambitious computer game of the time, with a $12 million USD budget for its

interactive-movie/space simulation content.
- September 22 — Eidos Interactive release *Championship Manager 2*. *CM2* was quite a leap forward, in terms of graphics, from its previous versions.
- October 31 — *Destruction Derby* released.
- October 31 — Cyberdreams release *I Have No Mouth, and I Must Scream*, an adaptation of writer Harlan Ellison's short story that won Computer Gaming World's award for "Best Graphic Adventure Game" of the year.
- November 11 — Mindscape releases *Warhammer: Shadow of the Horned Rat*, the first game of the real-time tactics genre and the first fully 3D real-time strategy/wargame.
- November 21 — Rareware and Nintendo releases *Donkey Kong Country 2: Diddy's Kong Quest* the sequel to the hugely popular *Donkey Kong Country* for the Super Nintendo Entertainment System.
- November 24 — Bungie releases *Marathon 2: Durandal*.
- December 9 — Blizzard releases *Warcraft II: Tides of Darkness*, sequel to their initial real-time strategy title, and a far more refined and popular title.
- December 15 — Namco releases *Tales of Phantasia*
- December 15 — Konami debuts the *Suikoden* series
- *Flight Unlimited* (Looking Glass Studios, DOS/Windows 95), possibly the first home flight simulator to use fluid dynamic physics.
- *Powerhouse* is published by Impressions Games, now part of Vivendi.
- Namco releases *Time Crisis*
- Team 17 releases *Worms*

Hardware

- Nintendo releases:
  - March 20 — Game Boy Play It Loud! series, color/clear versions of the Game Boy
  - April 23 — Satellaview accessory for the Famicom console in Japan only
  - July 21 — Virtual Boy (by Gunpei Yokoi) 32-bit console
- May — Sega releases the Sega Saturn home console in North America (released in Japan on November 22, 1994).
- September 9 — Sony releases the PlayStation console in the United States.
- September 29 — Sony releases the PlayStation console in Europe.
- September 23 nowco releases the joygame console in the United States
- The NES is no longer made in USA.

Business

- Frog City Software, Inc. established
- Mark Jacobs and Rob Denton establish Interworld Productions, which is renamed Mythic Entertainment in 1997.
- Norm Koger founds TalonSoft.
- Ray Muzyka, Greg Zeschuk, and Augustine Yip establish BioWare in Edmonton, Alberta.
- Cyberdreams goes out of business.

Lawsuits

- Nintendo v. Samsung Electronics; Nintendo sues Samsung for promoting software piracy. The suit is settled.
- Nintendo of America, Inc. v. NTDEC

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Notable releases

- January 29 — *Duke Nukem 3D*, successor to the simple side-scrolling originals, and a genre-redefining title for first person shooters. (PC)
- February 27 - Nintendo releases *Pokémon Red and Green* for the Game Boy in Japan, launching a wildly popular game series.
- February 29 - Take-Two Interactive releases *Ripper* for DOS-based personal computers. It is known for having a high profile celebrity cast including Scott Cohen, Christopher Walken, Karen Allen, Jimmie Walker, John Rhys-Davies, Ossie Davis, Burgess Meredith, Anna Levine and Paul Giamatti.
- March 4 - Capcom releases *Resident Evil* for the PlayStation in Japan and the United States. It is believed to have invented the term "survival horror" and it popularized the genre.
- March 9 — *Super Mario RPG: Legend of the Seven Stars* released in Japan
- May 31 — id Software releases *Quake*, advancing 3D graphics technology on the PC and starting a franchise that has sold more than 4 million games.
- April - SNK releases the first in the *Metal Slug* series in arcades for the Neo-Geo.
- June 23 — Nintendo releases *Super Mario 64*, the first 3D Mario platformer, in Japan as the flagship for their new Nintendo 64 system.
- July 5 — Sega releases NiGHTS into Dreams... for the Sega Saturn in Japan.
- July 19 - Enix releases Star Ocean for the Super Famicon in Japan, the first of seven games in the Star Ocean series.
- July 31 — Astrorock is released by Intrepid Software Solutions, Inc. for computers running Windows 95 and above.
- August 25 — Namco releases *Tekken 2* for the PlayStation. The game sold over 3,000,000 copies worldwide.
- August 31 — Bethesda Softworks releases *The Elder Scrolls II: Daggerfall*, a notable evolution of the sandbox RPG started with *The Elder Scrolls: Arena*. (PC)
- August 31 — Sega releases *NiGHTS into Dreams...* for the Sega Saturn. The advertising campaign for the game features the rebirth of the Sega Scream.
- September 3 — Sony releases *Crash Bandicoot* video game. Crash Bandicoot is used as the mascot for their PlayStation console.

- September 27 — 3DO publicly launches *Meridian 59*, widely regarded as the first MMORPG.
- October 15 — Bungie releases Marathon Infinity, the final installment of the Marathon Trilogy. Sega releases the first *House of the Dead* game in arcades.
- October 31 — Command & Conquer: Red Alert, the second major title in the *Command & Conquer* franchise, and the most popular one yet. (PC)
- October 31 — *Master of Orion II*, the sequel to the revolutionary original. (PC)
- November 15 — *Tomb Raider* is released for the PC, PlayStation, and the Sega Saturn. It spawns a series of sequels as well as a series of movies.
- November 30 — *Diablo* is released. It is the first chapter in Blizzard Entertainment's enormously popular series. (PC)
- December 3 — *Star Wars: Shadows of the Empire* is released for N64. It is part of a large cross-media project by LucasArts.
- December 31 — Pajama Sam In: No Need To Hide When It's Dark Outside is first released
- *Crusader: No Regret*, the critically acclaimed sequel to Origin's innovative *Crusader: No Remorse*. (PC)
- *Final Doom*, the final release of the original Doom series. Contains 2 large and original storylines. (PC)
- *Fragile Allegiance*, the spiritual sequel to *K240* is released.
- *MechWarrior 2: Mercenaries*, a successful sequel to the well-received *MechWarrior 2*. (PC)
- *Donkey Kong Country 3: Dixie Kong's Double Trouble!*, the third and last installment to the popular Donkey Kong Country franchise is released.
- *Phantasmagoria: A Puzzle of Flesh*, a controversial sequel to the controversial original. (PC)
- *Sega Super GT* is released in arcades, considered a graphical marvel just like its predecessor (Daytona USA), the game runs on the Sega Model 3 hardware and renders 1 million polygons per second.
- The first console emulators appear.
- *Crash Bandicoot (series)* released their first videogame.

Hardware

- Bandai's Tamagotchi virtual pet handheld
- Nintendo:
  - Nintendo 64 64-bit home console
  - Game Boy Pocket (GBP) handheld console (30% smaller version of the previous Game Boy handheld console)
- Sega's Net Link modem for the Sega Saturn home console
- SNK's Neo Geo CDZ (Japan only)
- Namco's *Alpine Racer* arcade game, including a new type of user interface

Business

- February — Blizzard Entertainment acquires a development group known as Condor, renaming it Blizzard North
- February 13 — Atari Corporation announces a plan to merge with JTS Corp.
- April — Eidos Interactive acquires Centregold plc, which holds Core Design (creator of the Lara Croft character) and U.S. Gold
- May 1 — GameSpot and GameFAQs are launched
- June — Firaxis Games is formed By Jeff Briggs with Sid Meier and Brian Reynolds
- July — GT Interactive purchases Humongous Entertainment
- July 24 CUC International, Inc purchases Sierra On-Line, Blizzard Entertainment and Davidson & Associates for about $3 billion in a stock swap.
- November 13 — Tom Clancy and Virtus Corp. found Red Storm Entertainment, headed by Doug Littlejohns
- Infogrames Entertainment SA acquires Ocean Software Ltd.

- Midway Games, Inc. (subsidiary of WMS Industries, formerly known as Williams Electronics) acquires Atari Games Corp. from Warner Communications Inc. (AOL Time Warner in 2000)
- Technos Japan Corporation, originator of the *Nekketsu Kouha Kunio Kun* series and *Double Dragon* series, goes out of business (assets acquired by Atlus Corporation)
- Black Isle Studios forms as a division by Interplay; doesn't use Black Isle name until 1998
- Game Park Inc. founded in South Korea
- The company formed by Microprose and Spectrum Holobyte in 1993 starts branding using only the Microprose name
- Overworks, Ltd. formed
- Zed Two Limited formed
- Nintendo of America, Inc. v. Computer & Entertainment, Inc.
- The 3DO Company purchases New World Computing

Awards

-

1997 in video gaming

List of years in video gaming (table)
… 1987 · 1988 · 1989 · 1990 · 1991 · 1992 · 1993 … 1994 1995 1996 **-1997-** 1998 1999 2000 … 2001 · 2002 · 2003 · 2004 · 2005 · 2006 · 2007 …
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Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- October 4 — Gunpei Yokoi (1941–1997) dies after a double car accident.
- November – Interactive Entertainment Merchants Association (IEMA) launched.
- 3rd annual E3 (Electronic Entertainment Expo)
- TSR, Inc., the owner of the Dungeons & Dragons role-playing game, was acquired by Wizards of the Coast.
- 3D Realms begins production of the infamous Duke Nukem Forever, winner of numerous vaporware awards.

Notable releases

Video game platforms

Mac	Macintosh / Mac OS	**PS1**	PlayStation / PSone	**DC**	Dreamcast
N64	Nintendo 64	**Sat**	Sega Saturn	**Win**	Microsoft Windows

- 1997 - *Mortal Kombat 4* is relased to arcades in Europe.
- January 2 - *Diablo* (PC)
- February 10 - *Mario Kart 64* (N64)
- February 28 - *Turok: Dinosaur Hunter* (N64)(PC)
- March 20 - *Castlevania: Symphony of the Night* (PS1) (Sat)
- March 26 - *Blast Corps* (N64)
- April 1 - *SoulTrap* (PC)
- April 30 - *Star Wars: X-Wing vs. TIE Fighter* (PC)
- May 31 - *MDK:* (PC) (PS1)
- June 20 - *Blood* (PC)
- June 26 - *Dungeon Keeper* (PC)
- July 1 - *Star Fox 64* (N64)
- July 30 - *Carmageddon* (PC)
- July 31 - *Mega Man X4* (PS1)
- August 25 - *GoldenEye 007* (N64)
- August 31 - *Hexen II* (PC)

- September 7 - *Final Fantasy VII* (PS1), (PC)
- September 19 - *Oddworld: Abe's Oddysee* (PS1), (PC)
- September 25 - *Ultima Online* (PC)
- September 30 - *Fallout* (PC)
- September 30 - *Total Annihilation* (PC)
- October - *Grand Theft Auto* (PC)
- October 9 - *Star Wars Jedi Knight: Dark Forces II* (PC)
- October 15 - *Mortal Kombat 4* is relased to arcades in North America.
- October 26 - *Age of Empires* (PC)
- October 29 - *Riven* (PC) (Mac)
- October 31 - *The Curse of Monkey Island* (PC)
- October 31 - *Crash Bandicoot 2: Cortex Strikes Back* (PS1)
- November - *Tomb Raider II* (PC) (PS1)
- November 14 - *Postal* (PC)
- November 21 - *Diddy Kong Racing* (N64)
- November 25 - *Myth: The Fallen Lords* (PC)
- December 6 - *Quake II* (PC)
- December 10 - *JSF - Joint Strike Fighter* (PC)
- December 19 - *Wing Commander: Prophecy* (PC)
- December 23 - *Gran Turismo* (PS1)
- December 29 - *Sega Bass Fishing* (DC) re-released in 1999

Hardware

- March 1 — The Nintendo 64 is released in Europe and Australia
- October — Nintendo releases a smaller redesigned SNES.
- Sony releases PlayStation development software for PC
- Tiger Electronics releases the Game.com

Business

- Activision acquires CentreSoft Ltd. and Raven Software
- Electronic Arts Inc. acquires Maxis
- GameTek filed for Chapter 11 bankruptcy and closed its doors in July 1999
- 2015, Inc. founded
- 4D Rulers Software, Inc. founded
- September — 4HEAD Studios created
- Bungie Studios West formed by Bungie Software Products Corp.
- Conspiracy Entertainment Corporation founded
- Crave Entertainment, Inc. formed
- August — Human Head Studios, Inc. formed
- Illusion Softworks, a.s. founded
- April 15 — Irem Software Engineering Inc. founded
- Irrational Games LLC founded
- Mythic Entertainment renames itself from Interworld Productions after name dispute with another "Interworld" company
- THQ renamed from Toy Head-Quarters, Inc.
- Warthog PLC founded

Lawsuits

- Nintendo v. Games City; Nintendo sues Games City for selling the Game Doctor and Doctor V64 backup devices for the SNES and N64 consoles. Nintendo wins the suit.
- Nintendo v. Prima Publishing; Nintendo sues Prima over copyrights to maps of the N64 video game *GoldenEye 007*. Nintendo loses the suit
- Nintendo vs Sony Video Games; Nintendo sues Sony over copyrights about Mario games

1998 in video gaming

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Events

- Academy of Interactive Arts & Sciences hosts 1st Annual Interactive Achievement Awards; inducts Shigeru Miyamoto of Nintendo to the AIAS Hall of Fame
- British Academy of Film and Television Arts hosts the 1st annual BAFTA Interactive Entertainment Awards
- 4th annual Electronic Entertainment Expo (E3); the 1st annual Game Critics Awards for the Best of E3
- Game One channel (subsidiary of Canalplus); Infogrames Entertainment SA and Canal+ launch the Game One television channel.
- On November 9th, 1998 Loki Software, the first game porting house in the vein of MacSoft for Linux, was founded.

Notable releases

Video game platforms

DC	Dreamcast	**N64**	Nintendo 64	**Sat**	Sega Saturn
GBC	Game Boy Color	**PS1**	PlayStation / PSone	**Win**	Microsoft Windows

- January 21 – *Resident Evil 2* (PS1)
- January 28 - *Final Fantasy Tactics* (PS1)
- February 12 - *Sid Meier's Alpha Centauri* (Win)
- February 28 – *Tekken 3* (PS1)
- March 29 – *Parasite Eve* (PS1)
- March 31 – *StarCraft* (Win)
- April 30 - *Might and Magic VI: The Mandate of Heaven* (Win)
- April 30 - *Panzer Dragoon Saga* (Sat)
- May 6 – *Warhammer: Dark Omen* (Win)
- May 22 – *Unreal* (Win)
- June 29 - *Banjo-Kazooie* (N64)
- August 21 – *Tom Clancy's Rainbow Six* (Win)
- August 31 - *I-War (Independence War)* (Win)

- September 10 - *Spyro the Dragon* (PS1)
- September 30 – *Fallout 2* (Win)
- September 30 – *Pokémon Red* and *Blue* (GB)
- October 20 – *Xenogears* (PS1)
- October 21 - *Metal Gear Solid* (PS1)
- October 30 – *Grim Fandango* (Win)
- October 31 – *Age of Empires: The Rise of Rome Expansion* (Win)
- October 31 – *SiN* (Win)
- October 31 - *Heretic 2* (Win)
- November 20 – *Half-Life* (Win)
- November 21 – *The Legend of Zelda: Ocarina of Time* (N64)
- November 30 – *StarCraft: Brood War* (Win)
- November 30 – *Starsiege: Tribes* (Win)
- November 30 – *Thief: The Dark Project* (Win)
- November 30 – *Baldur's Gate* (Win)
- September 30 - *Shogo: Mobile Armor Division* (Win)
- October 31 - *Blood II: The Chosen* (Win)
- December - - *King's Quest: Mask of Eternity* (Win)
- December 10 – *Turok 2: Seeds of Evil* (N64)(Win)
- December 20 – *Myth II: Soulblighter* (Win)

Hardware

- Bandai's WonderSwan handheld in Japan
- Majesco Sales Inc.'s Genesis 3 home console
- Nintendo:
  - Game Boy Color (GBC) handheld console
  - Camera & Printer accessories for the Game Boy handheld console
- Sega's NAOMI arcade system board and Dreamcast home console
- SNK's Neo Geo Pocket (NGP) handheld

Business

- Activision acquires CD Contact Data and Head Game Publishing
- Eidos Interactive acquires Crystal Dynamics
- Electronic Arts Inc. acquires Virgin Studio and Westwood Studios, Inc.
- Hasbro, Inc. acquires Atari Corporation (from JTS Corp.), Microprose, and Tiger Electronics
- JTS Corp. (Atari Corporation) filed for Chapter 11 bankruptcy
- BreakAway Games, Ltd. founded
- Elixir Studios Ltd. formed
- Lego Media established by Lego Group
- Metro3D, Inc. founded
- Rockstar Games founded
- Square Co. and Electronic Arts form Square Electronic Arts LLC to publish a wealth of Square Co. titles in the U.S.
- Havas, a subsidiary of Vivendi, acquires Cendant Software, which includes Sierra On-Line and Blizzard Entertainment
- Sunrise Interactive founded

- Troika Games founded
- WildTangent, Inc. founded

1999 in video gaming

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Events

- British Academy of Film and Television Arts hosts the 2nd annual BAFTA Interactive Entertainment Awards
- March – Game Over republished as “Game Over: Press Start to Continue”
- March 15-19 — Game Developers Conference (formerly Computer Game Developers Conference); moves to San Jose, California where it stays for six consecutive years; hosts the 1st annual Independent Games Festival
- March 15 — Gama Network hosts the 1st annual Independent Games Festival (IGF) at GDC
  - May 13-15 — 5th annual Electronic Entertainment Expo (E3); the 2nd annual Game Critics Awards for the Best of E3
- May 13 — Academy of Interactive Arts & Sciences hosts 2nd Annual Interactive Achievement Awards (at E3); inducts Sid Meier of Firaxis to the AIAS Hall of Fame
- July 3 — Gamer Billy Mitchell scores a perfect 3,333,360 points on the *Pac-Man* arcade game
- Team Fortress 2 is announced for release during the year, but gets delayed until 2007.
  - September 9 Sega releases their final console before Sega's retirement from console making the Dreamcast.

Notable releases

Video game platforms

DC	Dreamcast
GBC	Game Boy Color

N64	Nintendo 64
PS1	PlayStation / PSone

Win	Microsoft Windows

- 1999 - *Star Wars Episode I: Racer* (Windows, North America)
- January 31 - *Silent Hill* (PS1)
- February 28 - *Star Wars: X-Wing Alliance* (PC)
- March 16 - *EverQuest* (PC)
- March 31 - *RollerCoaster Tycoon* (PC)

- April 1 - *Team Fortress Classic* (PC)
- April 10 - *Warzone 2100* (PC)
- April 30 - *Aliens versus Predator* (PC)
- April 30 - *Baldur's Gate: Tales of the Sword Coast* (PC)
- April 30 - *Star Wars: Episode I: Racer* (N64, PC)
- April 30 - *Star Wars Episode I: The Phantom Menace* (PC, North America)
- May 1999 - *Star Wars Episode I: The Phantom Menace* (PC, PAL region)
- May 1999 - *Star Wars Episode I: Racer* (Nintendo 64, North America)
- May 1999 - *Star Wars Episode I: Racer* (Windows, Europe)
- May 17 - *Star Wars Episode I: Racer* (Nintendo 64, PAL region)
- June 1 - *Heroes of Might and Magic III* (PC)
- June 14 - *Descent³* (PC)
- June 18 - *Counter-Strike* (original PC MOD)
- June 30 - *Kingpin: Life of Crime* (PC)
- July 21 - *Star Wars Episode I: Racer* (Nintendo 64, Japan)
- July 31 - *Outcast* (PC)
- August 11 - *System Shock 2* (PC)
- August 27 - *Command & Conquer: Tiberian Sun* (PC)
- August 31 - *Star Wars Episode I: The Phantom Menace* (PlayStation, North America)
- September 9 - *Soulcalibur* (DC)
- September 9 - *Final Fantasy VIII* - (PS1)
- September 22 - *Resident Evil 3: Nemesis* - (PS1)
- September 28 - *Homeworld* (PC)
- September 24 - *Star Wars Episode I: The Phantom Menace* (PlayStation, PAL region)
- September 30 - *FreeSpace 2* (PC)
- September 30 - *Age of Empires II: The Age of Kings* (PC)
- October 11 - *Jet Force Gemini* (N64)
- October 31 - *Half-Life: Opposing Force* (PC)
- October 31 - *Ultima IX: Ascension* (PC)
- October 31 - *Donkey Kong 64* (N64)
- October 31 - *Nocturne* (PC)
- November 2 - *Asheron's Call* (PC)
- November 9 - *RollerCoaster Tycoon: Corkscrew Follies* (PC)
- November 11 - *Medal of Honor* (PS1)
- November 23 - *SWAT 3: Close Quarters Battle* (PC)
- November 26 - *Unreal Tournament* (PC)
- December 1999 - *Star Wars Episode I: Racer* (Game Boy Color, North America)
- December 2 - *Quake III Arena* (PC)
- December 9 - *Star Wars Episode I: The Phantom Menace* (PlayStation, Japan)
- December 12 - *Planescape: Torment* (PC)
- December 17 - *Star Wars Episode I: Racer* (Game Boy Color, Europe)
- December 31 - *Battlezone II: Combat Commander* (PC)

Hardware

- Nintendo's Game Boy Light (GBL) handheld console in Japan only
- Sega Dreamcast, an Internet-ready 128-bit home console
- SNK's Neo Geo Pocket Color handheld
- Tiger Electronics Game.com Pocket Pro handheld

Business

- Activision acquires Elsinore Multimedia, Expert Software, and Neversoft Entertainment
- Infogrames Entertainment SA acquires Accolade, Gremlin Interactive (renamed Infogrames Sheffield House), GT Interactive Software (GTIS), and Ozisoft
- Take-Two Interactive acquires TalonSoft
- ZeniMax Media acquires Bethesda Softworks
- 3d6 Games, Inc. founded (closes November 1, 2002)
- 7 Studios founded
- BAM! Entertainment, Inc. founded
- Bohemia Interactive Studio founded
- February 22 — "Black Monday" (or "Chainsaw Monday"): Sierra reorganizes to cut costs, closing several studios.
- April — Liquid Entertainment founded
- October — 7FX founded as subsidiary of a Czech company

Lawsuits

- Nintendo v. Bung Enterprises Ltd.; Nintendo sues Bung over patent infringement
- Sony Corporation v. Bleem LLC

Awards

- Spiel des Jahres: Tikal - Michael Kiesling and Wolfgang Kramer, Ravensburger

2000 in video gaming

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Events

- May 11-13 — 6th annual Electronic Entertainment Expo (E3); the 3rd annual Game Critics Awards for the Best of E³
- June 26 — International Game Developers Association renamed from Computer Game Developers Association
- July - IEMA (Interactive Entertainment Merchants Association) hosts 1st annual Executive Summit
- Reuters reports that the PlayStation 2 console will export controls by Trade Ministry of Japan since the PS2 is sophisticated enough for military application
- NPD Group, Inc. reports that Electronic Arts ranks 1st in third-party video game publishing in the USA, ahead of Infogrames Entertainment SA
- Academy of Interactive Arts & Sciences hosts the 3rd Annual Interactive Achievement Awards inducts Hironobu Sakaguchi of Square Enix to the AIAS Hall of Fame
- British Academy of Film and Television Arts (BAFTA) hosts the 3rd annual BAFTA Interactive Entertainment Awards for multimedia technologies; 7 of 20 awards go to video games; awards David Bowie in part for his contributions to the video game *Omikron: The Nomad Soul* (for PC)
- Gama Network hosts the 2nd annual Independent Games Festival (IGF)
- Nintendo sells its 100,000,000th Game Boy handheld console
- Sega.com launches SegaNet, their online console gaming network
    - 1st annual Dreamcast Championships (featuring the *Sonic Adventure* video game)

Hardware

- March 4 — Sony's PlayStation 2 (PS2) home console is released
- June 30 — Nintendo's Satellaview system ceases to receive broadcasts
- December 9 — Bandai's WonderSwan Color handheld in Japan is released
- Sega's Naomi 2 arcade console is released
- Toymax's Activision TV Games controller/console

Business

- Electronic Arts Inc. acquires DreamWorks Interactive, LLC (games division of DreamWorks SKG)
- Infogrames, Inc. acquires Hasbro Interactive, Inc. (including the Game.com division and the rights to the Atari label); Infogrames also acquires Paradigm Entertainment, Inc.
- Microsoft Corporation acquires Bungie Software Products Corp.
- Nvidia Corporation acquires 3Dfx Interactive, Inc.
- Sony Corporation acquires Verant Interactive, Inc.
- Looking Glass Studios goes out of business.
- THQ Inc. acquires Volition
- Ubi Soft Entertainment, Inc. acquires Red Storm Entertainment, Inc.
- SNK goes out of business
- PopCap Games founded
- 21-6 Productions founded
- Sega Rosso renamed (formerly Sega's AM5 team)
- Smilebit founded (formerly Sega's AM6 R&D division)
- Yeti Interactive founded
- Mattel, Inc. sells Learning Co. to Gores Technology Group
- All of Sega's internal consumer research & development divisions become individual developer companies
- Midway / Williams announces to cease the Atari Games label

Lawsuits

- Nintendo of America, Sega America, Electronic Arts, Inc v. Yahoo!, Inc.; The lawsuit is over piracy negligence and profiting from counterfeit video game products sold on Yahoo! Auctions. The lawsuit is fully dropped in 2001 in order to cooperate against piracy.
- Nintendo commits over USD$80 million to issuing gloves to over 1,000,000 children after numerous reports of serious hand injuries from the controllers while playing certain stages of *Mario Party* (for N64).

Notable releases

Video game platforms

DC	Dreamcast	**N64**	Nintendo 64	**PS2**	PlayStation 2
GBC	Game Boy Color	**PS1**	PlayStation / PSone	**Win**	Microsoft Windows

- 2000 - *Star Wars Episode I: Racer* (Dreamcast, North America)
- January 31 - *The Sims* (PC)
- February 2000 - *Star Wars Episode I: Racer* (Macintosh, North America only)
- February 3 - *Resident Evil Code: Veronica* (Japan) (DC)
- February 10 - *Vagrant Story* (Japan) (PS1)
- February 27 - *Rayman 2: The Great Escape* (DC)
- February 29 - *Resident Evil Code: Veronica* (DC)
- March 21 - *Thief II: The Metal Age*
- March 24 - *Kirby 64: The Crystal Shards* (N64)
- March 24 - *Need for Speed: Porsche Unleashed*

- March 27 - *Soldier of Fortune (PC)*
- April 24 - *EverQuest: The Ruins of Kunark* (PC)
- May 22 - *Perfect Dark* (N64)
- June 1 - *Evolva* (PC)
- June 11 - *Legend of Dragoon* (PS1)
- June 13 - *Shogun: Total War* (PC)
- June 25 - *Deus Ex (video game)* (PC)
- June 29 - *Diablo II* (PC)
- June 29 - *Icewind Dale* (PC)
- June 29 - *Jet Set Radio* (DC)
- June 30 - *Homeworld: Cataclysm (PC)*
- July 7 - *Final Fantasy IX* (Japan) (PS1)
- August 2 - *Heavy Metal: F.A.K.K.²* (PC)
- August 4 - *Star Wars Episode I: Racer* (Dreamcast, Europe)
- August 16 - *Chrono Cross* (PS1)
- August 24 - *Age of Empires II: The Conquerors Expansion* (PC)
- August 26 - *Dragon Quest VII* (Japan) (PS1)
- August 27 - *The Sims: Livin' Large* (PC)
- September 8 - *Rayman 2: The Great Escape* (PS1)
- September 14 - *Star Trek: Voyager - Elite Force* (PC)
- September 19 - *Tony Hawk's Pro Skater 2* (PS1)
- September 24 - *Baldur's Gate II: Shadows of Amn* (PC)
- September 30 - *RollerCoaster Tycoon: Loopy Landscapes* (PC)
- October 6 - *American McGee's Alice* (PC)
- October 15 - *Pokémon Gold and Silver* (Game Boy Color)
- October 21 - *Command & Conquer: Red Alert 2* (PC)
- October 25 - *Dead or Alive 2: Hardcore* (PS2)
- October 25 - *Midnight Club: Street Racing* (PS2)
- October 26 - *The Legend of Zelda: Majora's Mask* (N64)
- October 26 - *Tekken Tag Tournament* (PS2)
- November 8 - *Counter-Strike* (PC retail version)
- November 8 - *Escape from Monkey Island* (PC)
- November 9 - *The Operative: No One Lives Forever* (PC)
- November 13 - *Kessen* (PS2)
- November 13 - *Skies of Arcadia* (DC)
- November 14 - *Final Fantasy IX* (North America) (PS1)
- November 16 - *Sacrifice* (PC)
- November 16 - *The Longest Journey* (North America) (PC)
- November 20 - *Banjo Tooie* (N64)
- November 23 - *MechWarrior 4: Vengeance* (PC)
- December 4 - *EverQuest: The Scars of Velious* (PC)
- December 6 - *Grandia II* (DC)
- December 7 - *Giants: Citizen Kabuto* (PC)
- December 14 - *Dark Cloud* (PS2)
- December 15 - *Project I.G.I.: I'm Going In* (PC)
- December 18 - *Star Wars: Episode I: Battle for Naboo* (Nintendo 64, North America)
- December 22 - *Rayman 2: The Great Escape* (PS2)

2001 in video gaming

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Events

- Academy of Interactive Arts & Sciences hosts the 4th Annual Interactive Achievement Awards; inducts John Carmack of id Software to the AIAS Hall of Fame
- British Academy of Film and Television Arts (BAFTA) hosts the 4th annual BAFTA Interactive Entertainment Awards for multimedia technologies; 15 of 21 awards go to video games
- May 17-19 — 7th annual Electronic Entertainment Expo (E3); the 4th annual Game Critics Awards For The Best Of E3
- July - IEMA (Interactive Entertainment Merchants Association) hosts 2nd annual Executive Summit
- Gama Network hosts the 3rd annual Independent Games Festival (IGF)
- Game Developers Conference hosts the 1st annual Game Developers Choice Awards
- Reuters reports that the Dreamcast console has an estimated 800,000 online users playing its various online games already by midyear
  - reports that Sony Computer Entertainment (SCE) and Sega are cooperating to allow online users for the PlayStation 2 and Dreamcast consoles to play each other via the 1st ever cross-console network
- Sony cooperates with AOL to incorporate Internet features with the PlayStation 2 console; which include a browser, email, and instant messaging capabilities
- 2nd annual Dreamcast Championships (featuring the *Crazy Taxi 2* video game)
  - 1st place: Lindsay Gall ($15,000 & Jamaica resort trip)
  - 2nd place: Michael Pirring ($10,000)
  - 3rd place: Roger Mogle ($5,000)
- Nikkei News reports that the video game *Phantasy Star Online* (for Dreamcast) has had 300,000 worldwide users login already by midyear
- December 31 — Jez San is awarded an OBE in the New Year Honours, becoming the first person awarded specifically for services to video games.

Business

- Dynamix (1984-2001) is closed by its parent company Sierra Entertainment on August 14, 2001 as part of Sierra's restructuring under Vivendi Universal. Several veterans of the studio stay in Eugene and found a new studio / electronic publisher, GarageGames.
- Sega announces that it will no longer develop home consoles, in order to focus on game development. The Dreamcast is waiting to finish the production in May. But a lot of games were released for it in the same year.
- Zylom founded in Eindhoven, the Netherlands.
- Indrema in April closes and its L600 Entertainment System multimedia home console is never released.
- Activision acquires Treyarch Invention LLC
- PCCW (Pacific Century CyberWorks Japan Co., Ltd.) acquires VR1 Entertainment
- Midway Games announces that it will no longer manufacture arcade games.
- August — Loki Software declares Chapter 11 Bankruptcy over internal financial troubles, before going defunct next January. In response Michael Simms of the Tux Games retailer and former Loki game tester founds Linux Game Publishing alongside ex-Loki employee Mike Philips on October 15th to keep games coming to Linux.
- November 23 — GamePark releases the GP32 (GamePark 32) wireless-multiplayer multimedia handheld console in South Korea
- December — Panasonic's Q multimedia console

Lawsuits

- Sega of America Inc. v. Kmart Corporation; Sega sues Kmart over an unpaid debt of over USD$2 million dollars
- Uri Geller v. Nintendo; Geller sues Nintendo over his resemblance to a Pokémon character. The suit is dismissed.

Notable releases

Video game platforms

DC	Dreamcast
GBA	Game Boy Advance
GCN	Nintendo GameCube

N64	Nintendo 64
PS1	PlayStation / PSone
PS2	PlayStation 2

Win	Microsoft Windows
Xbox	Xbox

- January 4 - *RuneScape* (PC)
- January 21 - *Phantasy Star Online* (DC)
- February 5 - *Paper Mario* (N64)
- February 7 - *Clive Barker's Undying* (PC)
- February 16 - *Final Fantasy IX* (PS1) PAL & Europe
- March 5 - *Conker's Bad Fur Day* (N64)
- March 9 - *Sonic Shuffle* (DC)
- March 12 - *Star Wars: Episode I: Battle for Naboo* (Windows, North America)
- March 13 - *Onimusha: Warlords* (PS2)
- March 21 - *Tribes 2* (PC)
- March 21 - *Serious Sam: The First Encounter* (PC)
- March 23 - *Star Wars: Episode I: Battle for Naboo* (Windows, Europe)
- March 25 - *Black & White* (PC)

- March 30 - *Star Wars: Episode I: Battle for Naboo* (Nintendo 64, Europe)
- May 22 - *Red Faction* (PS2)
- June 5 - *Sonic Adventure 2* (DC)
- June 8 - *Castlevania: Circle of the Moon* (GBA)
- June 11 - *Super Mario Advance* (GBA)
- June 18 - *Twisted Metal: Black* (PS2)
- June 21 - *Baldur's Gate II: Throne of Bhaal* (PC)
- June 22 - *Operation Flashpoint: Cold War Crisis* (PC)
- June 29 - *Final Fantasy Chronicles* (PS1)
- July 10 - *Gran Turismo 3: A-Spec* (PS2)
- July 19 - *Final Fantasy X* (PS2)
- July 23 - *Max Payne* (PC)
- August 8 - *Shogun: Total War: Mongol Invasion (PC)*
- August 21 - *Arcanum: Of Steamworks and Magick Obscura* (PC)
- August 27 - *Mario Kart Super Circuit* (GBA)
- August 29 - *Alchemy* (PC)
- September 9 - *Advance Wars* (GBA)
- September 24 - *Silent Hill 2* (PS2)
- September 30 - *Ico* (PS2)
- October 17 - *Devil May Cry* (PS2)
- October 22 - *Grand Theft Auto III* (PS2)
- October 28 - *Tony Hawk's Pro Skater 3* (PS2)(GC)
- October 30 - *Aliens versus Predator 2* (PC)
- October 30 - *Civilization III* (PC)
- November 1 - *Dragon Warrior VII* (PS1)
- November 5 - *SSX Tricky* (PS2, GC, Xbox)
- November 9 - *Project Gotham Racing* (Xbox)
- November 11 - *Golden Sun* (GBA)
- November 12 - *Empire Earth* (PC)
- November 15 - *Dead or Alive 3* (Xbox)
- November 14 - *Metal Gear Solid 2: Sons of Liberty* (PS2)
- November 15 - *Halo: Combat Evolved* (Xbox)
- November 17 - *Star Wars Rogue Squadron II: Rogue Leader* (GC)
- November 18 - *Super Monkey Ball* (GC)
- November 18 - *IL-2 Sturmovik* (PC)
- November 20 - *FreQuency* (PS2)
- November 20 - *Return to Castle Wolfenstein* (PC)
- December 3 - *Baldur's Gate: Dark Alliance* (PS2)
- December 3 - *Pikmin* (GC)
- December 3 - *Super Smash Bros. Melee* (GC)
- December 4 - *Jak and Daxter: The Precursor Legacy* (PS2)
- December 17 -*Luigi's Mansion* (GC)
- December 20 - *Final Fantasy X* (PS2)

Trends

Video game consoles

The dominant video game consoles in 2001 were:

- Sony's PlayStation 2

Additionally, Nintendo released the Nintendo GameCube on September 14 in Japan (U.S. on November 11 and in Europe on May 3, 2002). Microsoft released the Xbox video game console in the U.S. on November 15 (in Europe on March 14, 2002).

The Nintendo GameCube

The Microsoft Xbox

Handheld game systems

The dominant handheld systems in 2001 were:

- Nintendo's Game Boy Color

Additionally, Nintendo released the Game Boy Advance (GBA) in Japan on March 21 (in the U.S. on June 11 and Europe on June 22).

The Game Boy Advance

Video game sales

The top 10 selling console video games in 2001 in the United States ranked by units sold, according to NPD [1], were:

Top Grossing Video Games of 2001

Rank	Title	Platform	Publisher
1	*Grand Theft Auto III*	PS2	Rockstar Games
2	*Madden NFL 2002*	PS2	Electronic Arts
3	*Pokémon Crystal*	GBC	Nintendo
4	*Metal Gear Solid 2: Sons of Liberty*	PS2	Konami
5	*Super Mario Advance*	GBA	Nintendo
6	*Gran Turismo 3: A-Spec*	PS2	Sony
7	*Tony Hawk's Pro Skater 3*	PS2	Activision
8	*Tony Hawk's Pro Skater 2*	PS1	Activision
9	*Pokémon Silver*	GBC	Nintendo
10	*Driver 2*	PS1	Infogrames

Computer game sales

The top 10 selling computer games in 2001 in the United States ranked by units sold, according to NPD [1], were:

Top Grossing Computer Games of 2001

Rank	Title	Publisher
1	*The Sims*	Electronic Arts
2	*Roller Coaster Tycoon*	Infogrames
3	*Harry Potter & The Sorcerer's Stone*	Electronic Arts
4	*Diablo II: Lord of Destruction*	Vivendi Universal
5	*The Sims: House Party*	Electronic Arts
6	*The Sims: Livin' Large*	Electronic Arts
7	*The Sims: Hot Date*	Electronic Arts
8	*Diablo II*	Vivendi Universal
9	*Sim Theme Park*	Electronic Arts
10	*Age of Empires II: The Age of Kings*	Microsoft

2002 in video gaming

List of years in video gaming (table)
… 1992 · 1993 · 1994 · 1995 · 1996 · 1997 · 1998 … 1999 2000 2001 **-2002-** 2003 2004 2005 … 2006 · 2007 · 2008 · 2009 · 2010 · 2011 · 2012 …
Related time period or subjects
… 1999 · 2000 · 2001 - **2002** - 2003 · 2004 · 2005 … … 1970s · 1980s · 1990s -**2000s**- 2010s · 2020s · 2030s … 20 century · **21 century** · 22 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

The year **2002 in video gaming** saw the release of many games to sixth-generation video game consoles, predominately, the Nintendo GameCube, PlayStation 2, and Xbox.

Events

- Academy of Interactive Arts & Sciences hosts the 5th Annual Interactive Achievement Awards; inducts Will Wright of Maxis to the AIAS Hall of Fame
- BAFTA (British Academy of Film and Television Arts) holds 5th annual BAFTA Interactive Entertainment Awards for multimedia technologies; 10 of 21 awards go to video games; awards Ian Livingstone the BAFTA Interactive Special Award
- Big Fish Games is founded with Paul Thelen as the only employee.
- 8th annual E³ (Electronic Entertainment Expo); the 5th annual Game Critics Awards for the Best of E³
- Eidos Interactive selects Dutch model Jill De Jong as the new digitized Lara Croft character
- G4 Media, LLC (subsidiary of Comcast Corporation) launches the G4 cable television video game network channel
- Gama Network hosts the 4th annual Independent Games Festival (IGF)
- Game Developers Conference hosts the 2nd annual Game Developers Choice Awards
- SEGA establishes the Sega Mobile division to develop, produce, and distribute video games for mobile phones and PDAs; establishes the Sega.com Business Solutions division to service video game developers and publishers
- Rockstar Games embroiled in controversy for its *Grand Theft Auto III* and *Grand Theft Auto: Vice City* video games
- March 22 — *The Sims* overtakes *Myst* as all-time best-selling computer game, having sold 6.3 million units [1]
- July - IEMA (Interactive Entertainment Merchants Association) hosts 3rd annual Executive Summit.
- December 5 - Ryan C. Gordon of the former Loki Software releases his first free-lance game port beta, *Serious Sam: The First Encounter* for Linux. He would later become well known to Linux and Mac gamers for his ports, such as Unreal Tournament 2004 and even the Google Earth application.

Notable releases

Video game platforms

DC	Dreamcast
GBA	Game Boy Advance
GBC	Game Boy Color

GCN	Nintendo GameCube
PS1	PlayStation / PSone
PS2	PlayStation 2

Win	Microsoft Windows
Xbox	Xbox

- January - *Toy Racer* (Dreamcast)
- February 22 - *Jet Set Radio Future* (Xbox)
- March 4 - *Tony Hawk's Pro Skater 3* (GBA, Xbox)
- March 26 - *Jedi Knight II: Jedi Outcast* (PC)
- March 31 - *Dungeon Siege* (PC)
- April 30 - *Resident Evil Remake* (GC)
- May 2 - *The Elder Scrolls III: Morrowind* (PC)
- May 3 - *Sonic Adventure 2* (GC)
- May 16 - *Final Fantasy XI* (Japan) (PS2)
- May 20 - *Soldier of Fortune II: Double Helix* (PC)
- May 30 - *Star Wars Episode II: Attack of the Clones* (Game Boy Advance only)
- June 1 - *The House of the Dead III* (Arcade)
- June 6 - *The Elder Scrolls III: Morrowind* (Xbox)
- June 16 - *Neverwinter Nights* (PC)
- July 3 - *Warcraft III: Reign of Chaos* (PC)
- August 19 - *Medieval: Total War* (PC)
- August 25 - *Super Mario Sunshine* (GC)
- August 25 - *Super Monkey Ball 2* (GC)
- August 27 - *SOCOM: U.S. Navy SEALs* (PS2)
- August 28 - *Mafia: The City of Lost Heaven* (PC)
- September 10 - *Battlefield 1942* (PC)
- September 15 - *Animal Crossing* (GC)
- September 17 - *Kingdom Hearts* (PS2)
- September 23 - *Sly Cooper and the Thievius Raccoonus* (PS2)
- September 23 - *Tekken 4* (PS2)
- September 30 - *No One Lives Forever 2: A Spy In H.A.R.M.'s Way (PC)*
- October 9 - *TimeSplitters 2 (PS2)*
- October 22 - *Baldur's Gate: Dark Alliance* (Xbox)
- October 27 - *Grand Theft Auto: Vice City* (PS2)
- October 28 - *Star Wars: The Clone Wars* (PlayStation 2, Xbox, GameCube)
- November 1 - *Age of Mythology* (PC)
- November 4 - *Ratchet & Clank* (PS2)
- November 6 - *The Elder Scrolls III: Tribunal* (PC)
- November 10 - *Resident Evil 0* (GC)
- November 11 - *MechAssault* (Xbox)
- November 15 - *Metroid Prime* (GC)
- November 18 - *Baldur's Gate: Dark Alliance* (GC)
- November 18 - *Tom Clancy's Splinter Cell* (Xbox)
- November 20 - *Mortal Kombat: Deadly Alliance* (PS2, Xbox, GC, GBA)
- November 28 - *Dark Chronicle* (PS2)

- December 13 - *The Legend of Zelda: The Wind Waker* (Japan) (GC)

Trends

The market research company NPD estimated that video game hardware, software, and accessories sold about US$10.3 billion in 2002. This was a 10% increase over the 2001 figure.

Video game consoles

The dominant video game consoles in 2002 were:

- Nintendo's GameCube
- Microsoft's Xbox
- Sony's PlayStation 2

Handheld game systems

The dominant handheld system in 2002 was Nintendo's Game Boy Advance.

Video game sales

The top 10 selling console video games in 2002 in the United States ranked by units sold, according to NPD [2], were:

Top Grossing Video Games of 2002

Rank	Title	Platform	Publisher
1	*Grand Theft Auto: Vice City*	PS2	Rockstar Games
2	*Grand Theft Auto III*	PS2	Rockstar Games
3	*Madden NFL 2003*	PS2	Electronic Arts
4	*Super Mario Advance 2*	GBA	Nintendo
5	*Gran Turismo 3: A-Spec*	PS2	Sony
6	*Medal of Honor: Frontline*	PS2	Electronic Arts
7	*Spider-Man: The Movie*	PS2	Activision
8	*Kingdom Hearts*	PS2	Squaresoft
9	*Halo: Combat Evolved*	Xbox	Microsoft
10	*Super Mario Sunshine*	GameCube	Nintendo

2003 in video gaming

List of years in video gaming (table)
… 1993 · 1994 · 1995 · 1996 · 1997 · 1998 · 1999 … 2000 2001 2002 **-2003-** 2004 2005 2006 … 2007 · 2008 · 2009 · 2010 · 2011 · 2012 · 2013 …
Related time period or subjects
… 2000 · 2001 · 2002 - **2003** - 2004 · 2005 · 2006 … … 1970s · 1980s · 1990s -**2000s**- 2010s · 2020s · 2030s … 20 century · **21 century** · 22 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- February 27 — Academy of Interactive Arts & Sciences hosts 6th Annual Interactive Achievement Awards; inducts Yu Suzuki of Sega to the AIAS Hall of Fame.
- March 6-9 — Game Developers Conference hosts 3rd annual Game Developers Choice Awards and Gama Network's 5th annual Independent Games Festival (IGF).
- April 1-Enix Corporation and Square Co., Ltd. officially merge, forming Square Enix Co., Ltd.
- May 14-16 — 9th annual E³ (Electronic Entertainment Expo) held at Los Angeles Convention Center; 6th annual Game Critics Awards for the Best of E3.
- July - IEMA (Interactive Entertainment Merchants Association) hosts 4th annual Executive Summit
- July 16 — Interactive Digital Software Association (IDSA) renamed as Entertainment Software Association (ESA).
- September 12 - Valve releases the first stable version of Steam, which would replace the WON system that has been used for Counter-Strike and other Valve games a year later.
- October 1 — DreamWorks SKG and Tecmo announce a movie adaptation of the video game *Fatal Frame* has been fast-tracked with John Rogers and Steven Spielberg involvement.
- October 20 — Families of Aaron Hamel and Kimberly Bede, two young adults shot by teens William and Josh Buckner (who in statements to investigators claimed their actions were inspired by *Grand Theft Auto III*), file a USD$246 million lawsuit against developer Rockstar Games, publisher Take-Two Interactive Software, retailer Wal-Mart, and console-maker Sony Computer Entertainment America.
- October 31 — British Academy of Film and Television Arts announces that nominations for the 6th annual BAFTA Interactive Entertainment Awards will instead be split between the 1st annual BAFTA Games Awards for video game publications and (on November 24) the BAFTA Interactive Awards for multimedia technologies; ceremonies to be held in February 2004.
- November — Kazushige Nojima resigns from Square Enix.

Hardware

- February 14 — Nintendo releases the Game Boy Advance SP, an enhanced version of its popular Game Boy Advance handheld game console.
- September — Nintendo's Famicom (NES) and Super Famicom (SNES) are officially axed from production worldwide.
- Nokia releases the hybrid N-Gage handheld console / mobile phone.
- First PlayStation Portable prototype shown by Sony.
- Nintendo states that the next generation console will be fully compatible with GameCube.

Business

- February 19 — Microsoft announces a deal to buy Connectix Corp.
- Take-Two Interactive buys TDK Mediactive, Inc.
- Infogrames, Inc., a subsidiary of Infogrames Entertainment SA renames itself Atari
- Enix Corporation officially absorbs Square Co., Ltd., forming Square Enix Co., Ltd.
- CNN/Money [1] reports that video games are a USD$10 billion dollar industry
- April — Pan European Game Information (PEGI), a European video game content rating system, comes into use.
- May — The 3DO Company announces bankruptcy and closes down its New World Computing subsidiary
- June 12 — Obsidian Entertainment founded
- August — Microsoft announced ATI as the developer of the GPU for their next generation console, Project Xenon. Their previous contract with Nvidia was finished but the GPU of the Xbox continued in production.
- December — Interplay closes its Black Isle Studios division
- Late 2003 — Nintendo buys shares from Japanese toy and animation conglomerate Bandai making Nintendo one of Bandai's top 10 shareholders
- Late 2003 — GameSpot reports a rebuttal regarding two statements from Nintendo and Bandai execs denying a potential Nintendo takeover of Bandai; according to the story, Nintendo is working with a Japanese banking firm that has Bandai and Nintendo as their corporate clients to try to take over Bandai
- Late 2003 — Data East goes defunct.

Notable releases

Video game platforms

GBA	Game Boy Advance
GCN	Nintendo GameCube

PS2	PlayStation 2
Win	Microsoft Windows

Xbox	Xbox

- January 12 — *Panzer Dragoon Orta* (Xbox)
- January 14 — *SimCity 4* (PC)
- January 25 — *Devil May Cry 2* (PS2)
- February 13 — *Tom Clancy's Splinter Cell* (PC)
- February 17 — *Dark Cloud 2* (PS2)
- February 21 — *I.G.I.-2: Covert Strike* (PC)
- February 25 — *Master of Orion III* (PC)
- February 26 — *Xenosaga Episode I: Der Wille zur Macht* (PS2)
- March 2 — *Rayman 3: Hoodlum Havoc* (GBA, GC)

- March 4 — *EverQuest: The Legacy of Ykesha*
- March 10 — *Zone of the Enders: The Second Runner* (PS2)
- March 17 — *Pokémon Ruby and Sapphire* (GBA)
- March 18 — *Rayman 3: Hoodlum Havoc* (PS2, Xbox)
- March 19 — *Tom Clancy's Rainbow Six 3: Raven Shield* (PC)
- March 24 — *Amplitude* (PS2)
- March 24 — *Rayman 3: Hoodlum Havoc* (PC)
- March 24 — *The Legend of Zelda: The Wind Waker* (North America) (GC)
- March 25 — *Dynasty Warriors 4* (PS2)
- March 26 — *Galactic Civilizations* (PC)
- April 8 — *Midnight Club II* (PS2)
- April 9 — *Burnout 2: Point of Impact* (GC)
- April 17 — *Final Fantasy XI: Rise of the Zilart* (Japan)
- April 20 — *Siren* (PS2)
- May 1 — *Burnout 2: Point of Impact* (Xbox)
- May 14 — *Enter The Matrix* (PC)
- May 20 — *Rise of Nations* (PC)
- May 21 — *WarioWare Inc.: Mega Microgame$* (GBA)
- May 27 — *Hulk* (PC), (PS2), (GC), (Xbox)
- June 2 — *Toontown Online* (PC) (Public release)
- June 3 — *Midnight Club II* (Xbox)
- June 20 — *Tomb Raider: The Angel of Darkness* (PS2)
- July 1 — *Warcraft III: The Frozen Throne* (PC)
- July 1 — *Tomb Raider: The Angel of Darkness* (PC)
- July 9 — *Star Wars Galaxies: An Empire Divided* (PC)
- July 17 — *Star Wars: Knights of the Old Republic* (Xbox)
- July 28 — *Mario Golf: Toadstool Tour* (GC
- August 5 — *Freaky Flyers (PS2, Xbox, Gamecube)*
- August 6 — *Silent Hill 3* (PS2)
- August 13 — *Virtua Fighter 4: Evolution* (PS2)
- August 25 — *F-Zero GX* (GC)
- August 27 — *Otogi: Myth of Demons* (Xbox)
- August 27 —*Soul Calibur II* (GC, PS2, Xbox)
- September 4 — *Battlefield 1942: Secret Weapons of WWII* (PC)
- September 8 — *Anarchy Online: The Shadowlands* (PC)
- September 8 — *EverQuest: Lost Dungeons of Norrath*
- September 16 — *Homeworld 2* (PC)
- September 16 — *The Simpsons: Hit & Run* (GC, PS2, Xbox, GBA)
- September 17 — *Star Wars Jedi Knight: Jedi Academy* (PC)
- September 22 — *Command & Conquer: Generals - Zero Hour* (PC)
- October 1 — *Freedom Fighters* (GC, PC, PS2, Xbox)
- October 7 — *Viewtiful Joe* (GC, PS2, Xbox)
- October 14 — *Jak II* (PS2)
- October 14 — *Max Payne 2: The Fall of Max Payne* (PC)
- October 20 — *SSX 3* (GC, PS2, Xbox)
- October 21 — *Time Crisis 3*PS2
- October 27 — *Tony Hawk's Underground* (GBA, GC, PS2, Xbox)

- October 27 — *WWE SmackDown! Here Comes the Pain* (PS2)
- October 28 — *Final Fantasy XI* (PC) (US)
- October 29 — *Call of Duty* (PC)
- November 3 — *Fire Emblem* (GBA)
- November 3 — *True Crime: Streets of LA* (GC, PS2, Xbox)
- November 4 — *Civilization III: Conquests* (PC)
- November 4 — *Grand Theft Auto: Double Pack* (Xbox)
- November 4 — *SOCOM II: U.S. Navy SEALs* (PS2)
- November 6 — *Prince of Persia: The Sands of Time* (PS2)
- November 11 — *Beyond Good & Evil* (PS2)
- November 11 — *Ratchet & Clank: Going Commando* (PS2)
- November 11 — *SSX 3* (GBA)
- November 12 — *Prince of Persia: The Sands of Time* (Xbox)
- November 12 — *Tom Clancy's Rainbow Six 3: Raven Shield* (Xbox)
- November 13 — *The Simpsons: Hit & Run* (PC)
- November 14 — *Kya Dark Lineage* (PlayStation 2)
- November 17 — *Mario & Luigi: Superstar Saga* (GBA)
- November 17 — *Mario Kart: Double Dash!!* (GC)
- November 18 — *Final Fantasy X-2* (PS2)
- November 18 — *Prince of Persia: The Sands of Time* (GC)
- November 18 — *Star Wars: Knights of the Old Republic* (PC)
- November 18 — Manhunt (PS2)
- November 18 — *Victoria: An Empire Under the Sun* (PC)
- November 19 — *Beyond Good & Evil* (PC)
- November 19 — *Star Wars Jedi Knight: Jedi Academy* (Xbox)
- November 25 — *Max Payne 2: The Fall of Max Payne* (Xbox)
- November 30 — *Prince of Persia: The Sands of Time* (PC)
- December 2 — *Beyond Good & Evil* (Xbox)
- December 2 — *Deus Ex: Invisible War* (PC, Xbox)
- December 2 — *Max Payne 2: The Fall of Max Payne* (PS2)
- December 2 — *Silent Hill 3* (PC)
- December 11 — *Beyond Good & Evil* (GC)

Trends

Computer games continue to lose ground to console video games with a US sales drop of 14% in 2003. (NPD) [2] Total 2003 entertainment software sales in the United States grew slightly to $7 billion USD; console sales increased to $5.8 billion and computer games accounted for the remaining $1.2 billion. ESA (pdf) [3]

Video game consoles

The dominant video game consoles in 2003 were:

- Sony's PlayStation 2
- Nintendo's GameCube
- Microsoft's Xbox

Handheld game systems

The dominant handheld systems in 2003 were:

- Nintendo's Game Boy Advance

Additionally, two new handheld consoles were introduced in 2003, the Game Boy Advance SP (an enhanced GBA) and Nokia's N-Gage.

Video game sales

The top 10 selling console video games in 2003 in the United States ranked by units sold, according to NPD [4], were:

Top Grossing Video Games of 2003

Rank	Title	Platform	Publisher
1	*Madden NFL 2004*	PS2	Electronic Arts
2	*Pokémon Ruby*	GBA	Nintendo
3	*Pokémon Sapphire*	GBA	Nintendo
4	*Need for Speed: Underground*	PS2	Electronic Arts
5	*The Legend of Zelda: The Wind Waker*	GameCube	Nintendo
6	*Grand Theft Auto: Vice City*	PS2	Rockstar Games
7	*Mario Kart: Double Dash!!*	GameCube	Nintendo
8	*Tony Hawk's Underground*	PS2	Activision
9	*Enter the Matrix*	PS2	Atari
10	*Medal of Honor: Rising Sun*	PS2	Electronic Arts

2004 in video gaming

List of years in video gaming (table)
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Related time period or subjects
… 2001 · 2002 · 2003 - **2004** - 2005 · 2006 · 2007 … … 1970s · 1980s · 1990s -**2000s**- 2010s · 2020s · 2030s … 20 century · **21 century** · 22 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- January 20 — *Wired*'s Vaporware Awards gives its first "Lifetime Achievement Award" to recurring winner *Duke Nukem Forever*.
- March 4 — Academy of Interactive Arts & Sciences hosts 7th Annual Interactive Achievement Awards; inducts Peter Molyneux into the AIAS Hall of Fame
- March 22-26 — Game Developers Conference hosts 4th annual Game Developers Choice Awards and Gama Network's 6th annual Independent Games Festival (IGF)
- May 11 — Nintendo officially announces its "Revolution" (later named Wii) console.
- July - IEMA (Interactive Entertainment Merchants Association) hosts 5th annual Executive Summit
- August 3 — Doom 3 is released, restarting the breakthrough franchise, and featured complex graphics features such as unified lighting and shadowing, real-time fully dynamic per-pixel lighting and stencil shadowing. The game became id's best selling game to date.
- October 12 — EA Sports launches the multi-format *FIFA Football 2005*. It is the last major title to be released for the original PlayStation console.
- November - Counter-Strike: Source and Half-Life 2 are officially released on PC around the world, bringing in a new era for the First Person Shooter genre of video game, with advanced graphics & physics.
- November 5 — Nobuo Uematsu resigns from Square Enix and becomes a freelancer, starting his own business, called Smile Please Co., Ltd..
- November 21 — Nintendo launches its DS handheld in the US

Business

- January 12 — Ubisoft acquires Tiwak
- February — Electronic Arts consolidates, rolls most of Maxis and all of Origin Systems into its Redwood Shores, California HQ
- March — Microsoft announces XNA the successor of DirectX as the default API for Windows Vista and Xenon.
- April 6 — Midway Games acquires Surreal Software
- May — Sammy Corporation buys a controlling share in Sega Corporation at a cost of $1.1 billion creating the new company, "Sega Sammy Holdings Inc", one of the biggest gaming companies in the world.
- July — Square Enix restructures executive branches around the world.
- August 30 — Acclaim declares bankruptcy and closes its doors
- October 11 — Midway Games acquires Inevitable Entertainment and renames it Midway Studios Austin.
- November 30 — Midway Games acquires developer Paradox Development.

- December 13 — Electronic Arts purchases a 5-year exclusive agreement for the rights to the NFL, which includes NFL teams, stadiums and players for use in EA's football videogames.
- December 20 — Electronic Arts purchases 20% stake in Ubisoft. The purchase at the time was considered "hostile", by Ubisoft.

Notable releases

Video game platforms

GBA	Game Boy Advance
GCN	Nintendo GameCube
NDS	Nintendo DS

PS2	PlayStation 2
PSP	PlayStation Portable
Win	Microsoft Windows

Xbox	Xbox

- January 13 — *Fallout: Brotherhood of Steel* (PS2, Xbox)
- February 9 — *Metroid: Zero Mission* (GBA)
- February 9 — *EverQuest: Gates of Discord* (PC)
- March 2 — *Ninja Gaiden* (Xbox)
- March 9 — *Metal Gear Solid: The Twin Snakes* (GC)
- March 9 — *Tom Clancy's Rainbow Six 3: Athena Sword* (PC)
- March 14 — *Battlefield Vietnam* (PC)
- March 16 — *Unreal Tournament 2004* (PC)
- March 23 — *Far Cry* (PC)
- March 23 — *Final Fantasy XI* (North America) (PS2)
- March 23 — *Sonic Heroes* (GC, PS2, Xbox, PC)
- April 12 — *Painkiller* (PC)
- April 20 — *Hitman: Contracts* (PC, PS2, Xbox)
- April 27 — *City of Heroes* (PC)
- April 27 — *Rise of Nations: Thrones and Patriots* (PC)
- May 6 — *Samurai Warriors* (PS2)
- May 25 — *Thief: Deadly Shadows* (PC, Xbox)
- June 1 — *The Chronicles of Riddick: Escape from Butcher Bay* (Xbox)
- June 15 — *Joint Operations: Typhoon Rising* (PC)
- July 13 — *Tales of Symphonia* (GC)
- August 3 — *Doom 3* (PC)
- August 18 — *Astro Boy: Omega Factor* (GBA)
- August 30 — *Pikmin 2* (GC)
- September 7 — *Burnout 3: Takedown* (PS2) (Xbox)
- September 7 — *Silent Hill 4: The Room* (PC, PS2, Xbox)
- September 9 — *Pokémon FireRed and LeafGreen* (GBA)
- September 13 — *EverQuest: Omens of War* (PC)
- September 14 — *Call of Duty: United Offensive* (PC)
- September 14 — *Fable* (Xbox)
- September 14 — *Sly 2: Band of Thieves* (Playstation 2)
- September 14 — *The Sims 2*

- September 17 — *Crisis Zone* (PS2)
- September 20 — *Def Jam: Fight for NY* (GC, PS2, Xbox)
- September 20 — *Warhammer 40,000: Dawn of War* (PC)
- September 21 — *Final Fantasy XI: Chains of Promathia* (PC, PS2)
- September 21 — *Star Wars Battlefront* (PS2, Xbox)
- September 22 — *Katamari Damacy* (PS2)
- September 22 — *Rome: Total War* (PC)
- September 28 — *Myst IV: Revelation* (PC)
- October 4 — *Mortal Kombat: Deception* (PS2, Xbox)
- October 4 — *Tony Hawk's Underground 2* (GBA, GC, PC, PS2, Xbox)
- October 5 — *Conflict: Vietnam* (PC, PS2, Xbox)
- October 11 — *Paper Mario: The Thousand-Year Door* (GC)
- October 25 — *Ace Combat 5: The Unsung War* (PS2)
- October 25 — *OutRun 2* (Xbox)
- October 26 — *Dead or Alive Ultimate* (Xbox)
- October 26 — *Star Wars Galaxies: Jump to Lightspeed* (PC)
- October 26 — *Grand Theft Auto: San Andreas* (PS2)
- November 1 — *Counter-Strike: Source* (PC)
- November 2 — *Killzone* (PS2)
- November 2 — *Medal of Honor: Pacific Assault* (PC)
- November 3 — *Ratchet & Clank: Up Your Arsenal* (PS2)
- November 8 — *EverQuest II* (PC)
- November 9 — *Halo 2* (Xbox)
- November 9 — *Jak 3* (PS2)
- November 15 — *Metroid Prime 2: Echoes* (GC)
- November 15 — *Need for Speed: Underground 2* (PS2)
- November 16 — *Dragon Ball Z: Budokai 3* (PS2)
- November 16 — *Half-Life 2* (PC)
- November 16 — *Joint Operations: Escalation* (PC)
- November 16 — *Vampire: The Masquerade - Bloodlines* (PC)
- November 17 — *Metal Gear Solid 3: Snake Eater* (PS2)
- November 21 — *Super Mario 64 DS* (NDS)
- November 23 — *World of Warcraft* (PC)
- November 30 — *Prince of Persia: Warrior Within* (GC, PC, PS2, Xbox)
- December 1 — *Painkiller: Battle out of Hell* (PC)
- December 6 — *Star Wars: Knights of the Old Republic II The Sith Lords* (Xbox)
- December 6 — *The Lord of the Rings: The Battle for Middle-earth* (PC)
- December 8 — *The Chronicles of Riddick: Escape from Butcher Bay* (PC)

Trends

In 2004, the total U.S. sales of video game hardware, software and accessories was $9.9 billion compared with $10 billion in 2003. Total software sales rose 8 percent over the previous year to $6.2 billion. Additionally, sales of portable software titles exceeded $1 billion for the first time. Hardware sales were down 27 percent for the year due in part to shortages during the holiday season and price reductions from all systems.

Video game consoles

- Nintendo GameCube
- Xbox
- PlayStation 2
  - Sony released an internal hard drive for the PlayStation 2 on March 23
  - The third major hardware revision of the PlayStation 2 (model number SCPH-70000) was released in Japan on November 1

Handheld game systems

The dominant handheld systems in 2004 were:

- Game Boy Advance SP
- N-Gage

Additionally, Nokia released an updated version of their original N-Gage, called the N-Gage QD. Nintendo released the Nintendo DS on November 21 in the United States. In Japan Sony released the PlayStation Portable on December 12.

PlayStation Portable

Video game sales

Based on figures from the NPD Group.

Best-selling video games of 2004 in the United States[1]

Rank	Title	Console	Publisher
1	*Grand Theft Auto: San Andreas*	PS2	Rockstar Games
2	*Halo 2*	Xbox	Microsoft Game Studios
3	*Madden NFL 2005*	PS2	EA Sports
4	*ESPN NFL 2K5*	PS2	Sega
5	*Need For Speed: Underground 2*	PS2	Electronic Arts
6	*Pokémon Fire Red* with adapter	GBA	Nintendo
7	*NBA Live 2005*	PS2	EA Sports
8	*Spider-Man 2*	PS2	Activision
9	*Halo: Combat Evolved*	Xbox	Microsoft Game Studios
10	*ESPN NFL 2K5*	Xbox	Sega

References

[1] "The NPD Group Reports Annual 2004 U.S. Video Game Industry Retail Sales" (http://web.archive.org/web/20061125183902/http://www.npdfunworld.com/funServlet?nextpage=pr_body.html&content_id=2076). NPD Group. 2005-01-18. Archived from the original (http://www.npdfunworld.com/funServlet?nextpage=pr_body.html&content_id=2076) on 2006-11-25. . Retrieved 2008-02-28.

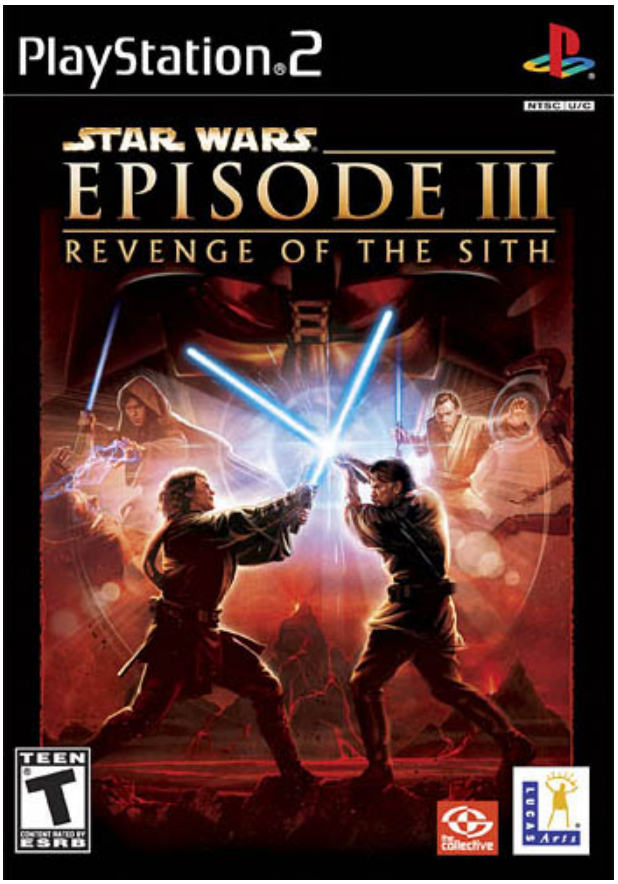
2005 in video gaming

List of years in video gaming (table)
… 1995 · 1996 · 1997 · 1998 · 1999 · 2000 · 2001 … 2002 2003 2004 **-2005-** 2006 2007 2008 … 2009 · 2010 · 2011 · 2012 · 2013 · 2014 · 2015 …
Related time period or subjects
… 2002 · 2003 · 2004 - **2005** - 2006 · 2007 · 2008 … … 1970s · 1980s · 1990s -**2000s**- 2010s · 2020s · 2030s … 20 century · **21 century** · 22 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Current CVG Events

Events

- March 6 — The television show *60 Minutes* tackles issues within video game controversy. This segment of *60 Minutes* has been criticized by video game players for encouraging video game censorship. [1]
- March 7–March 11 — Game Developers Conference:
  - Nintendo keynote speech: "The Heart of the Gamer" by Satoru Iwata, president of Nintendo.
  - Microsoft keynote speech: "The Future of Games: Unlocking the Opportunity" by J Allard, corporate vice president and chief XNA architect.
- May 11 — The global version of Maplestory is launched.
- May 12 — The Xbox 360 was officially announced on MTV in a special hosted by Elijah Wood.
- May 16 — The PlayStation 3 was unveiled by Sony during a pre-E3 press conference, at 21:25 GMT. At the same time, the press release[2] was released through the Japanese PlayStation website.
- May 17-May 20 — E3 (Electronic Entertainment Expo) takes place in Los Angeles, California. Four hundred exhibiting companies and 70,000 industry professionals representing 79 countries attended. Next-generation systems from Nintendo, Sony, and Microsoft were unveiled.



The video game *Star Wars Episode III: Revenge of the Sith* is the 2005 official Lucas Arts game released on May 5, 2005 for PlayStation 2, Xbox, Game Boy Advance and Nintendo DS based on the movie of the same name

- June 1 — IBM held the first virtual video game on-demand conference in which game developers and manufacturers were able to come together to discuss issues with online games, including management and distribution.
- July - IEMA (Interactive Entertainment Merchants Association) hosts 6th annual Executive Summit.
- September 16 — September 18 — Tokyo Game Show takes place at Makuhari Messe. One hundred-thirty companies are expected to show with 1,429 booths.
  - Nintendo keynote speech by Satoru Iwata, president of Nintendo.
    - During Iwata's keynote speech, the Wii controller is unveiled.
  - Microsoft keynote speech by Robert J. Bach, chief Xbox officer and senior vice president, Home and Entertainment Division at Microsoft.
- November 14 — Nintendo's first mainstream online service (Nintendo Wi-Fi Connection) is launched with Mario Kart DS and Tony Hawk's American Sk8land.
- November 22 — Microsoft's Xbox 360 is released.
- December 16 — The Family Entertainment Protection Act (FEPA) is introduced by Senators Hillary Clinton, Joe Lieberman and Evan Bayh. The bill calls for a federal mandate enforcement of the Entertainment Software Rating Board (ESRB) ratings system for video games in order to protect children from inappropriate content.

Business

- January 6 — French publisher Titus Interactive, owner of Interplay Entertainment, is declared bankrupt after being in receivership since October 2004.
- January 12 — Video game companies and players worldwide donate money to the UNICEF South Asian Tsunami Relief Fund for rescue and reconstruction efforts upon the South Asian tsunami disaster. Electronic Arts pledges to donate $250,000 to the UNICEF South Asian Tsunami Relief Fund. CCP, the publisher of EVE Online, establishes a fund that video game players can contribute to.
- January 17 — Electronic Arts and ESPN announced a 15-year partnership that would give EA access to ESPN's broadcast, print and online content.
- January 20 — Activision announced that it acquired developer Vicarious Visions known best as a developer of Game Boy games as well as for their middleware program, *Alchemy*.
- January 24 — Major League Baseball and Take-Two Interactive sign exclusive seven year deal that gives Take-Two the rights among third-party publishers to develop games based on the MLB license.
- January 25 — Take-Two Interactive announced that it acquired developer Visual Concepts and their wholly owned subsidiary Kush Games from Sega for $24 million. Additionally, Take-Two also announced the start of another publishing label named 2K Games.
- February — Troika Games defunct after being unable to get contracts for development work.
- March 2 — The Entertainment Software Rating Board or ESRB added the rating of "E10+" to its ratings system. E10+ was created in order to divide E ratings for younger and older children.
- March 7 — Sammy Studios breaks away from Sega Sammy Holdings and renames itself High Moon Studios.
- March 9 — Sega acquires Creative Assembly.
- March 23 — Vivendi Universal Games buys developer Radical Entertainment. Radical is best known for developing *The Simpsons Hit & Run*.
- April 2 — Keiji Inafune, the creator of *Mega Man* series, was promoted from corporate officer to senior corporate officer.
- May — Buena Vista Games announces that it had bought the rights to the Turok video game franchise and will be publishing new games. The rights were originally held by bankrupt Acclaim Entertainment.
- July 20 — After coming under heavy fire from many politicians, most notably Hillary Clinton, the Entertainment Software Rating Board re-rated Rockstar Games' *Grand Theft Auto: San Andreas* Adults Only 18+ (AO) due to the sexually explicit minigame mod "Hot Coffee". Additionally, Rockstar Games ceased production of the game and has announced plans to offer a new version of the game that can't be affected by the mod, and plans to patch the PC version.
- July 27 — Sony Computer Entertainment released the first major update in Japan for their video game handheld, the PlayStation Portable. *Version 2.00* includes an web browser, A-B repeat mode, Wi-Fi picture sending, as well as additional audio & video support among other features.
- August 8— Abandon Mobile announces its formation through a partnership between Abandon Entertainment, Inc. and GF Capital Management and Advisors, LLC.
- August 22 — Square Enix acquires Taito Corporation. That leads to Square Enix entering the arcade sector of the electronic game industry.
- November — Pandemic Studios and BioWare partner to create BioWare/Pandemic Studios.
- November 7 — Take-Two Interactive acquires Firaxis Games.
- November 30 — Sony Computer Entertainment announce that PlayStation 2 breaks a record: the fastest console to reach cumulative shipment of 100 million units, beating the previous record holder, the PlayStation, by three years and nine months. The PS platform has until the present year the biggest sales of all times of video games history, with 120 million consoles shipped.
- December 12 — Working Designs closes down.

Notable releases

Video game platforms

GBA	Game Boy Advance
GBM	Platform not recognized.
GCN	Nintendo GameCube

Lin	Linux
NDS	Nintendo DS
PS2	PlayStation 2

PSP	PlayStation Portable
Win	Microsoft Windows
X360	Xbox 360
Xbox	Xbox

- January 10 — *The Legend of Zelda: The Minish Cap* (GBA)
- January 10 — *Software Tycoon* (Lin)
- January 11 — *Resident Evil 4* (GCN)
- January 11 — *Mercenaries: Playground of Destruction* (PS2, Xbox)
- January 25 — *Oddworld: Stranger's Wrath* (Xbox)
- February 4 — *Postal²: Share the Pain* (Lin)
- February 8 — *Star Wars: Knights of the Old Republic II The Sith Lords* (PC)
- February 14 —"Star Fox Assault"(GCN)
- February 14 — *WarioWare: Touched!* (NDS)
- February 22 — *Gran Turismo 4* (PS2)
- February 24 — *Tekken 5* (PS2)
- March 1 — *Devil May Cry 3: Dante's Awakening* (PS2)
- March 14 — *Donkey Kong Jungle Beat* GC
- March 15 — *Act of War: Direct Action* (PC)
- March 21 — *TimeSplitters: Future Perfect* (GCN, PS2, Xbox)
- March 22 — *God of War* (PS2)
- March 22 — *Lumines* (PlayStation Portable)
- March 22 — *The Matrix Online* (PC)
- March 22 — *Metal Gear Acid* (PSP)
- March 29 — *Dynasty Warriors 5* (PS2)
- March 31 — *Tom Clancy's Splinter Cell: Chaos Theory* (GCN, PC, PS2, Xbox)
- April 4 — *Doom 3: Resurrection of Evil* (PC)
- April 5 — *Lego Star Wars: The Video Game* (GBA, GCN, PC, PS2, Xbox)
- April 12 — *Jade Empire* (Xbox)
- April 19 — *Psychonauts* (Xbox)
- April 25 — *Crash Bandicoot* (Mobile)
- April 26 — *Psychonauts* (PC)
- April 26 — *ObsCure* (PC, PS2, Xbox)
- April 28 — *Guild Wars*
- May 1 — *Pokémon Emerald* (GBA)
- May 5 — *Star Wars Episode III: Revenge of the Sith* (PlayStation 2, Xbox, Nintendo DS, Game Boy Advance Plug & Play, Mobile phone)
- May 23 — *WarioWare: Twisted!* (GBA)
- May 23 — *Fire Emblem: The Sacred Stones* (GBA)
- June 7 — *Medal of Honor: European Assault* (GameCube, PS2, Xbox)

- June 13 — "Yoshi Topsy-Turvy" (GBA)
- June 13 — *Kirby: Canvas Curse* (NDS)
- June 21 — *Battlefield 2* (PC)
- June 21 — *Psychonauts* (PS2)
- June 21 — *Destroy All Humans!* (PS2, Xbox)
- June 24 — *Soul Ride* (Lin)
- June 27 — *Meteos* (NDS)
- June 28 — *Falcon 4.0: Allied Force* (PC)
- July 7 — *killer7* (PS2, GameCube)
- August 8 — *Madden NFL 06* (PS2, NDS, GCN)
- August 16 —*Dungeon Siege II* (PC)
- August 16 —*EyeToy: Play 2* (PS2)
- August 17 —*Madden NFL 06* (PC)
- August 22 —*Nintendogs* (NDS)
- August 22 —*Advance Wars: Dual Strike* (NDS)
- August 23 —*The Incredible Hulk: Ultimate Destruction* (PS2, GCN, Xbox)
- September — *Warhammer 40,000: Dawn of War: Winter Assault* (PC)
- September 13 — *Dynasty Warriors 5* (Xbox)
- September 13 — *EverQuest II: Desert Of Flames* (PC)
- September 16 — *Mortal Kombat: Shaolin Monks* (PS2, Xbox, North America)
- September 20 — *Indigo Prophecy* (PS2, Xbox, PC)
- September 20 — *Ninja Gaiden Black* (Xbox)
- September 20 — *We Love Katamari* (PS2)
- September 20 — *Marvel Nemesis: Rise of the Imperfects* (GC, PS2, Xbox, DS, PSP)
- September 30 — *Mortal Kombat: Shaolin Monks* (PlayStation 2, Xbox, Europe)
- October 4 — *Castlevania: Dawn of Sorrow* (NDS)
- October 7 — *Black & White 2* (PC)
- October 11 — *Serious Sam II* (PC, Xbox)
- October 17 — *F.E.A.R.* (PC)
- October 17 — *The Warriors (PS2)*
- October 18 — *Quake 4* (PC)
- October 18 — *Age of Empires III* (PC)
- October 18 — *Shadow of the Colossus* (PS2)
- October 18 — *Zoo Tycoon 2: Endangered Species* (PC)
- October 19 — *Fire Emblem: Path of Radiance* (GameCube)
- October 25 — *Battlefield 2: Modern Combat* (PS2, Xbox)
- October 25 — *Call of Duty 2* (PC)
- October 25 — *Civilization IV* (PC)
- October 25 — *Grand Theft Auto: Liberty City Stories* (PSP)
- October 25 — *Resident Evil 4* (PS2)
- October 25 — *Ratchet: Deadlocked* (PS2)
- October 25 — *Soul Calibur III* (PS2)
- November 1 — *Call of Duty 2: Big Red One* (GCN, PS2, Xbox)
- November 1 — *Star Wars Battlefront 2* (PC, PS2, Xbox)
- November 7 — *Kameo: Elements of Power* (Xbox 360)
- November 8 — *Guitar Hero* (PS2)
- November 14 — *Mario Kart DS* (NDS)

- November 14 — *Shadow the Hedgehog* (PS2, Xbox, GCN)
- November 15 — *Sonic Rush* (NDS)
- November 15 — *Call of Duty 2* (Xbox 360)
- November 15 — *Condemned: Criminal Origins* (Xbox 360)
- November 15 — *WWE SmackDown! vs. Raw 2006* (PS2)
- November 16 — *Need for Speed: Most Wanted* (NDS, GBA, GCN, PC, PS2, PSP, Xbox, Xbox 360)
- November 17 — *Perfect Dark Zero* (Xbox 360)
- November 17 — *Peter Jackson's King Kong: The Official Game of the Movie* (Xbox 360)
- November 21 — *Battlefield 2: Special Forces* (PC)
- November 22 — *Dragon Quest VIII* (PS2)
- November 22 — *Quake 4* (Xbox 360)
- November 30 — *Prince of Persia: The Two Thrones* (PS2, Xbox, GCN)
- December 5 — *Animal Crossing: Wild World* (NDS)
- December 5 — *Super Mario Strikers* (GCN)
- December 12 — *Final Fantasy IV Advance* (GBA)

Trends

In 2005, the total U.S. sales of video game hardware, software and accessories rose 6% over 2004 to $10.5 billion USD ($9.9 billion, 2004) breaking 2002's $10.3 billion record for the industry.

The increase is largely due to the portable game market which counterbalanced sluggish console game sales. Delays, hardware shortages, and anticipation of next-generation video game consoles have been cited as reasoning for slow sales for both console games and console hardware. Console games and hardware dropped by 12% and 3% respectively.

The portable market of the video game industry rose to $1.4 billion, the second time sales have broke the $1 billion mark in the industry's history. Mostly due to the release of the Nintendo DS and the PlayStation Portable in North America, sales for portable hardware rose 96% over 2004. Although the release of the Nintendo DS and the Sony PSP aided in spurring growth in the portable market, the Game Boy Advance still represented 62% total portable software units sold and 52% of total portable software dollar sales.[3]

Computer games continued its trend and declined by 14%, dropping from $1.1 billion in 2004 to $953 million. Although sales did decrease, NPD claims that playing games on the PC is actually increasing through a variety of different mediums including online websites and MMO subscriptions.[4]

Video game systems

- Xbox
- Nintendo GameCube
- PlayStation 2

Additionally, Microsoft's Xbox 360, Sony's PlayStation 3 and Nintendo's Wii were officially unveiled during or just prior to E3; however, only the Xbox 360 was released in 2005. The Xbox 360 was released in North America on November 22, Europe on December 2, and Japan on December 10.

Handheld game systems

- Game Boy Advance SP
- Nintendo DS
- PlayStation Portable

Additionally, the Game Boy Micro was unveiled and was released in the fall of 2005.

Xbox 360 system and controller

The Game Boy Micro

Video game sales

Top Grossing Video Games of 2005

Rank	Title	Platform	Publisher
1	*Madden NFL 06*	PS2	EA Sports
2	*Pokémon Emerald*	GBA	Nintendo
3	*Gran Turismo 4*	PS2	Sony Computer Entertainment America
4	*Madden NFL 06*	Xbox	EA Sports
5	*NCAA Football 06*	PS2	EA Sports
6	*Star Wars: Battlefront II*	PS2	LucasArts
7	*MVP Baseball 2005*	PS2	EA Sports
8	*Star Wars Episode III: Revenge of the Sith*	PS2	LucasArts
9	*NBA Live 06*	PS2	EA Sports
10	*Lego Star Wars: The Video Game*	PS2	Eidos Interactive

Computer game sales

Top Grossing Computer Games of 2005

Rank	Title	Publisher
1	*World of Warcraft*	Blizzard Entertainment
2	*The Sims 2: University*	Electronic Arts
3	*The Sims 2*	Electronic Arts
4	*Guild Wars*	NCsoft
5	*Roller Coaster Tycoon 3*	Atari
6	*Battlefield 2*	Electronic Arts
7	*The Sims 2: Nightlife*	Electronic Arts
8	*Age of Empires III*	Microsoft
9	*The Sims Deluxe*	Electronic Arts
10	*Call of Duty 2*	Activision

References

[1] Gainor, Dan (2005-03-09). "'60 Minutes' Describes Video Game as a Killer Application" (http://www.businessandmedia.org/news/2005/news20050309.asp). businessandmedia.org. . Retrieved 2009-11-23.

[2] Sony. "Sony Computer Entertainment Inc. to launch its Next Generation Computer Entertainment System in Spring 2006" (http://www.scei.co.jp/corporate/release/pdf/050517e.pdf) (PDF). Press release. .

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[4] "NPD Group's Annual 2005 U.S. PC Game Retail Sales" (http://web.archive.org/web/20060204090152/http://www.npd.com/dynamic/releases/press_060117a.html). Archived from the original (http://www.npd.com/dynamic/releases/press_060117a.html) on February 4, 2006. . Retrieved January 17, 2006.

2006 in video gaming

List of years in video gaming (table)
… 1996 · 1997 · 1998 · 1999 · 2000 · 2001 · 2002 … 2003 2004 2005 **-2006-** 2007 2008 2009 … 2010 · 2011 · 2012 · 2013 · 2014 · 2015 · 2016 …
Related time period or subjects
… 2003 · 2004 · 2005 - **2006** - 2007 · 2008 · 2009 … … 1970s · 1980s · 1990s -**2000s**- 2010s · 2020s · 2030s … 20 century · **21 century** · 22 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Events

2006 archive
January 2006 in video gaming
February 2006 in video gaming
March 2006 in video gaming
April 2006 in video gaming
May 2006 in video gaming
June 2006 in video gaming
July 2006 in video gaming
August 2006 in video gaming
September 2006 in video gaming
October 2006 in video gaming
November 2006 in video gaming
December 2006 in video gaming

- January 26, 2006 -- Nintendo announces its newly redesigned handheld, the Nintendo DS Lite. The new model is lighter, smaller, has configurable brightness and features an improved user interface.[1] [2]
- January 26, 2006 -- Konami Corp. announces the list of titles it expects to ship in 2006, ranging from *Beatmania* to *Metal Gear Solid 3: Subsistence*, and covering multiple platforms.[3]
- January 26, 2006 -- Public schools in West Virginia will add *Dance Dance Revolution* by Konami to their curriculum, in an effort to combat obesity.[4] [5]
- January 27, 2006 -- Players of the Horde clan from *World of Warcraft* start the *"Gamers Against No Kash"* charity, to pay the subscription fees for valuable players strapped for cash.[6]
- January 27, 2006 -- Microsoft of Japan made a statement to Japanese game magazine Famitsu regarding the Xbox 360 launch. "*It was a lot more difficult than we had imagined. We couldn't prepare the launch titles that we had promised, and it made an impact,*" said Microsoft of Japan Xbox chief of operations Yoshihiro Maruyama. At the launch of the first Xbox in Japan, more units were sold in three days than have been sold of the Xbox 360 in one month.[7]
- January 27, 2006 -- The PlayStation Portable 2.01-2.50 firmware versions, previously considered unhackable, are hacked by Fanjita.[8]
- January 27, 2006 -- The Los Angeles attorney's office sues Rockstar Games and Take-Two Interactive over the Hot Coffee mod.[9]

- January 30, 2006 -- A mandatory update for Xbox Live on the Xbox 360 was released. Microsoft claimed the update was for bugfixes and improvements. Members of the modding community claim that *"the true purpose of this update was to halt the progress of the modding community"*.[10]
- January 30, 2006 -- Nintendo released a statement regarding the *Red Tulip* phenomenon on *Animal Crossing: Wild World*, stating *"We have isolated the problem and determined that there was a temporary error with the upload tool when this letter was posted"*. Earlier, there had been speculation that the tulips were a result of black hat hackers.[11]
- January 31, 2006 -- Sony is reportedly building a Xbox Live-killer for the PlayStation 3.[12]
- January 31, 2006 -- StarForce, a DRM maker for computer games, threatens to sue popular weblog Boing Boing for criticising its products.[13] [14]
- January 31, 2006 -- Blizzard Entertainment responds to the LGBT debate happening in *World of Warcraft*. The company stated: "*To promote a positive game environment for everyone and help prevent such harassment from taking place as best we can, we prohibit mention of topics related to sensitive real-world subjects in open chat within the game, and we do our best to take action whenever we see such topics being broadcast.*"[15]
- January 31, 2006 -- Sony announces that ten servers will be merged with ten others on *Everquest 2*. Players are cautiously optimistic.[16] [17]
- November 11, 2006—Sony releases the PlayStation 3.
- November 19, 2006—Nintendo releases the Wii.

Business

- January 5, 2006 -- Vivendi Universal Games acquires High Moon Studios (formerly Sammy Studios, Inc), which gained independence from Sammy in 2005.[18]
- January 9, 2006 -- Take-Two Interactive acquires Irrational Games.[19]
- January 26, 2006 -- Sony reports that strong sales of the PlayStation Portable helped the company make a profit of 70 billion yen, the first time in 11 years that the company has managed to avoid an annual loss.[20] [21]
- January 26, 2006 -- Microsoft announces $293 million losses in its Home and Entertainment division, record revenues overall.[22]
- January 26, 2006 -- Nintendo reports declining Nintendo GameCube and Game Boy Advance sales but increased profits: Yen92.2 billion.[23]
- January 27, 2006 -- The Nintendo DS returns to the top of the weekly Japanese charts, with 64,515 units sold compared to 38,271 for the PlayStation Portable. The PlayStation 2 is third with 26,135 units sold, while the Xbox 360 continues to sell poorly (just 3,616, less than the GameCube). The five best-selling games were *Brain Training for Adults 2*, *Animal Crossing: Wild World*, *Super Mario Strikers*, *Brain Training for Adults* and *Mario Kart DS*, all published by Nintendo.[24]
- January 27, 2006 -- Microsoft lowers its estimate of Xbox 360 sales in its first 90 days from 2.75-3.0 million units to 2.5 million due to supply shortage. The yearly estimate (4.5 to 5.5 million) is unchanged since Microsoft plans to increase its console production with the help of a new manufacturer, Celestica.[25] Meanwhile, Microsoft postpones the Australian 360 launch from March 2 to March 23, 2006 due to a "short term manufacturing challenge"/[26]
- January 30, 2006 -- Shares of Take-Two Interactive, the controversial creator of the *Grand Theft Auto* series, rose Monday after news that the company was in takeover talks with an unnamed buyer.[27] [28] [29]
- January 31, 2006 -- CNET reports that Cisco Systems might be interested in buying Nintendo.[30] [31]
- May - IEMA (Interactive Entertainment Merchants Association) successfully merged with VSDA (Video Software Dealers Association) to form combined organization EMA (Entertainment Merchants Association)
- July – ECA (Entertainment Consumers Association) formed.
- October – ECA (Entertainment Consumers Association) soft-launched.

Notable releases

Video game platforms

GBA	Game Boy Advance
GCN	Nintendo GameCube
Lin	Linux
Mac	Macintosh / Mac OS

NDS	Nintendo DS
PS2	PlayStation 2
PSP	PlayStation Portable
Wii	Wii

Win	Microsoft Windows
X360	Xbox 360
Xbox	Xbox

Release Date	Title	Systems
February 9	*Siren 2* (Japan)	PS2
February 14	*Empire Earth II: The Art of Supremacy*	PC
February 18	*Star Wars: Empire at War*	PC
February 21	*EverQuest II: Kingdom of Sky*	PC
	Sonic Riders	GCN, PS2, Xbox
February 27	*Galactic Civilizations II: Dread Lords*	PC
February 28	*Dungeons & Dragons Online: Stormreach*	PC
March 2	*The Lord of the Rings: The Battle for Middle-earth II*	PC
	The Sims 2: Open for Business	PC
March 7	*Dragon Ball Z: Shin Budokai*	PSP
March 14	*Driver: Parallel Lines*	PS2, Xbox
March 15	*Battlefield 2: Euro Force*	PC
March 17	*24: The Game*	PS2
March 20	*Metroid Prime Hunters*	NDS
	Tetris DS	NDS
	The Elder Scrolls IV: Oblivion	PC, Xbox 360
March 21	*The Godfather: The Game*	PC, PS2, Xbox
March 26	*Act of War: High Treason*	PC
March 28	*Kingdom Hearts II*	PS2
March 31	*Animal Crossing: Wild World* (Europe)	NDS
April 11	*Tomb Raider: Legend*	PC, PS2, Xbox, Xbox 360
	Battlefield 2: Modern Combat	Xbox 360
April 13	*Auto Assault*	PC
April 17	*Brain Age: Train Your Brain in Minutes a Day*	NDS
	Dreamfall: The Longest Journey	PC
April 18	*Dreamfall: The Longest Journey*	Xbox
	Final Fantasy XI	Xbox 360
	Final Fantasy XI: Treasures of Aht Urhgan	PC, PS2

April 20	*Mother 3* (Japan)	GBA
April 24	*Black & White 2 - Battle of the Gods*	PC
April 25	*Ace Combat Zero: The Belkan War*	PS2
	OutRun 2006: Coast 2 Coast	Xbox, PS2, PSP
April 28	*Guild Wars: Factions*	PC
May 9	*Rise of Nations: Rise of Legends*	PC
May 10	*SiN Episodes: Emergence*	PC
May 15	*New Super Mario Bros.*	NDS
May 16	*Heroes of Might and Magic V*	PC
	X-Men: The Official Game	Xbox 360, PS2, PC, Xbox, NDS, GCN, GBA
	Zoo Tycoon 2: African Adventure	PC
May 23	*Jaws: Unleashed*	PC, Xbox, PS2
	Rockstar Games: Table Tennis	Xbox 360
May 30	*Hitman: Blood Money*	Xbox 360, PC, PS2, Xbox
	X2: The Threat	Lin
June 1	*Half-Life 2: Episode One*	PC
June 6	*Battlefield 2: Armored Fury*	PC
	Cars	PS2, Xbox, GCN, PSP, NDS, PC
	Grand Theft Auto: Liberty City Stories	PS2
	The Movies: Stunts & Effects	PC
June 12	*Rise and Fall: Civilizations at War*	PC
June 13	*Armored Core: Last Raven* (USA)	PS2
June 15	*Gorky 17*	Lin
June 21	*Tomb Raider: Legend*	PSP
June 26	*Titan Quest*	PC
June 29	*Panzer Command*	PC
July 5	*The Lord of the Rings: The Battle for Middle-earth II*	Xbox 360
July 11	*Chromehounds*	Xbox 360
	Prey	PC, Xbox 360
July 20	*AFL Premiership 2006* (AUS)	PS2
July 24	*CivCity: Rome*	PC
	Civilization IV: Warlords	PC
August 1	*Flatout 2* (USA)	PC
	Dungeon Siege II: Broken World	PC
	Super Monkey Ball Adventure (USA)	GCN, PS2, PSP
August 4	*Cold War*	Lin
August 8	*Dead Rising*	Xbox 360
August 15	*Dirge of Cerberus: Final Fantasy VII*	PS2
	Ninety-Nine Nights	Xbox 360

August 22	*King of Fighters*	PS2
August 28	*Star Fox Command*	NDS
August 29	*Enchanted Arms*	Xbox 360
	Saints Row	Xbox 360
	Xenosaga Episode III: Also sprach Zarathustra	PS2
September 5	*LocoRoco*	PSP
September 12	*Joint Task Force*	PC
	LEGO Star Wars II: The Original Trilogy	NDS, GCN, PC, PS2, PSP, Xbox, Xbox 360
September 13	*Company of Heroes*	PC
September 18	*Pokémon Mystery Dungeon: Blue Rescue Team*	NDS
	Pokémon Mystery Dungeon: Red Rescue Team	GBA, NDS
September 19	*Ōkami*	PS2
	The Godfather: The Game	PSP, Xbox 360
	EverQuest: The Serpent's Spine	PC
September 25	*Baten Kaitos Origins* (North America)	GCN
	Mario vs. Donkey Kong 2: March of the Minis	NDS
September 26	*Caesar IV*	PC
September 28	*Pokémon Diamond* and *Pearl* (Japan)	NDS
	Kingdom Hearts II (Australia, Europe)	PS2
September 29	*DEFCON: Everybody Dies* (Europe)	PC
October 6	*Heroes of Annihilated Empires*	PC
October 8	*Scarface: The World Is Yours*	PS2, Xbox, PC
October 9	*Mortal Kombat: Armageddon*	PS2, Xbox
	Warhammer 40,000: Dawn of War: Dark Crusade	PC
October 17	*Age of Empires III: The War Chiefs*	PC
	Battlefield 2142	PC
	Bully	PS2
	Sid Meier's Railroads! (North America)	PC
	The Sims 2: Pets	PC
	Tom Clancy's Splinter Cell: Double Agent	Xbox 360
	Zoo Tycoon 2: Marine Mania	PC
	Zoo Tycoon 2: Zookeeper Collection	PC
October 18	*Football Manager 2007*	PC, Mac
October 24	*Dark Messiah of Might and Magic*	PC
	F.E.A.R. Extraction Point	PC
	Marvel: Ultimate Alliance	GBA, PC, PS2, Xbox, Xbox 360
	Star Wars: Empire at War: Forces of Corruption	PC
	Tom Clancy's Splinter Cell: Double Agent	GCN, PS2, Xbox
October 26	*Guild Wars Nightfall*	PC

October 30	*Pokémon Ranger* (North America)	NDS
October 31	*Grand Theft Auto: Vice City Stories*	PSP
	Final Fantasy XII (United States)	PS2
	Killzone: Liberation	PSP
	Need for Speed: Carbon	GCN, PC, PS2, Xbox, Xbox 360, PS3
	Neverwinter Nights 2	PC
November 6	*Lumines II*	PSP
November 7	*Call of Duty 3*	PS2, Xbox, Xbox 360
	Guitar Hero II	PS2
	Gears of War	Xbox 360
	SOCOM U.S. Navy SEALs: Combined Assault	PS2
	Tom Clancy's Splinter Cell: Double Agent	PC
	Tony Hawk's Project 8	PS2, Xbox, Xbox 360
November 13	*EverQuest II: Echoes of Faydwer*	PC
	Medieval 2: Total War	PC
	Yoshi's Island DS	NDS
November 14	*Final Fantasy III*	NDS
	Heroes of Might and Magic V: Hammers of Fate	PC
	Left Behind: Eternal Forces	PC
	Sonic the Hedgehog	Xbox 360
	Sonic the Hedgehog Genesis	GBA
	Tomb Raider: Legend	GBA, GCN, NDS
	Xiaolin Showdown	PS2, PSP
	Warhammer: Mark of Chaos	PC
	WWE SmackDown! vs. RAW 2007	PS2, Xbox 360
November 15	*Xiaolin Showdown*	Xbox
November 17	*Call of Duty 3*	PS3
	Marvel: Ultimate Alliance	PS3
	Resistance: Fall of Man	PS3
	Ridge Racer 7	PS3
	Tony Hawk's Project 8	PS3

November 19	*Call of Duty 3* (America)	Wii
	Excite Truck (America)	Wii
	Marvel: Ultimate Alliance (America)	Wii
	Red Steel (America)	Wii
	Rayman Raving Rabbids (America)	Wii
	Super Monkey Ball: Banana Blitz (America)	Wii
	The Legend of Zelda: Twilight Princess (America)	Wii
	Trauma Center: Second Opinion (America)	Wii
	Wii Sports (America)	Wii
November 20	*Tom Clancy's Rainbow Six: Vegas*	Xbox 360
	Superman Returns: The Videogame	GCN, PS2, Xbox 360, NDS
November 21	*The Elder Scrolls IV: Knights of the Nine*	PC
November 22	*Superman Returns*	PS2, X360, Xbox, NDS
	Tony Hawk's Project 8	PSP
November 28	*The Lord of the Rings: The Battle for Middle-earth II: The Rise of the Witch-king*	PC
	Tom Clancy's Splinter Cell: Double Agent	Wii
	Xiaolin Showdown	NDS
November 30	*Final Fantasy VI Advance* (Japan)	GBA
December 5	*Metal Gear Solid: Portable Ops*	PSP
	Star Trek: Legacy	PC
	WWE SmackDown! vs. RAW 2007	PSP
	Castlevania: Portrait of Ruin	NDS
December 13	*The Legend of Zelda: Twilight Princess*	GCN
December 29	*Ape Escape: Million Monkeys*	PS2

Hardware and software sales

United States

- Based on figures from the NPD Group:

Best-selling video games of 2006 in the US [32]

Place	Title	Console	Units sold
1	*Madden NFL 07*	PS2	1.8 million
2	*New Super Mario Bros.*	NDS	1.5 million
3	*Kingdom Hearts II*	PS2	1.5 million
4	*Gears of War*	X360	1 million
5	*Tom Clancy's Ghost Recon: Advanced Warfighter*	X360	913,000
6	*Final Fantasy XII*	PS2	895,000
7	*Grand Theft Auto: Liberty City Stories*	PS2	860,000
8	*NCAA Football 07*	PS2	849,000
9	*Madden NFL 07*	X360	826,000
10	*Brain Age: Train Your Brain in Minutes a Day!*	NDS	792,000

- Based on figures from the NPD Group via IGN;[33] the games' publishers are listed in brackets:

Best-selling video games of 2006 by platform[33]

Place	Nintendo DS[34]	Nintendo GameCube[35]	PC[36]
1	*New Super Mario Bros.* (Nintendo)	*Sonic Riders* (Sega)	*World of Warcraft* (Blizzard Entertainment)
2	*Pokémon Mystery Dungeon: Blue Rescue Team* (Nintendo)	*Naruto: Clash of Ninja* (D3 Publisher)	*The Sims 2: Open for Business* (Electronic Arts)
3	*Brain Age: Train Your Brain in Minutes a Day!* (Nintendo)	*Lego Star Wars II: The Original Trilogy* (LucasArts)	*The Sims 2* (Electronic Arts)
4	*Metroid Prime Hunters* (Nintendo)	*Cars* (THQ)	*The Elder Scrolls IV: Oblivion* (Bethesda Softworks)
5	*Super Princess Peach* (Nintendo)	*Madden NFL 07* (Electronic Arts)	*Star Wars: Empire at War* (LucasArts)
6	*Big Brain Academy* (Nintendo)	*Naruto: Clash of Ninja 2* (D3 Publisher)	*Age of Empires III* (Microsoft)
7	*Tetris DS* (Nintendo)	*Rampage: Total Destruction* (Midway Games)	*Civilization IV* (2K Games)
8	*Nintendogs: Dalmatian & Friends* (Nintendo)	*Over the Hedge* (Activision)	*The Sims 2: Nightlife* (Electronic Arts)
9	*Mario Hoops 3-on-3* (Nintendo)	*Harvest Moon: Magical Melody* (Natsume)	*Guild Wars Factions* (NCsoft)
10	*Pokémon Ranger* (Nintendo)	*Teen Titans* (Majesco)	*Zoo Tycoon 2* (Microsoft)

Place	PlayStation 2[37]	PlayStation 3[38]	Xbox[39]
1	*Madden NFL 07* (Electronic Arts)	*Resistance: Fall of Man* (Sony Computer Entertainment)	*Madden NFL 07* (Electronic Arts)
2	*Kingdom Hearts II* (Square Enix)	*Madden NFL 07* (Electronic Arts)	*Black* (Electronic Arts)
3	*Guitar Hero* (RedOctane)	*Call of Duty 3* (Activision)	*NCAA Football 07* (Electronic Arts)
4	*Final Fantasy XII* (Square Enix)	*Marvel: Ultimate Alliance* (Activision)	*MVP 06: NCAA Baseball* (Electronic Arts)
5	*NCAA Football 07* (Electronic Arts)	*Ridge Racer 7* (Namco Bandai)	*The Godfather: The Game* (Electronic Arts)
6	*Guitar Hero II* (RedOctane)	*Need for Speed: Carbon* (Electronic Arts)	*Fight Night Round 3* (Electronic Arts)
7	*MLB 06: The Show* (Sony Computer Entertainment)	*Tony Hawk's Project 8* (Activision)	*Major League Baseball 2K6* (2K Sports)
8	*Scarface: The World Is Yours* (Vivendi)	*NBA 2K7* (Sony Computer Entertainment)	*Lego Star Wars II: The Original Trilogy* (LucasArts)
9	*Lego Star Wars II: The Original Trilogy* (LucasArts)	*NBA 07* (Sony Computer Entertainment)	*Scarface: The World Is Yours* (Vivendi Games)
10	*Fight Night Round 3* (Electronic Arts)	*Untold Legends: Dark Kingdom* (Sony Online Entertainment)	*Tom Clancy's Ghost Recon Advanced Warfighter* (Ubisoft)

Place	Xbox 360[33]	Wii[40]
1	*Tom Clancy's Ghost Recon Advanced Warfighter* (Ubisoft)	*The Legend of Zelda: Twilight Princess* (Nintendo)
2	*Madden NFL 07* (Electronic Arts)	*Red Steel* (Ubisoft)
3	*Gears of War* (Microsoft)	*Super Monkey Ball: Banana Blitz* (Sega)
4	*The Elder Scrolls IV: Oblivion* (Bethesda Softworks / 2K Games)	*Rayman Raving Rabbids* (Ubisoft)
5	*Fight Night Round 3* (Electronic Arts)	*Call of Duty 3* (Activision)
6	*Saints Row* (THQ)	*Madden NFL 07* (Electronic Arts)
7	*Dead Rising* (Capcom)	*Trauma Center: Second Opinion* (Atlus)
8	*NCAA Football 07* (Electronic Arts)	*Marvel: Ultimate Alliance* (Activision)
9	*Call of Duty 3* (Activision)	*Excite Truck* (Nintendo)
10	*Tom Clancy's Splinter Cell: Double Agent* (Ubisoft)	*Dragon Ball Z: Budokai Tenkaichi 2* (Majesco)

Japan

- Based on figures from Enterbrain:

Best-selling video games of 2006 in Japan [41]

Place	Title	Console	Units sold
1	*Pokémon Diamond* and *Pearl*	NDS	4,302,815
2	*New Super Mario Bros.*	NDS	3,818,214
3	*Brain Training 2*	NDS	3,748,638
4	*Animal Crossing: Wild World*	NDS	2,485,264
5	*Final Fantasy XII*	PS2	2,322,329
6	*Brain Training*	NDS	1,991,116
7	*English Training*	NDS	1,529,618
8	*Mario Kart DS*	NDS	1,115,082
9	*Winning Eleven 10*	PS2	1,050,236
10	*Tetris DS*	NDS	985,246

Europe

- Based on estimates from Electronic Arts:

Video game console sales of 2006 in Europe[42] [43]

Place	Console	Units sold
1	Nintendo DS	6.4 million
2	PlayStation 2	6 million
3	PlayStation Portable	4 million
4	Xbox 360	2 million
5	Wii	0.7 million

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2007 in video gaming

List of years in video gaming (table)
… 1997 · 1998 · 1999 · 2000 · 2001 · 2002 · 2003 … 2004 2005 2006 **-2007-** 2008 2009 2010 … 2011 · 2012 · 2013 · 2014 · 2015 · 2016 · 2017 …
Related time period or subjects
… 2004 · 2005 · 2006 - **2007** - 2008 · 2009 · 2010 … … 1970s · 1980s · 1990s -**2000s**- 2010s · 2020s · 2030s … 20 century · **21 century** · 22 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Events

- March 14: Microsoft announces Games for Windows - Live, a version of Xbox Live for the Windows platform. The service launched on May 8.[1]
- March 27: Microsoft announces the new "Xbox 360 Elite" stock-keeping unit (SKU). The revision comes with a bigger hard drive and the ability to output HDMI it went on sale in April.[2]
- March 28: Nintendo and Sega announce *Mario & Sonic at the Olympic Games* for the Nintendo DS and Wii. This marks the first time Sonic and Mario have ever appeared in a video game together.
- April 11: Sony announces that they are discontinuing the 20 GB PlayStation 3 SKU, one of two SKUs available at the systems launch, leaving only the 60 GB SKU available for consumer purchase.[3]
- May 19: Blizzard Entertainment announces *StarCraft II* at Seoul, South Korea.[4]
- June 27: Nintendo announces WiiWare, a service similar to Xbox Live Arcade, that will allow developers to release original downloadable games for the Wii. Previously the only downloadable games available on the Wii have been limited to its Virtual Console program.[5]
- July 5: After an outpouring of complaints over faulty Xbox 360 hardware, Microsoft announces an extension for the Xbox 360's warranty that applies retroactively to all consumers who have purchased the console since launch.[6]
- August 29: Nokia reveals plans to revive its failing N-Gage brand in November; however, this time the line will not be a console, but rather a service players can download onto Nokia phones and/or PCs.[7]
- September 25: *Halo 3* is released and grosses US$170 million in a 24-hour period, a record for the highest grossing opening day in video game history.[8]
- September 26: Activision buys Bizarre Creations, developer of the *Project Gotham Racing* series.[9]
- October 5: Bungie announces its split with Microsoft to become an independent studio.[10]
- October 10: *The Orange Box* (A video game compilation that includes *Half-Life 2*, *Half-Life 2: Episode One*, *Half-Life 2: Episode Two*, *Portal* & Team Fortress 2*) is officially released in North America on gaming platforms: PC & Xbox 360.*
- October 11: Electronic Arts (EA) announces plans to buy VG Holding Corp., which owns both Pandemic Studios and Bioware, effectively making both companies subsidiaries.[11]
- November 6: EA closes down its EA Chicago studios.[12]
- December 19: 3D Realms releases teaser trailer for *Duke Nukem Forever*[13] after six years since the last trailer and eleven years since announcing the game.

Business

- July 10 to July 13 — E3 Media & Business Summit at several hotels and the Barker Hangar in Santa Monica, California, USA.
- August 23 to August 26 — the Leipzig Games Developers Convention in Leipzig, Germany.
- August 24 to August 26 — Penny Arcade Expo (PAX) at the Washington State Convention and Trade Center in Seattle, Washington, USA.
- September 20 to September 23 — Tokyo Game Show at the Makuhari Messe International Convention complex in Mihama-ku, Chiba, Japan.
- September 28 to September 30 — Digital Life at New York's Javits Center.
- October 18 to October 20 — E for All Expo at the Los Angeles Convention Center.
- November 2 to November 4 — Videogames Expo (VGXPO) at the Pennsylvania Convention Center in Philadelphia, Pennsylvania, USA.
- November 27 to November 28 — Montreal Games Summit at the Palais de Congress international convention.

Notable releases

Video game platforms

GBA	Game Boy Advance
GCN	Nintendo GameCube
Lin	Linux
Mac	Macintosh / Mac OS

NDS	Nintendo DS
PS2	PlayStation 2
PS3	PlayStation 3
PSP	PlayStation Portable

Wii	Wii
Win	Microsoft Windows
X360	Xbox 360

Release Date	Title	Systems
January 12	*Lost Planet: Extreme Condition*	Xbox 360, PlayStation 3, Microsoft Windows
January 15	*WarioWare: Smooth Moves*	Wii
January 16	*Phoenix Wright: Ace Attorney - Justice for All*	NDS
	World of Warcraft: The Burning Crusade	Mac, Win
January 22	*Hotel Dusk: Room 215*	NDS
January 30	*Rogue Galaxy*	PS2
	Battlestations: Midway	X360, Win
February 5	*Final Fantasy VI Advance*	GBA
February 6	*Winning Eleven: Pro Evolution Soccer 2007*	PS3, X360
	The Sims Life Stories	Win
February 12	*Wii Play*	Wii
	The Warriors	PSP
February 13	*Ratchet & Clank: Size Matters*	PSP
February 15	*Myst Online: Uru Live*	Win

February 20	*Maelstrom*	Win
	Supreme Commander	Win
	Crackdown	X360
	Sonic and the Secret Rings	Wii
	Virtua Fighter 5	PS3, X360
February 27	*Dance Dance Revolution Universe*	X360
	Bullet Witch	X360
March 1	*Tekken 5: Dark Resurrection*	PS3
March 5	*Wario: Master of Disguise*	NDS
March 6	*Def Jam: Icon*	PS3, X360
	MotorStorm	PS3
	Tom Clancy's Ghost Recon Advanced Warfighter 2	X360
March 13	*God of War II*	PS2
	Knights and Merchants: The Shattered Kingdom	Lin
	Spectrobes	NDS
March 19	*Custom Robo Arena*	NDS
March 20	*Silent Hunter 4: Wolves of the Pacific*	Win
	Armored Core 4	PS3, X360
	Cooking Mama: Cook Off	Wii
	After Burner: Black Falcon	PSP
	Kororinpa: Marble Mania	Wii
	Lost in Blue 2	NDS
March 23	*S.T.A.L.K.E.R.: Shadow of Chernobyl*	Win
March 27	*The Elder Scrolls IV: Shivering Isles*	X360, Win
March 28	*Command & Conquer 3: Tiberium Wars*	Win
April 3	*Final Fantasy Fables: Chocobo Tales*	NDS
	Guitar Hero II	X360
	SingStar Pop	PS2
	Enchanted Arms	PS3
March 30	*Penumbra: Overture*	Win
April 9	*Super Paper Mario*	Wii
April 22	*Pokémon Diamond and Pearl*	NDS
April 24	*The Lord of the Rings Online: Shadows of Angmar*	Win
May 8	*Command & Conquer 3: Tiberium Wars*	X360
May 15	*MLB 07: The Show*	PS2, PS3, PSP
	Etrian Odyssey	NDS
May 25	*Penumbra: Overture*	Lin

May 29	*Forza Motorsport 2*	X360
	Mario Party 8	Wii
	Shadowrun	X360, Win
May 31	*Halo 2 for Windows Vista*	Win
June 4	*Planet Puzzle League*	NDS
	Nintendo DS Browser	NDS
June 5	*Tomb Raider: Anniversary*	PS2, PSP, Win
June 7	*Ballistics*	Lin
June 11	*Big Brain Academy: Wii Degree*	Wii
June 12	*Scarface: The World Is Yours*	Wii
June 19	*Dirt*	X360, Win
	SimCity DS	NDS
	Resident Evil 4: Wii Edition	Wii
	Brothers in Arms DS	NDS
June 25	*Pokémon Battle Revolution*	Wii
	The Darkness	PS3, X360
	Overlord	X360, Win
July 3	*Ninja Gaiden Sigma*	PS3
July 17	*NCAA Football 08*	PS2, PS3, XB, X360
July 23	*Civilization IV: Beyond the Sword*	Win
July 30	*Mario Strikers Charged*	Wii
	Picross DS	NDS
August 7	*Mega Man Star Force*	NDS
August 14	*Heroes of Mana*	NDS
	Madden NFL 08	GCN, NDS, PS2, PS3, PSP, Wii, XB, X360, Win
	Luminous Arc	NDS
	Rune Factory: A Fantasy Harvest Moon	NDS
	Shin Megami Tensei: Persona 3	PS2
August 15	*Sam & Max Season One*	Win
August 20	*Brain Age 2: More Training in Minutes a Day!*	NDS
August 21	*BioShock*	X360, Win
August 27	*Metroid Prime 3: Corruption*	Wii
August 28	*Blue Dragon*	X360
	Dead Head Fred	PSP
	Medieval II: Total War Kingdoms	Win
	Warhawk	PS3
	Wild Arms 5	PS2
August 31	*Guild Wars: Eye of the North*	Win

September 4	*Lair*	PS3
	Medal of Honor: Airborne	PS3, X360, Win
September 7	*Stranglehold*	X360
September 10	*DK Jungle Climber*	NDS
	Drawn to Life	NDS
September 11	*Dirt*	PS3
	Jam Sessions	NDS
	NHL 08	PS2, PS3, X360, Win
September 12	*Heavenly Sword*	PS3
September 13	*Skate*	PS3, X360
September 17	*Eternal Sonata*	X360
September 18	*Sonic Rush Adventure*	NDS
	Dewy's Adventure	Wii
	World in Conflict	Win
	MySims	NDS, Wii
	Warriors Orochi	PS2
September 24	*Company of Heroes: Opposing Fronts*	Win
September 25	*Halo 3*	X360
	The Settlers: Rise of an Empire	Win
	Dance Dance Revolution: Hottest Party	Wii
October 1	*The Legend of Zelda: Phantom Hourglass*	NDS
October 2	*Chibi-Robo: Park Patrol*	NDS
	Project Gotham Racing 4	X360
	Enemy Territory: Quake Wars	Win
October 9	*Folklore (video game)*	PS3
	Looney Tunes: Duck Amuck	NDS
	Bleach: The Blade of Fate	NDS
	Final Fantasy Tactics: The War of the Lions	PSP
	FIFA Soccer 08	NDS, PS2, Wii, X360, Win
October 10	*The Orange Box*	X360, Win
October 15	*Flash Focus: Vision Training in Minutes a Day*	NDS

October 16	*Tony Hawk's Proving Ground*	NDS, PS2, PS3, Wii, X360
	Beautiful Katamari	X360
	Clive Barker's Jericho	PS3, X360, Win
	Zack & Wiki: Quest for Barbaros' Treasure	Wii
	Front Mission	NDS
	Phoenix Wright: Ace Attorney - Trials and Tribulations	NDS
	Ace Combat 6: Fires of Liberation	X360
	Microsoft Flight Simulator X: Acceleration	Win
	Painkiller: Overdose	Win
	Mega Man ZX Advent	NDS
October 17	*Zoo Tycoon 2: Extinct Animals*	PC
October 19	*Enemy Territory: Quake Wars*	Lin
October 28	*Guitar Hero III: Legends of Rock*	PS2, PS3, Wii, X360, Mac, Win
October 29	*Battalion Wars 2*	Wii
October 30	*Ratchet & Clank Future: Tools of Destruction*	PS3
	The Simpsons Game	NDS, PS2, PS3, Wii, X360
	Naruto: Rise of a Ninja	X360
	Hellgate: London	Win
	Manhunt 2	PS2, PSP, Wii
	The Witcher	Win
November 2	*Tabula Rasa*	Win
November 5	*Call of Duty 4: Modern Warfare*	NDS, PS3, X360, Win
	Fire Emblem: Radiant Dawn	Wii
November 6	*Mario & Sonic at the Olympic Games*	Wii
	Lego Star Wars: The Complete Saga	X360, PS3, Wii, NDS
Dragon Quest Monsters: Joker	NDS	
November 9	*Empire Earth III*	Win
	Cooking Mama 2: Dinner with Friends	NDS
November 12	*Super Mario Galaxy*	Wii
November 13	*Medal of Honor: Heroes 2*	Wii
	Resident Evil: The Umbrella Chronicles	Wii
	Contra 4	NDS
	Sonic Rivals 2	PSP
November 14	*Need for Speed: ProStreet*	Wii, PS2, PS3, PSP, X360, Win
	Kane & Lynch: Dead Men	PS3, X360, Win
November 15	*Crysis*	Win
November 16	*SimCity Societies*	Win
	Assassin's Creed	PS3, X360
	Lego Star Wars: The Complete Saga	Wii, NDS

November 19	*Mario Party DS*	NDS
	Uncharted: Drake's Fortune	PS3
	Unreal Tournament 3	Win
November 20	*Mass Effect*	X360
	Final Fantasy XII: Revenant Wings	NDS
	Rock Band	PS3, X360
	Time Crisis 4	PS3
November 26	*Master of Illusion*	NDS
December 12	*Universe at War: Earth Assault*	Win
December 18	*Nights: Journey of Dreams*	Wii

Hardware and software sales

Europe

- Based on estimates from Electronic Arts:

Video game console sales of 2007 in Europe[14] [15]

Place	Console	Units sold
1	Nintendo DS	8.7 million
2	Wii	4.8 million
3	PlayStation 2	3.8 million
4	PlayStation Portable	3.1 million
5	PlayStation 3	2.8 million
6	Xbox 360	1.9 million

Japan

- Based on figures from Enterbrain:

Video game console sales of 2007 in Japan[16] [17] [18] [19]

Place	Console	Units sold
1	Nintendo DS	7,143,702
2	Wii	3,629,361
3	PSP	3,022,659
4	PlayStation 3	1,206,347
5	PlayStation 2	816,419[20]
6	Xbox 360	257,841

Best-selling video games of 2007 in Japan[17] [21] [22]

Place	Title	Console	Units sold
1	*Wii Sports*	Wii	1,911,520
2	*Monster Hunter Portable 2*	PSP	1,489,898
3	*Wii Play*	Wii	1,487,484
4	*Pokémon Mystery Dungeon: Explorers of Time* and *Explorers of Darkness*	NDS	1,256,516
5	*Mario Party DS*	NDS	1,232,644
6	*New Super Mario Bros.*	NDS	1,176,939
7	*Pokémon Diamond* and *Pearl*	NDS	1,094,389
8	*Mario Party 8*	Wii	1,053,934
9	*Dragon Quest IV*	NDS	1,052,827
10	*Brain Age 2: More Training in Minutes a Day!*	NDS	1,033,933

North America

- Based on figures from the NPD Group via IGN;[23] [24] the games' publishers are listed in brackets:

Best-selling video games of 2007 in North America (by platform)

Place	Nintendo DS[25]	PC[26]	PlayStation 2[27]
1	*Pokémon Diamond* (Nintendo)	*World of Warcraft: The Burning Crusade* (Blizzard Entertainment)	*Madden NFL 08* (Electronic Arts)
2	*Pokémon Pearl* (Nintendo)	*The Sims 2: Seasons* (Electronic Arts)	*God of War II* (Sony Computer Entertainment)
3	*The Legend of Zelda: Phantom Hourglass* (Nintendo)	*Command & Conquer 3: Tiberium Wars* (Electronic Arts)	*Guitar Hero III: Legends of Rock* (RedOctane)
4	*Diddy Kong Racing* (Nintendo)	*The Sims 2: Bon Voyage* (Electronic Arts)	*Guitar Hero Encore: Rocks the 80s* (RedOctane)
5	*Brain Age 2: More Training in Minutes a Day!* (Nintendo)	*Supreme Commander* (THQ)	*MLB 07: The Show* (Sony Computer Entertainment)
6	*Spectrobes* (Disney Interactive)	*The Lord of the Rings Online: Shadows of Angmar* (Midway)	*Spider-Man 3* (Activision)
7	*High School Musical: Makin' the Cut!* (Disney Interactive)	*The Orange Box* (Valve)	*NCAA Football 08* (Electronic Arts)
8	*MySims* (Electronic Arts)	*Call of Duty 4: Modern Warfare* (Activision)	*Transformers: The Game* (Activision)
9	*Paws and Claws: Pet Vet* (THQ)	*BioShock* (2K Games)	*Grand Theft Auto: Vice City Stories* (Rockstar Games)
10	*Mario Party DS* (Nintendo)	*The Sims 2: H&M Fashion Stuff* (Electronic Arts)	*Naruto: Ultimate Ninja 2* (Bandai)

Place	PlayStation 3[28]	PlayStation Portable[29]
1	*Madden NFL 08* (Electronic Arts)	*MLB 07: The Show* (Sony Computer Entertainment)
2	*Call of Duty 4: Modern Warfare* (Activision)	*Madden NFL 08* (Electronic Arts)
3	*Assassin's Creed* (Ubisoft)	*Ratchet & Clank: Size Matters* (Sony Computer Entertainment)
4	*MotorStorm* (Sony Computer Entertainment)	*Transformers: The Game* (Activision)
5	*Guitar Hero III: Legends of Rock* (RedOctane)	*Final Fantasy Tactics: The War of the Lions* (Square Enix)
6	*Tom Clancy's Rainbow Six: Vegas* (Ubisoft)	*300: March to Glory* (Warner Bros. Interactive)
7	*NCAA Football 08* (Electronic Arts)	*Call of Duty: Roads to Victory* (Activision)
8	*Heavenly Sword* (Sony Computer Entertainment)	*Major League Baseball 2K7* (2K Games)
9	*Ninja Gaiden Sigma* (Tecmo)	*Tom Clancy's Rainbow Six: Vegas* (Ubisoft)
10	*The Elder Scrolls IV: Oblivion* (Bethesda Softworks)	*Ghost Rider* (2K Games)

Place	Wii[30]	Xbox 360[24]
1	*Wii Play* (Nintendo)	*Halo 3* (Microsoft)
2	*Mario Party 8* (Nintendo)	*Call of Duty 4: Modern Warfare* (Activision)
3	*Super Mario Galaxy* (Nintendo)	*Guitar Hero II* (RedOctane)
4	*Super Paper Mario* (Nintendo)	*Madden NFL 08* (Electronic Arts)
5	*Guitar Hero III: Legends of Rock* (Red Octane)	*Assassin's Creed* (Ubisoft)
6	*WarioWare: Smooth Moves* (Nintendo)	*BioShock* (2K Games)
7	*Metroid Prime 3: Corruption* (Nintendo)	*Crackdown* (Microsoft)
8	*Resident Evil 4: Wii Edition* (Capcom)	*Guitar Hero III: Legends of Rock* (RedOctane)
9	*Mario Strikers Charged* (Nintendo)	*Tom Clancy's Ghost Recon Advanced Warfighter 2* (Ubisoft)
10	*Pokémon Battle Revolution* (Nintendo)	*Lost Planet: Extreme Condition* (Capcom)

United Kingdom

- Based on figures from Chart-Track:

Best-selling video games of 2007 in the UK[31] [32] [33] [34]

Place	Title	Publisher	Units sold
1	*FIFA 08*	Electronic Arts	1,391,435
2	*Dr Kawashima's Brain Training: How Old is Your Brain?*	Nintendo	1,016,558
3	*Call of Duty 4: Modern Warfare*	Activision	935,044
4	*Pro Evolution Soccer 2008*	Konami	787,382
5	*More Brain Training from Dr Kawashima*	Nintendo	760,225
6	*Halo 3*	Microsoft	735,176
7	*The Simpsons Game*	Electronic Arts	734,595
8	*Wii Play*	Nintendo	688,002
9	*Assassin's Creed*	Ubisoft	670,286
10	*WWE SmackDown vs. Raw 2008*	THQ	563,121

Best-selling video games of 2007 in the UK (by platform)[35]

The games' publishers are listed in brackets:

Place	Nintendo DS	PlayStation 2	PlayStation 3
1	*Dr Kawashima's Brain Training: How Old is Your Brain?* (Nintendo)	*FIFA 08* (Electronic Arts)	*Resistance: Fall of Man* (Sony Computer Entertainment)
2	*More Brain Training from Dr Kawashima* (Nintendo)	*Pro Evolution Soccer 2008* (Konami)	*MotorStorm* (Sony Computer Entertainment)
3	*New Super Mario Bros.* (Nintendo)	*The Simpsons Game* (Electronic Arts)	*Call of Duty 4: Modern Warfare* (Activision)
4	*Cooking Mama* (505 Games)	*Final Fantasy XII* (Square Enix)	*FIFA 08* (Electronic Arts)
5	*Big Brain Academy* (Nintendo)	*High School Musical: Sing It!* (Disney)	*Assassin's Creed* (Ubisoft)
6	*Pokémon Diamond* (Nintendo)	*WWE SmackDown vs. Raw 2008* (THQ)	*Pro Evolution Soccer 2008* (Konami)
7	*42 All-Time Classics* (Nintendo)	*Need for Speed: ProStreet* (Electronic Arts)	*Formula One Championship Edition* (Sony Computer Entertainment)
8	*Nintendogs: Labrador & Friends* (Nintendo)	*Spider-Man 3* (Activision)	*Need for Speed: ProStreet* (Electronic Arts)
9	*Sonic Rush* (Sega)	*Grand Theft Auto: Vice City Stories* (Rockstar Games)	*Uncharted: Drake's Fortune* (Sony Computer Entertainment)
10	*Zoo Tycoon DS* (THQ)	*Transformers: The Game* (Activision)	*WWE SmackDown vs. Raw 2008* (THQ)

Place	PlayStation Portable	Wii	Xbox 360
1	*Grand Theft Auto: Vice City Stories* (Rockstar Games)	*Wii Play* (Nintendo)	*Halo 3* (Microsoft)
2	*FIFA 08* (Electronic Arts)	*Mario & Sonic at the Olympic Games* (Sega)	*Call of Duty 4: Modern Warfare* (Activision)
3	*Sega Mega Drive Collection* (Sega)	*Big Brain Academy: Wii Degree* (Nintendo)	*Assassin's Creed* (Ubisoft)
4	*Pro Evolution Soccer 6* (Konami)	*Super Mario Galaxy* (Nintendo)	*Forza Motorsport 2* (Microsoft)
5	*Grand Theft Auto: Liberty City Stories* (Rockstar Games)	*Mario Party 8* (Nintendo)	*FIFA 08* (Electronic Arts)
6	*Sonic Rivals* (Sega)	*WarioWare: Smooth Moves* (Nintendo)	*Pro Evolution Soccer 2008* (Konami)
7	*The Simpsons Game* (Electronic Arts)	*The Legend of Zelda: Twilight Princess* (Nintendo)	*Crackdown* (Microsoft)
8	*FIFA 07* (Electronic Arts)	*Mario Strikers Charged Football* (Nintendo)	*Gears of War* (Microsoft)
9	*Midnight Club 3: Dub Edition* (Rockstar Games)	*Sonic and the Secret Rings* (Sega)	*Lost Planet: Extreme Condition* (Capcom)
10	*Need for Speed: Carbon* (Electronic Arts)	*Resident Evil 4* (Capcom)	*BioShock* (2K Games)

United States

- Based on figures from the NPD Group:

Video game console sales of 2007 in the US[36] [37] [38]

Place	Console	Units sold
1	Nintendo DS	8.50 million
2	Wii	6.29 million
3	Xbox 360	4.62 million
4	PlayStation 2	3.97 million
5	PSP	3.82 million
6	PlayStation 3	2.56 million

Best-selling video games of 2007 in the US[37] [38] [39]

Place	Title	Console	Units sold
1	*Halo 3*	X360	4.82 million
2	*Wii Play*	Wii	4.12 million
3	*Call of Duty 4: Modern Warfare*	X360	3.04 million
4	*Guitar Hero III: Legends of Rock* with guitar	PS2	2.72 million
5	*Super Mario Galaxy*	Wii	2.52 million
6	*Pokémon Diamond*	NDS	2.48 million
7	*Madden NFL 08*	PS2	1.90 million
8	*Guitar Hero II* with guitar	PS2	1.89 million
9	*Assassin's Creed*	X360	1.87 million
10	*Mario Party 8*	Wii	1.82 million

Best-selling video games of all time in the US (as of September 25, 2007)[40]

Place	Title	Units sold
1	*Grand Theft Auto: San Andreas*	8.6 million
2	*Madden NFL 07*	7.4 million
3	*Grand Theft Auto: Vice City*	6.8 million
4	*Madden NFL 06*	6.5 million
5	*Halo 2*	6.3 million
6	*Namco Museum*	6.2 million
7	*Super Mario 64*	6.0 million
8	*Madden NFL 2005*	5.9 million
9	*Grand Theft Auto III*	5.7 million
10	*Tony Hawk's Pro Skater 2*	5.3 million

Success

Both GameTrailers and ScrewAttack have called and listed 2007 as the best year in gaming history due to so many memorable releases of well received games.

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2008 in video gaming

List of years in video gaming (table)
… 1998 · 1999 · 2000 · 2001 · 2002 · 2003 · 2004 … 2005 2006 2007 **-2008-** 2009 2010 2011 … 2012 · 2013 · 2014 · 2015 · 2016 · 2017 · 2018 …
Related time period or subjects
… 2005 · 2006 · 2007 - **2008** - 2009 · 2010 · 2011 … … 1970s · 1980s · 1990s -**2000s**- 2010s · 2020s · 2030s … 20 century · **21 century** · 22 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

Notable events of **2008 in video gaming**. See also history of video games. The release dates listed in this article are the games' original release dates.

Events

- May 28: Ubisoft announces *Beyond Good & Evil 2* during the end of Ubidays at the Carrousel du Louvre in Paris, France, along with a teaser trailer featuring the game's first-two main characters: Pey'j and (possibly, though never focused clearly) Jade.
- June 28: Blizzard Entertainment announces *Diablo III* at Paris, France.
- November 13: Zeebo was announced. The console is aiming for developing countries.
- March 10, 2009: 5th British Academy Video Games Awards, honoring achievement for video games released in late 2007 and 2008.

Notable releases

- January 31 - *Super Smash Bros. Brawl*, the successor to the Nintendo GameCube's best-selling game, *Super Smash Bros. Melee*,[1] [2] was released in Japan for the Wii. The game is a joint cooperation between former rival companies, Nintendo and Sega, along with the help of Konami.[3] [4] It is the first Wii game to strongly support online play.[5] It dominated sales during its first week in Japan and the United States, selling 820,000 in Japan and becoming the fastest-selling video game in Nintendo of America's history with 1.4 million sold in the US.[6] [7] [8]
- April 29 - *Grand Theft Auto IV* was released simultaneously for both the PlayStation 3 and Xbox 360. A few Hollywood producers have set precedent by beginning to browse video game release dates to check for conflicts due to *Grand Theft Auto IV*'s potential harm to the May 2, 2008 release of *Iron Man*.[9] The PS3 and Xbox 360 version has taken the second and fourth positions of Game Rankings' best-rated games of all time, respectively;[10] as well as being the first console game since 1999 to receive a perfect rating from IGN,[11] and the first title to receive a perfect rating from GameSpot since 2001.[12] It Received 98% from metacritic (Which makes it the Highest Rated Game in the site).
- June 12 - *Metal Gear Solid 4: Guns of the Patriots* for the PlayStation 3 was released to critical acclaim, earning also a 10 out of 10 from both IGN and GameSpot,[13] [14] and a 94% Metacritic rating.[15] As of June 26, 2008, the game has shipped 3 million copies worldwide,[16] [17] selling 1 million in Europe[18] over 500,000 in Japan,[19] and 1 million in the US.[20]
- November 13 - Blizzard Entertainment releases the anticipated *World of Warcraft: Wrath of the Lich King* expansion set for the popular *World of Warcraft* computer game (MMORPG)[21] to critical acclaim. It sold 2.8 million copies within the first 24 hours of availability. This makes it the fastest selling computer game of all time.[22]

Business

- July 15 to July 17 - E3 2008 at the Los Angeles Convention Center in Los Angeles, California, United States.
- July 31 to August 3 - QuakeCon 2008 at the Hilton Anatole in Dallas, Texas, U.S.A.
- October 2 to October 4 - Nintendo conference held in San Francisco, USA and Tokyo, Japan.
- December 1 - National Amusements' Sumner Redstone sells his controlling stake in Midway Games to private investor Mark Thomas, for $100,000 ($0.0012 a share), and assumes $70 million of senior secured and unsecured debt.[23]
- December 9 - Infogrames, Atari's parent company, purchases Cryptic Studios.[24]

Open to the public

- August 21 to August 24 - Games Convention in Leipzig, Germany.
- October 3 to October 5 - E for All at the Los Angeles Convention Center in Los Angeles, U.S.A.
- October 9 to October 12 - Tokyo Game Show at the Makuhari Messe International Convention in Mihama-ku, Chiba, Japan.[25]
- October 9 to October 12 - Games Convention Asia in Singapore.
- October 10 to October 11 - Blizzcon 2008 in Anaheim, California, U.S.A.

Releases

Video game platforms

iPod	iPod
Lin	Linux
Mac	Macintosh / Mac OS
NDS	Nintendo DS

PS2	PlayStation 2
PS3	PlayStation 3
PSP	PlayStation Portable
Wii	Wii

Win	Microsoft Windows
X360	Xbox 360
Xbox	Xbox

Release date	Title	Platform(s)
January 3	*Rune Factory 2: A Fantasy Harvest Moon*	NDS
January 8	*Harvey Birdman: Attorney at Law*	PS2, PSP, Wii
	Sonic Riders: Zero Gravity	PS2, Wii
January 15	*CSI: Hard Evidence*	Wii
	Nanostray 2	NDS
	Nitrobike	Wii
January 16	*Rail Simulator*	Win
January 17	*Mario & Sonic at the Olympic Games*	NDS
January 21	*Advance Wars: Days of Ruin*	NDS
January 22	*Burnout Paradise*	PS3, X360
	No More Heroes	Wii
	Pirates of the Burning Sea	Win

January 31	*Disgaea 3: Absence of Justice*	PS3
	Super Smash Bros. Brawl (Japan)	Wii
	We Ski	Wii
February 4	*Sins of a Solar Empire*	Win
	Zoo Tycoon 2 DS	NDS
February 5	*Assassin's Creed: Altaïr's Chronicles*	NDS
	Devil May Cry 4	PS3, X360
	Turok	PS3, X360
February 7	*L the Prologue to Death Note -Rasen no Wana-*	NDS
	The Club	PS3, Win, X360
February 8	*Agatha Christie: And Then There Were None*	Wii
February 12	*Conflict: Denied Ops*	PS3, Win, X360
	Dark Messiah of Might and Magic	X360
	Penumbra: Black Plague	Lin, Win
February 18	*MX vs. ATV: Untamed*	Wii
	Need for Speed: ProStreet	PSP
February 19	*Etrian Odyssey II: Heroes of Lagaard*	NDS
	The History Channel: Battle for the Pacific	PS3
February 21	*Lost Planet: Extreme Condition*	PS3
	Space Invaders Extreme	NDS, PSP
February 25	*Destroy All Humans! Big Willy Unleashed*	Wii
	Frontlines: Fuel of War	Win, X360
February 26	*Lost: Via Domus*	PS3, Win, X360
	Turning Point: Fall of Liberty	PS3, Win, X360
	Universe at War: Earth Assault	X360
February 28	*The Idolmaster: Live For You!*	X360
	The Sims 2: FreeTime	Win
March 3	*Bully: Scholarship Edition*	Wii, X360
	Major League Baseball 2K8	PS2, PS3, PSP, Wii, X360
	Super Dodgeball Brawlers	NDS
March 4	*Army of Two*	PS3, X360
	God of War: Chains of Olympus	PSP
	MLB 08: The Show	PS2, PS3, PSP
	Ninja Reflex	Wii
	Silent Hill: Origins	PS2
March 5	*Harvest: Massive Encounter*	Mac, Win
	Warhammer 40,000: Dawn of War: Soulstorm	Win
March 6	*Yakuza: Kenzan!*	PS3
March 9	*Super Smash Bros. Brawl (US)*	Wii

March 10	*Worms: A Space Oddity*	Wii
March 11	*Condemned 2: Bloodshot*	PS3, X360
	Insecticide	NDS, Win
	Ratchet & Clank: Size Matters	PS2
	The House of the Dead 2 & 3 Return	Wii
March 18	*Enemy Territory: Quake Wars*	Mac
	Pro Evolution Soccer 2008	Wii
	Sega Superstars Tennis	NDS, PS2, PS3, Wii, X360
	Target: Terror	Wii
	Tom Clancy's Rainbow Six: Vegas 2	PS3, Win, X360
March 19	*Deca Sports*	Wii
	SimCity DS 2	NDS
March 20	*Pokémon Ranger: Shadows of Almia*	NDS
	Ys I	NDS
	Ys II	NDS
March 24	*Command & Conquer 3: Kane's Wrath*	Win, X360
March 25	*ObsCure II*	Wii
March 28		
	Dark Sector	PS3, X360
	Ninja Gaiden Dragon Sword	NDS
	Viking: Battle for Asgard	PS3, X360
April 1	*Brothers in Arms: Road to Hill 30*	Wii
April 2	*Star Ocean: Second Evolution*	PSP
April 8	*Assassin's Creed*	Win
	Baroque	Wii
	Supreme Commander	X360
April 10	*Mario Kart Wii*	Wii
April 15	*Ōkami*	Wii
	Teenage Zombies: Invasion of the Alien Brain Thingys!	NDS
April 22	*Turok*	Win
April 24	*Valkyria Chronicles*	PS3
April 25	*King's Bounty: The Legend*	Win
April 29	*Grand Theft Auto IV*	PS3, X360
April 30	*Galactic Civilizations II: Twilight of the Arnor*	Win
May 2	*Iron Man*	NDS, PS2, PS3, PSP, Wii, Win, X360
May 5	*Crosswords DS*	NDS
May 6	*Boom Blox*	Mobile, Wii
	Speed Racer	NDS, Wii
May 13	*Drone Tactics*	NDS
	The Chronicles of Narnia: Prince Caspian	NDS, PS2, PS3, PSP, Wii, Win, X360

May 15	*Luminous Arc 2: Will*	NDS
May 17	*Monster Madness: Grave Danger*	PS3
May 20	*Age of Conan: Hyborian Adventures*	Win
May 21	*Penny Arcade Adventures: On the Rain-Slick Precipice of Darkness*	Lin, Mac, Win, X360
May 23	*Haze*	PS3
May 27	*Emergency Heroes*	Wii
	Enemy Territory: Quake Wars	PS3, X360
May 28	*Mass Effect*	Win
May 30	*Race Driver: GRID*	PS3, Win, X360
June 3	*Kung Fu Panda*	NDS, PS2, PS3, Wii, Win, X360
	Lego Indiana Jones: The Original Adventures	NDS, PS2, PS3, PSP, Wii, Win, X360
	Ninja Gaiden II	X360
	Robert Ludlum's The Bourne Conspiracy	PS3, X360
June 5	*Dragon Ball Z: Burst Limit*	PS3, X360
	Fushigi no Dungeon - Furai no Shiren 3: Karakuri Yashiki no Nemuri Hime	Wii
	The Incredible Hulk	NDS, PS2, PS3, Wii, X360
June 10	*Don King Presents: Prizefighter*	X360
	NASCAR 09	PS2, PS3, X360
	The Incredible Hulk	Win
June 12	*Metal Gear Solid 4: Guns of the Patriots*	PS3
June 13	*Civilization Revolution*	PS3, X360
June 17	*Supreme Ruler 2020*	Win
June 19	*Mario Super Sluggers*	Wii
June 20	*Alone in the Dark*	PS2, Wii, Win, X360
	Top Spin 3	PS3, Wii, X360
June 22	*Guitar Hero: On Tour*	NDS
	Rock Band	Wii
June 23	*Battlefield: Bad Company*	PS3, X360
	Top Spin 3	NDS
June 24	*WALL-E*	NDS, PS2, PS3, PSP, Wii, Win, X360
	Big Beach Sports	Wii
June 25	*Happy Tree Friends: False Alarm*	X360
June 26	*Disgaea DS: Prince of the Demon World and the Red Moon*	NDS
	Tales of Symphonia: Dawn of the New World	Wii
June 29	*Guitar Hero: Aerosmith*	PS2, PS3, Wii, X360
July 1	*Trauma Center: Under the Knife 2*	NDS
July 3	*Initial D Extreme Stage*	PS3
	Nanashi no Game	NDS
	Unreal Tournament 3	X360

July 7	*Song Summoner: The Unsung Heroes*	iPod
July 8	*Civilization Revolution*	NDS
	Devil May Cry 4	Win
July 10	*Resident Evil Zero*	Wii
	Shin Megami Tensei: Persona 4	PS2
July 11	*Dynasty Warriors 6*	Win
July 14	*Major League Eating: The Game*	Wii
July 15	*NCAA Football 09*	PS2, PS3, PSP, Wii, X360
	Space Chimps	NDS, PS2, Wii, Win, X360
July 17	*Dragon Quest V: Hand of the Heavenly Bride*	NDS
	Tears to Tiara: Kakan no Daichi	PS3
July 24	*Siren: Blood Curse*	PS3
	Wario Land: The Shake Dimension	Wii
July 29	*MLB Power Pros 2008*	PS2, Wii
	Soulcalibur IV	PS3, X360
July 31	*Fatal Frame IV*	Wii
	Phantasy Star Portable	PSP
	Rhythm Heaven	NDS
August 1	*Race Driver: GRID*	NDS
August 7	*Fire Emblem: Shadow Dragon*	NDS
	Tales of Vesperia	X360
August 12	*Space Siege*	Win
August 13	*Madden NFL 09*	NDS, PS2, PS3, PSP, Wii, X360, Xbox
August 19	*Too Human*	X360
August 21	*Ratchet & Clank Future: Quest for Booty*	PS3
	Sigma Harmonics	NDS
August 22	*Inazuma Eleven*	NDS
August 25	*MLB Power Pros 2008*	NDS
August 26	*The Sims 2: Apartment Life*	Win
	The Sims 2: Apartment Pets	NDS
	Tiger Woods PGA Tour 09	PS2, PS3, PSP, Wii, X360
August 28	*Afrika*	PS3
	Captain Rainbow	Wii
August 31	*Mercenaries 2: World in Flames*	PS2, PS3, Win, X360
September 2	*Infinite Undiscovery*	X360
	Viva Piñata: Trouble in Paradise	X360
September 4	*Blue Dragon Plus*	NDS

September 5	*FaceBreaker*	PS3, X360
	S.T.A.L.K.E.R.: Clear Sky	Win
	Spore	Mac, mobile, NDS, Win
	Viva Piñata: Pocket Paradise	NDS
September 8	*NHL 2K9*	PS2, PS3, Wii, X360
September 9	*NHL 09*	PS3, X360
	TNA iMPACT!	PS2, PS3, Wii, X360
September 11	*One Piece: Unlimited Cruise: Episode 1*	Wii
September 12	*Crysis Warhead*	Win
September 13	*Pokémon Platinum*	NDS
September 14	*Rock Band 2*	X360
September 16	*Dance Dance Revolution Hottest Party 2*	Wii
	Dance Dance Revolution X	PS2
	Star Wars: The Force Unleashed	NDS, PS2, PS3, PSP, Wii, X360
	The Witcher: Enhanced Edition	Win
	Pure	PS3, X360, Win
September 18	*Dragon Ball: Origins*	NDS
	Eternal Sonata	PS3
	Warhammer Online: Age of Reckoning	Win
September 22	*Civilization IV: Colonization*	Win
	De Blob	NDS, Wii, Win
	Kirby Super Star Ultra	NDS
	SimCity Creator	Wii
September 23	*Brothers in Arms: Double Time*	Wii
	Brothers in Arms: Hell's Highway	PS3, Win, X360
	Lego Batman: The Video Game	NDS, PS2, PS3, PSP, Wii, Win, X360
September 25	*Aquanaut's Holiday: Hidden Memories*	PS3
	Cross Edge	PS3
	Disaster: Day of Crisis	Wii
	Sands of Destruction	NDS
	World Destruction: Michibikareshi Ishi	NDS
September 30	*Silent Hill: Homecoming*	PS3, Win, X360
	Sonic Chronicles: The Dark Brotherhood	NDS
October 2	*Dynasty Warriors 6*	PS2
	Ikki Tousen: Eloquent Fist	PSP

October 7	*Crash: Mind over Mutant*	NDS, PS2, PSP, Wii, X360
	Fracture	PS3, X360
	NBA Live 09	PS2, PS3, PSP, Wii, X360
	NBA 2K9	PS2, PS3, Wii, X360
	Spectrobes: Beyond the Portals	NDS
October 9	*Macross Ace Frontier*	PSP
October 13	*Blitz: The League II*	PS3, X360
October 14	*Dead Space*	PS3, X360
	FIFA 09	Mobile, NDS, PS2, PS3, PSP, Wii, Win, X360
	Rock Revolution	NDS, PS3, Wii, X360
	Saints Row 2	PS3, X360
	SOCOM: U.S. Navy SEALs Confrontation	PS3
	Golden Axe: Beast Rider	PS3, X360
	Boogie Superstar	Wii
October 16	*Culdcept DS*	NDS
	Wii Music	Wii
	X3: Terran Conflict	Win
October 19	*Rock Band 2*	PS3
October 20	*Midnight Club: Los Angeles*	PS3, X360, PSP
	NHL 09	Win
	Dead Space	Win
October 21	*Bully: Scholarship Edition*	Win
	BioShock	PS3
	Castlevania: Order of Ecclesia	NDS
	Dance Dance Revolution Universe 3	X360
	Far Cry 2	PS3, Win, X360
	Fable II	X360
	Spider-Man: Web of Shadows	NDS, PS2, PS3, PSP, Wii, Win, X360
	The Legend of Spyro: Dawn of the Dragon	NDS, PS2, PS3, Wii, X360
	NBA 2K9	Win
	What's Cooking? with Jamie Oliver	NDS
October 26	*Guitar Hero World Tour*	Mac, PS2, PS3, Wii, Win, X360
October 27	*MySims Kingdom*	NDS, Wii
October 28	*Command & Conquer: Red Alert 3*	Win
	Fallout 3	PS3, Win, X360
	Goosebumps HorrorLand	NDS, PS2, Wii
	LittleBigPlanet	PS3
	MotorStorm: Pacific Rift	PS3
	MySims	Win

October 29	*Penny Arcade Adventures: On the Rain-Slick Precipice of Darkness - Episode 2*	Lin, Mac, Win, X360
October 30	*Valkyrie Profile: Covenant of the Plume*	NDS
	Thunder Force VI	PS2
October 31	*Don King Presents: Prizefighter*	NDS, Wii
	Quantum of Solace	NDS, PS2, PS3, Wii, Win, X360
November 3	*Legendary*	PS3, Win, X360
November 4	*Naruto: Ultimate Ninja Storm*	PS3
	Tom Clancy's EndWar	NDS, PS3, PSP, X360
	Resistance 2	PS3
November 7	*Gears of War 2*	X360
	Men of War	Win
	Sacred 2 Fallen Angel	Win
November 11	*Banjo-Kazooie: Nuts & Bolts*	X360
	Call of Duty: World at War	NDS, PS3, Wii, Win, X360, PS2
	Command & Conquer: Red Alert 3	X360
	FaceBreaker	Wii
	Mirror's Edge	PS3, X360
	WWE SmackDown vs. Raw 2009	Mobile, NDS, PS2, PS3, PSP, Wii, X360
	Star Wars: The Clone Wars - Lightsaber Duels	Wii
	Star Wars: The Clone Wars - Jedi Alliance	NDS
	Tecmo Bowl: Kickoff	NDS
November 12	*Pro Evolution Soccer 2009*	PS2, PS3, PSP, Wii, Win, X360
November 13	*World of Warcraft: Wrath of the Lich King*	Win, Mac
November 14	*Football Manager 2009*	Win, Mac, PSP
November 16	*Animal Crossing: City Folk*	Wii
	Mortal Kombat vs. DC Universe	PS3, X360
	Shaun White Snowboarding	PS3, Wii, Win, X360
November 17	*Guitar Hero On Tour: Decades*	NDS
	Skate It	NDS, Wii
November 18	*Alone in the Dark: Inferno*	PS3
	Ultimate Band	NDS, Wii
	Castlevania Judgment	Wii
	Left 4 Dead	Win, X360
	Need for Speed: Undercover	Mobile, PS2, PS3, PSP, Wii, Win, X360
	Sonic Unleashed	PS2, PS3, Wii, X360
	Tomb Raider: Underworld	NDS, PS2, PS3, Wii, Win, X360
	Rayman Raving Rabbids TV Party	NDS, Wii
	Naruto: The Broken Bond	X360
	CSI: NY (video game)	Win,

November 20	*The Last Remnant*	X360
November 21	*LocoRoco 2*	PSP
	Beyond Protocol	Win
November 25	*Chrono Trigger*	NDS
	Club Penguin: Elite Penguin Force	NDS
November 27	*Patapon 2*	PSP
	Rune Factory Frontier	Wii
December 1	*Destroy All Humans! Path of the Furon*	X360
December 2	*Prince of Persia: The Fallen King*	NDS
	Mushroom Men: The Spore Wars	Wii
	Mushroom Men: Rise of the Fungi	NDS
	Grand Theft Auto IV	Win
	Prince of Persia	PS3, X360
	Kingdom Hearts Re:Chain of Memories	PS2
December 4	*Rygar: The Battle of Argus*	Wii
December 5	*X3: Reunion*	Lin
December 7	*Prey*	Lin
December 9	*Prince of Persia*	Win
December 11	*Elebits: The Adventures of Kai and Zero*	NDS
December 18	*Rise of the Argonauts*	PS3, Win, X360
December 18	*Dissidia: Final Fantasy*	PSP
	Dynasty Warriors: Gundam 2	PS2, PS3, X360
	Suikoden Tierkreis	NDS
	Tales of Hearts	NDS
December 25	*White Knight Chronicles*	PS3
	RIZ-ZOAWD	NDS

Hardware and software sales

Canada

- Based on figures from the NPD Group:

Video game console sales in Canada (first seven months of 2008)[26]

Place	Console	Units sold
1	Wii	376,000
2	PlayStation 3	200,000
3	Xbox 360	154,000

Japan

- Based on figures from Enterbrain:

Video game console sales of 2008 in Japan (December 31, 2007 – December 28, 2008)[27] [28] [29]

Place	Console	Units sold
1	Nintendo DS	4,029,804
2	PlayStation Portable	3,543,171
3	Wii	2,908,342
4	PlayStation 3	991,303
5	PlayStation 2	480,664
6	Xbox 360	317,859
7	Other	9,575

Best-selling video games of 2008 in Japan (December 31, 2007 – December 28, 2008)[27] [28] [29]

Place	Title	Platform	Publisher	Units sold
1	*Monster Hunter Portable 2nd G*	PSP	Capcom	2,452,111
2	*Pokémon Platinum*	NDS	Pokémon Company	2,187,337
3	*Wii Fit*	Wii	Nintendo	2,149,131
4	*Mario Kart Wii*	Wii	Nintendo	2,003,315
5	*Super Smash Bros. Brawl*	Wii	Nintendo	1,747,113
6	*Rhythm Heaven*	NDS	Nintendo	1,350,671
7	*Dragon Quest V: Hand of the Heavenly Bride*	NDS	Square Enix	1,176,082
8	*Animal Crossing: City Folk*	Wii	Nintendo	895,302
9	*Kirby Super Star Ultra*	NDS	Nintendo	855,427
10	*Wii Sports*	Wii	Nintendo	841,736

- Based on figures from *Dengeki*:

Best-selling video games of 2008 in Japan (December 31, 2007 – December 21, 2008)[30] [31] [32]

Place	Title	Platform	Publisher	Units sold
1	*Monster Hunter Portable 2nd G*	PSP	Capcom	2,507,400
2	*Pokémon Platinum*	NDS	Pokémon Company	2,125,348
3	*Wii Fit*	Wii	Nintendo	2,024,113
4	*Mario Kart Wii*	Wii	Nintendo	1,973,089
5	*Super Smash Bros. Brawl*	Wii	Nintendo	1,808,709
6	*Rhythm Heaven*	NDS	Nintendo	1,320,047
7	*Dragon Quest V: Hand of the Heavenly Bride*	NDS	Square Enix	1,228,014
8	*Kirby Super Star Ultra*	NDS	Nintendo	724,608
9	*Animal Crossing City Folk*	Wii	Nintendo	709,640
10	*Wii Sports*	Wii	Nintendo	694,765

United States

- Based on figures from the NPD Group:

Video game console sales in the US (first six months of 2008)[33]

Place	Console	Units sold
1	Wii	3.5 million
2	PlayStation 3	1.6 million
3	Xbox 360	1.34 million

Best-selling video games of 2008 in the US[34] [35]

Place	Title	Platform	Publisher	Units sold
1	*Wii Play*	Wii	Nintendo	5.28 million
2	*Mario Kart Wii*	Wii	Nintendo	5.00 million
3	*Wii Fit*	Wii	Nintendo	4.53 million
4	*Super Smash Bros. Brawl*	Wii	Nintendo	4.17 million
5	*Grand Theft Auto IV*	X360	Rockstar North	3.29 million
6	*Call of Duty: World at War*	X360	Activision	2.75 million
7	*Gears of War 2*	X360	Microsoft	2.31 million
8	*Grand Theft Auto IV*	PS3	Take-Two Interactive	1.89 million
9	*Madden NFL 09*	X360	Electronic Arts	1.87 million
10	*Mario Kart DS*	NDS	Nintendo	1.65 million

- Based on figures from the NPD Group via IGN;[36] [37] the games' publishers are listed in brackets:

Best-selling video games of 2008 in the US (by platform)[a][›]

Place	NDS[38]	PC[39]	PS3[40]
1	*Mario & Sonic at the Olympic Games* (Sega)	*Spore* (Electronic Arts)	*Grand Theft Auto IV* (Rockstar Games)
2	*Pokémon Mystery Dungeon: Explorers of Time* and *Explorers of Darkness* (Nintendo)	*Age of Conan: Hyborian Adventures* (Funcom)	*Metal Gear Solid 4: Guns of the Patriots* (Konami)
3	*Guitar Hero: On Tour* (Activision)	*Warhammer Online: Age of Reckoning* (Electronic Arts)	*Madden NFL 09* (Electronic Arts)
4	*Lego Indiana Jones: The Original Adventures* (LucasArts)	*The Sims 2: FreeTime* (Electronic Arts)	*Gran Turismo 5 Prologue* (Sony Computer Entertainment)
5	*Kirby Super Star Ultra* (Nintendo)	*Spore Creature Creator* (Electronic Arts)	*MLB 08: The Show* (Sony Computer Entertainment)
6	*Professor Layton and the Curious Village* (Nintendo)	*Sins of a Solar Empire* (Stardock)	*Star Wars: The Force Unleashed* (LucasArts)
7	*Kung Fu Panda* (Activision)	*The Sims 2: Apartment Life* (Electronic Arts)	*NCAA Football 09* (Electronic Arts)
8	*Advance Wars: Days of Ruin* (Nintendo)	*The Sims 2: Kitchen & Bath Interior Design Stuff* (Electronic Arts)	*Army of Two* (Electronic Arts)
9	*Crosswords DS* (Nintendo)	*Warhammer 40,000: Dawn of War: Soulstorm* (THQ)	*Soulcalibur IV* (Namco Bandai)
10	*Final Fantasy Tactics A2: Grimoire of the Rift* (Square Enix)	*The Sims Castaway Stories* (Electronic Arts)	*Devil May Cry 4* (Capcom)

Place	PSP[41]	Wii[42]	X360[36]
1	*Crisis Core: Final Fantasy VII* (Square Enix)	*Super Smash Bros. Brawl* (Nintendo)	*Grand Theft Auto IV* (Rockstar Games)
2	*God of War: Chains of Olympus* (Sony Computer Entertainment)	*Mario Kart Wii* (Nintendo)	*Madden NFL 09* (Electronic Arts)
3	*MLB 08: The Show* (Sony Computer Entertainment)	*Wii Fit* (Nintendo)	*Fable II* (Microsoft)
4	*Iron Man* (Sega)	*Rock Band* (MTV Games)	*Tom Clancy's Rainbow Six: Vegas 2* (Ubisoft)
5	*Patapon* (Sony Computer Entertainment)	*Lego Indiana Jones: The Original Adventures* (LucasArts)	*Army of Two* (Electronic Arts)
6	*Madden NFL 09* (Electronic Arts)	*Mario Super Sluggers* (Nintendo)	*Star Wars: The Force Unleashed* (LucasArts)
7	*Lego Indiana Jones* (LucasArts)	*Star Wars: The Force Unleashed* (LucasArts)	*Battlefield: Bad Company* (Electronic Arts)
8	*Major League Baseball 2K8* (2K Games)	*Deca Sports* (Hudson Soft)	*NCAA Football 09* (Electronic Arts)
9	*Star Wars: The Force Unleashed* (LucasArts)	*Endless Ocean* (Nintendo)	*Rock Band 2* (MTV Games)

10	*Need for Speed: ProStreet* (Electronic Arts)	Unknown	*Ninja Gaiden II* (Microsoft)

^ a: In the IGN articles used as sources, IGN lists the titles as the "Top 10 Sellers in 2008"; however, the IGN articles were published on December 9–12, 2008, so the articles might not take into account November and December sales figures, as the NPD Group did not release November's console game sales figures until December 11, 2008.[43]

- Based on figures from the NPD Group:

Best-selling console games of all time in the US (as of May 1, 2008)[44]

Place	Title	Units sold
1	*Grand Theft Auto: San Andreas*	9.40 million
2	*Guitar Hero III: Legends of Rock*	8.20 million
3	*Madden NFL 07*	7.70 million
4	*Grand Theft Auto: Vice City*	7.30 million
5	*Madden NFL 06*	6.70 million
6	*Halo 2*	6.61 million
7	*Madden NFL 08*	6.60 million
8	*Call of Duty 4: Modern Warfare*	6.25 million
9	*Grand Theft Auto 3*	6.20 million
10	*Madden NFL 2005*	6.10 million

Other

- Based on figures from Enterbrain, GfK Chart-Track, and the NPD Group, respectively:

Best-selling video games in Japan, United Kingdom, and the United States combined (January–July 2008)[45]

Place	Title	Units sold in Japan	Units sold in the UK	Units sold in the US	Total units sold
1	*Grand Theft Auto IV*	–	1,582,000	4,711,000	6,293,000
2	*Super Smash Bros. Brawl*	1,681,000	213,000	3,539,000	5,433,000
3	*Mario Kart Wii*	1,601,000	687,000	2,409,000	4,697,000
4	*Wii Fit*	1,547,000	624,000	1,433,000	3,604,000
5	*Guitar Hero III: Legends of Rock*	26,000	412,000	3,037,000	3,475,000

Best-selling video games in Japan, United Kingdom, and the United States combined (July–September 2008)[46]

Place	Title	Units sold in Japan	Units sold in the UK	Units sold in the US	Total units sold
1	*Madden NFL 09*	1,000	35,000	2,958,000	2,994,000
2	*Wii Fit*	346,000	460,000	1,283,000	2,089,000
3	*Star Wars: The Force Unleashed*	–	321,000	1,417,000	1,738,000
4	*Pokémon Platinum*	1,482,000	–	–	1,482,000
5	*Mario Kart Wii*	218,000	394,000	856,000	1,468,000

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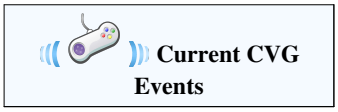

2009 in video gaming

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List of years in video gaming (Table of years in video gamingtable)… 1999 in video gaming1999 . 2000 in video gaming2000 . 2001 in video gaming2001 . 2002 in video gaming2002 . 2003 in video gaming2003 . 2004 in video gaming2004 . 2005 in video gaming2005 …2006 in video gaming2006 2007 in video gaming2007 2008 in video gaming2008 -2009 in video gaming2009- 2010 in video gaming2010 2011 in video gaming2011 2012 in video gaming2012… 2013 in video gaming2013 . 2014 in video gaming2014 . 2015 in video gaming2015 . 2016 in video gaming2016 . 2017 in video gaming2017 . 2018 in video gaming2018 . 2019 in video gaming2019 …Related time period or subjectsList of years… 2006 . 2007 . 2008 - 2009 - 2010 . 2011 . 2012 List of years…List of decades… 1970s . 1980s . 1990s -2000–20092000s- 2010s . 2020s . 2030s List of centuries… 20 century . 21 century . 22 century List of centuries…2009 in artArt . 2009 in archaeologyArchaeology . 2009 in architectureArchitecture . 2009 in literatureLiterature . 2009 in musicMusic . 2009 in scienceScience +...The year 2009 saw the release of many video games, including several sequels.Events Month Day Event January 29 Ensemble Studios, the creators of the Age of Empires series, was shut down after about 15 years of service.Breckon, Nick (November 17, 2008). "Age of Empires Dev Ensemble Speaks Out on Studio Closure, Microsoft, and the Cancelled Halo MMO". Shacknews. . Retrieved 2009-02-04.Ocampo, Jason (January 30, 2009). "Ensemble Says Goodbye". IGN. . Retrieved 2009-02-05. February 3 Crytek, the developers of FarCry and Crysis, buys Free Radical Design, the developers of the TimeSplitters (series)TimeSplitters seriesFaylor, Chris (February 3, 2009). "Crytek Buys TimeSplitters Dev. Free Radical". Shacknews. . Retrieved 2009-02-04.Onyett, Charles (February 4, 2009). "Crytek Purchases Free Radical". IGN. . Retrieved 2009-02-05. and renames them to Crytek UK.Faylor, Chris (February 4, 2009). "Crytek Buys TimeSplitters Dev. Free Radical". Shacknews. . Retrieved 2009-02-05.Orry, James (February 4, 2009). "Free Radical becomes Crytek UK". Videogamer. . Retrieved 2009-02-05. 4 Warner Bros. Interactive Entertainment acquires Snowblind Studios, the developers of Baldur's Gate: Dark Alliance.Ahearn, Nate (February 4, 2009). "WB Acquires Snowblind Studios". IGN. . Retrieved 2009-02-05.Goldstein, Maarten (February 4, 2009). "Warner Bros. Acquires Baldur's Gate: Dark Alliance Developer Snowblind Studios". Shacknews. . Retrieved 2009-02-05. March 23–27 Game Developers Conference 2009 was held in San Francisco, California April 22 Square Enix fully acquires Eidos plc, the publishers of the Tomb Raider (series)Tomb Raider and Hitman (series)Hitman series. Eidos ceases trading as independent publisher May 4-5 Sneeze (game)Sneeze launched to teach public about 2009 flu pandemic May 25 Tectoy launches the gaming console, Zeebo in Brazil. June 2–4 Electronic Entertainment Expo 2009E3 2009 in Los Angeles, which showcased many new games as well as new motion controllers for both the PlayStation 3 and the Xbox 360. Sony's new iteration of its PlayStation Portable handheld was also revealed, the PSP Go is the first handheld console to forgo the use of any physical media opting instead to use Digital Download-only.Purchese, Rob (October 24, 2008). "E for All consumer show scrapped". Euro Gamer. . Retrieved 2008-12-19. July 3–5 ScrewAttack Gaming Convention at the Westin DFW in Forth Worth, TexasDallas/Fort Worth, Texas, United States August 13–16 QuakeCon 2009 at the Hilton Anatole in DallasDallas, Texas, United StatesSkistimas, Craig (December 7, 2008). "ScrewAttack Gaming Convention". ScrewAttack. . Retrieved 2009-01-07. 17 In Sweden, Joakim Bennet announces that the video game magazine "Super PLAY" wil be disestablished in the near future. Super PLAY säger hej då! Super PLAY läggs ned 17–19 Games Developers Conference Europe 2009 to be held at Cologne Trade Fair in Cologne, Germany

http://www.gamescom-cologne.com/ 19–23 gamescom 2009 was held at Cologne Trade Fair in Cologne, Germany where Sony unveiled the new version of its PlayStation 3 consoles the 120GB PS3 Slim which rebranded the PlayStation 3 using a new logo as well as a new exterior design. 21–22 BlizzCon 2009 was held at Anaheim Convention Center in Anaheim, California, United States whose tickets were sold out online within minutes of them being released.Orry, James (February 17, 2009). "BlizzCon 2009 confirmed". VideoGamer. . Retrieved 2009-02-18.Faylor, Chris (February 17, 2009). "BlizzCon 2009 Announced". Shacknews. . Retrieved 2009-02-18. 31 Batman: Arkham Asylum attains a Guinness World Record for 'Most Critically Acclaimed Superhero Game Ever'.CBR News Team (2009-08-31). ""Batman: Arkham Asylum" Awarded a Guinness World Record". www.comicbookresources.com. . Retrieved 2009-09-01. September 1-3 Launch of the new 120GB Sony PlayStation 3#Slim modelPS3 Slim with a cheaper price which has been positively received by critics and gamers alike garnering positive reviews and high sales worldwide. 4-7 Penny Arcade Expo#PAX 2009PAX 2009 at the Washington State Convention and Trade Center in Washington (U.S. state)Washington State, USA. 17-20 GCA Games Convention Asia 2009 is to be held at the Suntec Singapore International Convention and Exhibition Centre in Singapore. 24–27 Tokyo Game Show 2009 is to be held at the Makuhari Messe, in Chiba, ChibaChiba, Japan. One of the biggest gaming conventions alongside Electronic Entertainment ExpoE3 and gamescom. October 1 Launch of the new Sony PSP Go which was met with mixed reviews due to its high pricing in comparison to its predecessor the PSP-3000. 23–25 Infinite Bits 2009 at the Doubletree Miami Mart Hotel and Convention Center in MiamiMiami, Florida, United States. October - November Oct 30– Nov 01 International Digital Entertainment Festival 2009 (iDEF) to be held at the Royal Exhibition Building, Carlton in MelbourneMelbourne, Australia, "iDEF - International Digital Entertainment Festival 2009". June 10, 2009. . November 14-15 GameOn! London at Earls Court. Exhibitors include Capcom, Electronic Arts, Nintendo and Sony Computer Entertainment. "GameOn! London". .Scheduled releasesVideo game platformsLinLinuxMacMacintosh / Mac OSNDSNintendo DSPS2PlayStation 2PS3PlayStation 3PSPPlayStation PortableWiiWiiWinMicrosoft WindowsX360Xbox 360MonthDayTitlePlatform(s) JANUARY 6 Saints Row 2Microsoft WindowsWin 13 Mirror's EdgeMicrosoft WindowsWinMoon (video game)MoonNintendo DSNDSThe Lord of the Rings: ConquestPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360, Nintendo DSNDS 20 Star Ocean: Second EvolutionPlayStation PortablePSP 21 Skate 2PlayStation 3PS3, Xbox 360X360SimAnimalsNintendo DSNDS, Wii 26 MLB Front Office ManagerPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360 27 Afro Samurai (video game)Afro SamuraiPlayStation 3PS3, Xbox 360X360Coraline (video game)CoralinePlayStation 2PS2, Nintendo DSNDS, WiiDJ Max FeverPlayStation PortablePSP 29 Savage MoonPlayStation 3PS3 30 Jets'n'GunsLinuxLinFEBRUARY 3 My World, My Way (video game)My World, My WayNintendo DSNDSTenchu: Shadow AssassinsWii 5 Burnout ParadiseBurnout Paradise: The Ultimate BoxMicrosoft WindowsWin 9 Deadly CreaturesWii 10 F.E.A.R. 2: Project OriginPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360X-BladesPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360Sonic's Ultimate Genesis CollectionPlayStation 3PS3, Xbox 360X360NASCAR Kart RacingWiiRetro Game ChallengeNintendo DSNDSOneChanbara: Bikini Zombie SlayersWiiOneChanbara: Bikini Samurai SquadXbox 360X360The House of the Dead: OverkillWiiLocoRoco 2PlayStation PortablePSP 12 Flower (video game)FlowerPlayStation 3PS3 13 Perimeter 2: New EarthMicrosoft WindowsWin 16 Fire Emblem: Shadow DragonNintendo DSNDS 17 Street Fighter IVPlayStation 3PS3, Xbox 360X360Race ProXbox 360X360Disney Sing It! - High School Musical 3: Senior YearPlayStation 3PS3, PlayStation 2PS2, Wii, Xbox 360X360Dragon Quest V: Hand of the Heavenly BrideNintendo DSNDSGrand Theft Auto IV: The Lost and DamnedXbox 360X360 19 Warhammer 40,000: Dawn of War IIMicrosoft WindowsWinNoby Noby BoyPlayStation 3PS3 24 Star Ocean: The Last HopeXbox 360X360Shellshock 2: Blood TrailsPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360Tom Clancy's EndWarMicrosoft WindowsWin50 Cent: Blood on the SandPlayStation 3PS3, Xbox 360X360Dead Rising: Chop Till You DropWiiPuzzle Quest: GalactrixNintendo DSNDS, Microsoft WindowsWin, Xbox Live ArcadeXBLA, PlayStation 3PS3 26 Eat Lead: The Return of Matt HazardPlayStation 3PS3, Xbox 360X360Halo WarsXbox 360X360 27 Killzone 2PlayStation 3PS3Rogue Trooper (video game)Rogue TrooperWiiMARCH 3 Empire: Total WarMicrosoft WindowsWinSonic and the Black KnightWiiMajor League Baseball 2K9Xbox

360X360, PlayStation 3PS3, PlayStation 2PS2, PlayStation PortablePSP, WiiMLB 09: The ShowPlayStation 3PS3, PlayStation 2PS2, PlayStation PortablePSP 4 Watchmen: The End Is NighPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360 6 Tom Clancy's H.A.W.X.PlayStation 3PS3, Xbox 360X360 10 World in Conflict: Soviet AssaultMicrosoft WindowsWinMen of WarMicrosoft WindowsWinMySims PartyNintendo DSNDS, WiiMadWorldWiiGrey's Anatomy: The Video GameMicrosoft WindowsWin, Nintendo DSNDS, Wii 12 Command & Conquer Red Alert 3: UprisingMicrosoft WindowsWin 13 Codename Panzers: Cold WarMicrosoft WindowsWinResident Evil 5PlayStation 3PS3, Xbox 360X360 17 Wanted: Weapons of FatePlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360Grand Theft Auto: Chinatown WarsNintendo DSNDSResistance: RetributionPlayStation PortablePSPGrand Ages: RomeMicrosoft WindowsWinTom Clancy's H.A.W.X.Microsoft WindowsWinValkyrie Profile: Covenant of the PlumeNintendo DSNDS 21 Broken Sword: The Shadow of the TemplarsBroken Sword: Shadows of the Templars - The Director's CutNintendo DSNDS, Wii 22 Pokémon PlatinumNintendo DSNDS 23 BattleForgeMicrosoft WindowsWinCommand & Conquer: Red Alert 3PlayStation 3PS3Dark SectorMicrosoft WindowsWin 24 WWE Legends of WrestleManiaPlayStation 3PS3, Xbox 360X360Final Fantasy Crystal Chronicles: Echoes of TimeNintendo DSNDS, WiiThe WheelmanPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360The Last RemnantMicrosoft WindowsWinStormrisePlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360Wallace & Gromit's Grand AdventuresMicrosoft WindowsWinFreaky CreaturesMicrosoft WindowsWin 27 Leisure Suit Larry: Box Office BustMicrosoft WindowsWin, Xbox 360X360, PS3 29 Guitar Hero: MetallicaPlayStation 2PS2, PlayStation 3PS3, Wii, Xbox 360X360APRIL 7 The Godfather II (video game)The Godfather Part II: The GamePlayStation 3PS3, Xbox 360X360, Microsoft WindowsWinNinja BladeXbox 360X360Elven LegacyMicrosoft WindowsWinThe Chronicles of Riddick: Assault on Dark AthenaPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360 9 Company of Heroes: Tales of ValorMicrosoft WindowsWinSacred (video game)SacredLinuxLin 10 Braid (video game)BraidMicrosoft WindowsWin 14 Demigod (video game)DemigodMicrosoft WindowsWin 20 Excitebots: Trick RacingWii 21 Zeno ClashMicrosoft WindowsWin 22 Dynasty Warriors: Gundam 2PlayStation 3PS3, PlayStation 2PS2, Xbox 360X360 28 Velvet AssassinXbox 360X360, Microsoft WindowsWin 29 Stalin vs. MartiansMicrosoft WindowsWinMAY 1 X-Men Origins: Wolverine (video game)X-Men Origins: WolverineNintendo DSNDS, PlayStation 2PS2, PlayStation 3PS3, Wii, Microsoft WindowsWin, Xbox 360X360, PlayStation PortablePSP 5 Night at the Museum: Battle of the Smithsonian (video game)Night at the Museum: Battle of the SmithsonianNintendo DSNDS, Wii, Microsoft WindowsWin, Xbox 360X360 8 Secret Files 2: Puritas CordisMicrosoft WindowsWin, Wii, Nintendo DSNDS 12 Battlestations: PacificMicrosoft WindowsWin, Xbox 360X360Sacred 2: Fallen AngelPlayStation 3PS3, Xbox 360X360 14 Killing Floor (2009 video game)Killing FloorMicrosoft WindowsWin 18 Punch-Out!! (Wii)Punch-Out!!Wii 19 Bionic Commando (2009 video game)Bionic CommandoPlayStation 3PS3, Xbox 360X360Terminator Salvation (video game)Terminator SalvationPlayStation 3PS3, Wii, Microsoft WindowsWin, Xbox 360X360UFC 2009 UndisputedPlaystation 3PS3, Xbox 360X360Boom Blox Bash PartyWii 26 inFamousPlaystation 3PS3Damnation (video game)DamnationMicrosoft WindowsWin, Playstation 3PS3, Xbox 360X360JUNE 2 The Sims 3WindowsWin, MacintoshMacVirtua Tennis 2009WiiRed Faction: GuerrillaPlayStation 3PS3, Xbox 360X360Fuel (2009 video game)FuelPlayStation 3PS3, Xbox 360X360 8 Tiger Woods PGA Tour 10Playstation 2PS2, Playstation 3PS3, Playstation PortablePSP, Wii, Xbox 360X360MySims RacingWii, Nintendo DSNDS 9 Virtua Tennis 2009Xbox 360X360, Playstation 3PS3Prototype (video game)PrototypePlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360Black Sigil: Blade of the ExiledNintendo DSNDSRock Band UnpluggedPlayStation PortablePSPIndiana Jones and the Staff of KingsWii, Nintendo DSNDS, Playstation PortablePSP, Playstation 2PS2 16 Ghostbusters: The Video GameNintendo DSNDS, PlayStation 2PS2, PlayStation 3PS3, Wii, Microsoft WindowsWin, Xbox 360X360Guitar Hero: Smash HitsPlaystation 2PS2, Playstation 3PS3, Wii, Xbox 360X360 22 Adam's VentureAdam's Venture : The Search for the Lost GardenMicrosoft WindowsWin 23 Anno 1404Microsoft WindowsWinTransformers: Revenge of the Fallen (video game)Transformers: Revenge of the FallenNintendo DSNDS, PlayStation 2PS2, PlayStation 3PS3, Wii, Microsoft WindowsWin, Xbox 360X360, Playstation PortablePSPThe ConduitWiiOverlord IIPlayStation 3PS3, Microsoft WindowsWin, Xbox

360X360Overlord: Dark LegendWiiOverlord: MinionsNintendo DSNDSSpore Galactic AdventuresMicrosoft WindowsWin 25 Fight Night Round 4PlayStation 3PS3, Xbox 360X360Battlefield HeroesMicrosoft WindowsWin 26 Blood Bowl (2009 video game)Blood BowlPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360 30 Harry Potter and the Half-Blood Prince (video game)Harry Potter and the Half Blood PrinceMac OS XMac, Microsoft WindowsWin, Nintendo DSNDS, Playstation 2PS2, Playstation 3PS3, Playstation PortablePSP, Wii, Xbox 360X360Call of Juarez: Bound in BloodPlaystation 3PS3, Microsoft WindowsWin, Xbox 360X360BlazBlue: Calamity TriggerPlaystation 3PS3, Xbox 360X360JULY 3 Virtua Tennis 2009Microsoft WindowsWinFuel (2009 video game)FuelMicrosoft WindowsWinTrine (video game)TrineMicrosoft WindowsWin 7 ArmA 2Microsoft WindowsWinStreet Fighter IVMicrosoft WindowsWinTales of Monkey IslandMicrosoft WindowsWinThe Bigs 2Xbox 360X360, PlayStation 3PS3, PlayStation 2PS2, Wii, PlayStation PortablePSP 8 Battlefield 1943Xbox 360X360, Playstation 3PS3 14 NCAA Football 10Xbox 360X360, PlayStation 3PS3, PlayStation 2PS2, PlayStation PortablePSP 20 Final Fantasy Crystal Chronicles: My Life as a DarklordWii 21 Little King's StoryWii 26 Wii Sports ResortWii 28 The King of Fighters XIIPlaystation 3PS3, Xbox 360X360Bionic Commando (2009 video game)Bionic CommandoMicrosoft WindowsWin 30 Puyo Puyo 7Nintendo DSNDSFat PrincessPlaystation 3PS3 31 East India Company (video game)East India CompanyMicrosoft WindowsWinAUGUST 4 G.I. Joe: The Rise of Cobra (video game)G.I. Joe: The Rise of CobraNintendo DSNDS, Playstation 2PS2, Playstation 3PS3, Playstation PortablePSP, Wii, Xbox 360X360, Mobile Phone 7 Hearts of Iron IIIMicrosoft WindowsWinAshes Cricket 2009PlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360, Wii 10 Still Life 2Microsoft WindowsWin, Mac OS XMac 11 C.O.R.E. (video game)C.O.R.E.Nintendo DSNDS 14 Madden NFL 10PlayStation 3PS3, PlayStation PortablePSP, Xbox 360X360Return to Mysterious Island 2Microsoft WindowsWin 18 Wolfenstein (2009 video game)WolfensteinPlayStation 3PS3, Microsoft WindowsWin, Xbox 360X360 21 Raven Squad: Operation Hidden DaggerMicrosoft WindowsWin, Xbox 360X360 24 Metroid Prime: TrilogyWii 25 Cursed MountainWiiDissidia Final FantasyPlayStation PortablePSPBatman: Arkham AsylumPlayStation 3PS3, Xbox 360X360SEPTEMBER 1 Champions OnlineMicrosoft WindowsWinGuitar Hero 5Playstation 2PS2, Playstation 3PS3, Wii, Xbox 360X360Soul Calibur: Broken DestinyPlaystation PortablePSP 4 Section 8 (video game)Section 8Microsoft WindowsWin, Xbox 360X360 8 IL-2 Sturmovik: Birds of PreyXbox 360X360, PlayStation 3PS3, Nintendo DSNDS, PlayStation PortablePSPAFL ChallengePSPMuramasa: The Demon BladeWiiDarkest of DaysMicrosoft WindowsWin, Xbox 360X360Colin McRae: Dirt 2Xbox 360X360, PlayStation 3PS3, PlayStation PortablePSP, Wii, Nintendo DSNDSMini NinjasMicrosoft WindowsWin, Xbox 360X360, PlayStation 3PS3, Wii, Nintendo DSNDS 9 The Beatles: Rock BandPlayStation 2PS2, PlayStation 3PS3, Xbox 360X360, Wii 14 Heroes Over EuropeXbox 360X360, Playstation 3PS3, Microsoft WindowsWinMario & Luigi: Bowser's Inside StoryNintendo DSNDS 15 Cloudy with a Chance of Meatballs (video game)Cloudy with a Chance of MeatballsPS3, Xbox 360X360, Wii, Nintendo DSNDS, Playstation PortablePSPNeed for Speed: ShiftPlayStation 3PS3, PlayStation PortablePSP, Microsoft WindowsWin, Xbox 360X360Resident Evil 5Microsoft WindowsWinBatman: Arkham AsylumMicrosoft WindowsWinNHL 10Xbox 360X360, PlayStation 3PS3NHL 2K10Xbox 360X360, PlayStation 2PS2, PlayStation 3PS3, WiiRed Faction: GuerrillaMicrosoft WindowsWinMarvel: Ultimate Alliance 2Nintendo DSNDS, PlayStation 3PS3, PlayStation 2PS2, Wii, Xbox 360X360ScribblenautsNintendo DSNDSWet (video game)WetPlayStation 3PS3, Xbox 360X360 16 ShadowgroundsLinuxLin 18 Majesty 2: The Fantasy Kingdom SimMicrosoft WindowsWinShadowgrounds SurvivorLinuxLin 22 Katamari ForeverPS3Fallen EarthMicrosoft WindowsWinHalo 3: ODSTXbox 360X360Teenage Mutant Ninja Turtles: Smash-UpWii, PS2Aion: The Tower of EternityMicrosoft WindowsWinSpyborgsWiiOrder of WarMicrosoft WindowsWin 25 Professor Layton and the Diabolical BoxNintendo DSNDS 29 Tornado OutbreakWii, PS3, Xbox 360X360BeateratorPlayStation PortablePSPDead Space: ExtractionWiiKingdom Hearts 358/2 DaysNintendo DSNDSMotorStorm: Arctic EdgePlaystation PortablePSPNinja Gaiden Sigma 2PlayStation 3PS3ObsCure IIPlayStation PortablePSP 30 The Wizard of Oz: Beyond the Yellow Brick RoadNintendo DSNDSOCTOB ER 1 Gran Turismo PSPPlayStation PortablePSP 4 Wii Fit PlusWii 6 NBA Live 10PS3, PlayStation PortablePSP, Xbox 360X360NBA 2K10Xbox 360X360, PS2, PS3, PlayStation PortablePSPOperation Flashpoint 2: Dragon RisingPlayStation 3PS3, Microsoft WindowsWin, Xbox

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2010 in video gaming

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Art · Archaeology · Architecture · Literature · Music · Science +...

The year **2010** will see many new **video games**, including several sequels and prequels.

Events

Month	Day	Event
January	7-10	International Consumer Electronics Show 2010 was held in Las Vegas, Nevada, USA[1]
February	11	Microsoft X10 held in San Francisco[2]
	24	Nintendo World Summit held in San Francisco[3]
March	9-13	Game Developers Conference 2010 held in San Francisco, CA[4]
	26-28	First PAX East Coast at the John B. Hynes Veterans Memorial Convention Center in Boston, MA
April	15	Xbox Live for original Xbox console and games discontinued[5]
	20	Captivate, Capcom's annual tradeshow was held in Honolulu, Hawaii[6]
May	4	The Humble Indie Bundle, an experiment into indie, charitable, cross-platform, DRM-free digital game distribution, is first released to great success.
June	14-17	E3 2010 was held at the Los Angeles Convention Center.
	17	OnLive released.
August	12-15	QuakeCon was held in the Hotel Hilton Anatole, in Dallas, Texas, USA.
	16-18	Game Developers Conference was held in Europe in Cologne.
	18-22	Gamescom 2010 was held at Cologne, Germany
September	3-5	Penny Arcade Expo 2010 was held at Washington State Convention Center in Seattle.
	15-21	PlayStation Move was launched in North America, Europe and various Asian countries.
	16-19	Tokyo Game Show 2010 was held at Makuhari Messe in Japan.
October	22-23	BlizzCon 2010 was held at Anaheim Convention Center in Anaheim, California.

November	4	Microsoft's Kinect launched worldwide, starting in North America.

Game releases

Scheduled releases

Video game platforms

Lin	Linux
Mac	Macintosh / Mac OS
NDS	Nintendo DS
PS2	PlayStation 2
PS3	PlayStation 3

PSN	PlayStation Network
PSP	PlayStation Portable
Wii	Wii
WiiWare	WiiWare
Win	Microsoft Windows

X360	Xbox 360
XBLA	Xbox Live Arcade
iOS	iOS (iPhone OS)

Month	Day	Title	Platform(s)
JANUARY	5	*Divinity 2: Ego Draconis*	Win, X360
		Bayonetta	PS3, X360
		Darksiders	PS3, X360
	6	*Matt Hazard: Blood Bath and Beyond*	XBLA
	7	*Matt Hazard: Blood Bath and Beyond*	PSN
	12	*Vancouver 2010*	Win, X360, PS3
		Army of Two: The 40th Day	PS3, X360, PSP
		The Sky Crawlers: Innocent Aces	Wii
	19	*Dark Void*	Win, X360, PS3
	26	*Mass Effect 2*	Win, X360
		Tatsunoko vs. Capcom: Ultimate All-Stars	Wii
		MAG	PS3
		No More Heroes 2: Desperate Struggle	Wii

FEBRUARY	1	*Global Agenda*	Win
	2	*White Knight Chronicles*	PS3
		Star Trek Online	Win
		S.T.A.L.K.E.R.: Call of Pripyat	Win
		The Sims 3: High-End Loft Stuff	Win, Mac
	9	*BioShock 2*	Win, X360, PS3
		Dante's Inferno	PS3, X360
		Shiren the Wanderer	Wii
	10	*Stargate Resistance*	Win
	16	*Tropico 3*	X360
		SOCOM: U.S. Navy SEALs Fireteam Bravo 3	PSP
		Aliens vs. Predator	Win, X360, PS3
		Ace Attorney Investigations: Miles Edgeworth	NDS
	22	*Endless Ocean 2: Adventures of the Deep*	Wii
	23	*Arsenal of Democracy*	Win
		Heavy Rain	PS3
		Sonic & Sega All-Stars Racing	PS3, X360, NDS, Wii, Win
		Napoleon: Total War	Win
		M.U.D. TV	Win
	24	*Greed Corp*	XBLA, PSN

MARCH	1	*Dante's Inferno*	PSP
		Mega Man 10	Wii
	2	*Silent Hunter V: Battle of the Atlantic*	Win
		Battlefield: Bad Company 2	Win, X360, PS3
		Supreme Commander 2	Win
		MLB 10: The Show	PS2, PS3, PSP
		MLB 2K10	Win, X360, PS2, PS3, Wii, PSP
		SpongeBob's Boating Bash	NDS, Wii
		Sonic Classic Collection	NDS
	9	*Assassin's Creed II*	Win, X360, PS3
		Final Fantasy XIII	PS3, X360
		Yakuza 3	PS3
		Rise of Prussia	Win
		Resident Evil 5: Gold Edition	PS3
	11	*Mega Man 10*	PSN
		Warhammer 40,000: Dawn of War II - Chaos Rising	Win
	14	*Pokémon HeartGold* and *SoulSilver*	NDS
	16	*God of War III*	PS3
		Command & Conquer 4: Tiberian Twilight	Win
		Metro 2033	Win, X360
		Supreme Commander 2	X360
		Resonance of Fate	X360, PS3
		Dragon Age: Origins - Awakening	Win, X360, PS3
		Infinite Space	NDS
	17	*Perfect Dark*	XBLA
	23	*The Settlers 7: Paths to a Kingdom*	Win
		Red Steel 2	Wii
		Just Cause 2	Win, X360, PS3
		Shin Megami Tensei: Strange Journey	NDS
	28	*WarioWare D.I.Y.*	NDS
	30	*Prison Break: The Conspiracy*	Win, X360, PS3
	31	*Mega Man 10*	XBLA

APRIL	9	*Lead and Gold: Gangs of the Wild West*	Win, X360, PS3
	13	*Tom Clancy's Splinter Cell: Conviction*	Win, X360
		Grand Theft Auto: Episodes From Liberty City	PS3, Win
	15	*Sam & Max: The Devil's Playhouse Episode 1: The Penal Zone*	Win, Mac, PS3
	20	*Monster Hunter Tri*	Wii
	27	*Tom Clancy's Splinter Cell: Conviction*	Win
		Dead to Rights: Retribution	X360, PS3
		2010 FIFA World Cup South Africa	PS3, X360, Wii, PSP, iOS
		Nier	X360, PS3
		Super Street Fighter IV	PS3, X360
	28	*Tecmo Bowl Throwback*	XBLA
MAY	4	*What Did I Do To Deserve This My Lord? 2*	PSP
		Iron Man 2	PS3, PSP, X360, Wii, NDS
	11	*3D Dot Game Heroes*	PS3
		Skate 3	PS3, X360
		Lost Planet 2	X360, PS3
	12	*Rocket Knight*	Win, XBLA
		Eschalon: Book II	Win
		Things on Wheels	XBLA
	18	*Rocket Knight*	PSN
		Split Second: Velocity	Win, X360, PS3
		Prince of Persia: The Forgotten Sands	NDS, Wii, PSP PS3, X360
		Trauma Team	Wii
		Alan Wake	X360
		Red Dead Redemption	X360, PS3
	19	*Aqua - Naval Warfare*	XBLA
	21	*Gray Matter*	Win
	23	*Super Mario Galaxy 2*	Wii
	24	*Phoenix Wright: Ace Attorney*	WiiWare
	25	*Blur*	Win, X360, PS3
		ModNation Racers	PS3, PSP
		UFC 2010	X360, PS3
	26	*Eschalon: Book II*	Mac, Lin
		Ben 10 Alien Force: The Rise of Hex	XBLA
	31	*Ben 10 Alien Force: The Rise of Hex*	Wii

JUNE	1	*Backbreaker*	X360, PS3
		The Sims 3: Ambitions	Win
		Alpha Protocol	Win, X360, PS3
		Tecmo Bowl Throwback	PSN
		Planet Minigolf	PSN
	4	*FIFA Online*	Win
	8	*Green Day: Rock Band*	X360, PS3, Wii
		Metal Gear Solid: Peace Walker	PSP
	12	*Prince of Persia: The Forgotten Sands*	Win
	15	*Toy Story 3: The Video Game*	PS3, 360, Wii, PSP, DS, Win
	22	*Transformers: War for Cybertron*	Win, X360, PS3, Wii, NDS
	24	*Dream Chronicles: The Book of Air*	Win
	27	*Sin and Punishment: Star Successor*	Wii
	29	*APB All Points Bulletin*	Win
		Deathsmiles	X360
		Lego Harry Potter: Years 1-4	Win, PS2, PS3, Wii, PSP, X360, NDS
		Naughty Bear	X360, PS3
		Ninety-Nine Nights II	X360
		Singularity	Win, X360, PS3
		Sniper: Ghost Warrior	Win, X360
		Trinity Universe	PS3
JULY	6	*Shin Megami Tensei: Persona 3*	PSP
		Tournament of Legends	Wii
		Crackdown 2	X360
	9	*Battlefield 1943*	PS3, X360
	11	*Dragon Quest IX: Sentinels of the Starry Skies*	NDS
	13	*DeathSpank*	PSN
		NCAA Football 11	PS2, PS3, X360
	14	*DeathSpank*	XBLA
		The King of Fighters XIII	PS3, X360
	19	*Furry Legends*	WiiWare
	21	*Limbo*	XBLA
	27	*Need for Speed: World*	Win
		Arc Rise Fantasia	Wii
		StarCraft II: Wings of Liberty	Win, Mac
		BlazBlue: Continuum Shift	PS3, X360

AUGUST	5	*Tales of Phantasia: Narikiri Dungeon X*	PSP
	10	*Madden NFL 11*	PS2, PS3, PSP, Wii, X360
		Scott Pilgrim vs. the World: The Game	PSN
	13	*Victoria 2*	Win
	17	*Kane & Lynch 2: Dog Days*	Win, X360, PS3
	18	*Lara Croft and the Guardian of Light*	XBLA
	24	*Elemental: War of Magic*	Win
		Ivy the Kiwi?	Wii, NDS
		Mafia II	Win, X360, PS3
	25	*Scott Pilgrim vs. the World: The Game*	XBLA
	26	*Worms: Reloaded*	Win, Mac
	31	*Metroid: Other M*	Wii
		Valkyria Chronicles II	PSP

SEPTEMBER	7	*Tom Clancy's H.A.W.X 2*	PS3, X360
		Batman: The Brave and the Bold	Wii, NDS
		Spider-Man: Shattered Dimensions	NDS, PS3, Wii, X360
		Kingdom Hearts Birth by Sleep	PSP
		NHL 11	PS3, X360
		NHL Slapshot	Wii
	8	*Amnesia: The Dark Descent*	Win, Mac, Lin
		Plants vs. Zombies	XBLA
	10	*Ninety-Nine Nights II*	X360
	12	*Professor Layton and the Unwound Future*	NDS
	14	*UFC 2010*	PSP
		Halo: Reach	X360
		The Lord of the Rings: Aragorn's Quest	PS3, PS2, PSP, Wii, NDS
		Scooby-Doo! And the Spooky Swamp	PS2, Wii, NDS
	17	*R.U.S.E.*	X360, PS3, Win
		EyePet	PS3
	21	*Civilization V*	Win
		Darksiders	Win
		Etrian Odyssey III: The Drowned City	DS
	22	*F1 2010*	Win, X360, PS3
	23	*Darksiders*	Win
	24	*NHL 2K11*	Wii
	27	*Samurai Warriors 3*	Wii
	28	*Lara Croft and the Guardian of Light*	PSN, Win
		Dead Rising 2	Win, PS3, X360
		FIFA 11	Win, X360, Wii, NDS, PS2, PS3, PSP
		Front Mission Evolved	Win, X360, PS3
		Guitar Hero: Warriors of Rock	PS3, Wii, X360
		Quantum Theory	PS3, X360
	29	*Hydrophobia*	XBLA
	30	*Final Fantasy XIV*	Win
		World of Tanks	Win

OCTOBER	1	*EyePet*	PSP
	3	*Wii Party*	Wii
	4	*Pokémon Ranger: Guardian Signs*	DS
	5	*Pro Evolution Soccer 2011*	Win, X360, Wii, NDS, PS2, PS3, PSP
		Ben 10 Ultimate Alien: Cosmic Destruction	X360, Wii, NDS, PS2, PS3, PSP
		Castlevania: Lords of Shadow	X360, PS3
		Enslaved: Odyssey to the West	X360, PS3
		NBA 2K11	Win, PS3, X360 PSP, PS2, Wii, iOS
		NBA Jam	Wii
	6	*ProtoGalaxy*	Win
	7	*Sonic the Hedgehog 4: Episode 1*	iOS
		Kingdom Hearts Re:coded	DS
	11	*Sonic the Hedgehog 4: Episode 1*	WiiWare
	12	*Lost Planet 2*	Win
		Sengoku Basara: Samurai Heroes	PS3, Wii
		Arcania: Gothic 4	Win, X360
		Medal of Honor	Win, PS3, X360
		Super Scribblenauts	NDS
		Sonic the Hedgehog 4: Episode 1	PSN
	13	*Sonic the Hedgehog 4: Episode 1*	XBLA
	14	*DJ Max Portable 3*	PSP
	17	*Kirby's Epic Yarn*	Wii
	19	*DJ Hero 2*	X360, PS3, Wii
		Saw II: Flesh & Blood	PS3, X360
		Naruto Shippuden: Ultimate Ninja Storm 2	PS3, X360
		DJ Max Portable 3	PSN
		EA Sports MMA	PS3, X360
		Fallout: New Vegas	PS3, X360, Win
		Rock of the Dead	X360, PS3, Wii
		Vanquish	PS3, X360
	20	*Super Meat Boy*	XBLA
	25	*Bit.Trip Fate*	WiiWare
	26	*Fable III*	X360
		Lego Universe	Win
		Rock Band 3	PS3, X360, Wii, DS
		The Sims 3: Late Night	Win, Mac OS X
		The Sims 3	PS3, X360, Wii, DS
		Star Wars: The Force Unleashed II	PS3, X360, Win, Wii, DS
		WWE SmackDown vs Raw 2011	PS3, X360, PSP, PS2, Wii

NOVEMBER	2	*Blood Stone*	Win, X360, PS3, NDS
		Fist of the North Star: Ken's Rage	PS3, X360
		GoldenEye 007	Wii, NDS
		Toy Story 3: The Video Game	PS2
	4	*Kinect Sports*	X360
		Kinectimals	X360
		Sonic Free Riders	X360
	5	*Def Jam Rapstar*	X360, PS3
		Football Manager 2011	Win
	9	*Call of Duty: Black Ops*	X360, PS3, Wii, Win
		The Sly Collection	PS3
	12	*Tom Clancy's H.A.W.X 2*	Wii, Win
	16	*Assassin's Creed: Brotherhood*	PS3, X360
		EA Sports Active NFL Training Camp	Wii
		Harry Potter and the Deathly Hallows: Part I	Win, NDS, PS3, X360, Mobile, Wii
		Pac-Man Party	Wii
		Need for Speed: Hot Pursuit	X360, PS3, Win
		Sonic Colors	Wii, NDS
	21	*Donkey Kong Country Returns*	Wii
		Raving Rabbids: Travel in Time	Wii
	23	*Splatterhouse*	X360, PS3
	24	*Gran Turismo 5*	PS3[7]
	29	*Golden Sun: Dark Dawn*	NDS
	30	*Epic Mickey*	Wii
DECEMBER	7	*Tron: Evolution*	Win, PS3, X360, NDS
		Tron: Evolution - Battle Grids	Wii
		World of Warcraft: Cataclysm	Win, Mac
	12	*Super Mario All-Stars*	Wii
		The Agency: Covert Ops	PS3, Win
	21	*TrackMania Wii*	Wii

Unscheduled releases

Title	Platforms	Genre	References
BattleBlock Theater	XBLA	Platformer, Action-adventure	[8]
Dawn of Fantasy	Win, X360	Real-time strategy	[9]
Fairytale Fights	Win	Hack and slash, Action-adventure	[10] [11]
Kingdom Under Fire II	Win, XBLA, PS3	Real-time strategy	[12] [13] [14]
Natural Selection 2	Win, Mac, Lin, X360	First-person shooter, Real-time strategy	[15]
Postal III	Win, Lin, Mac, X360, PS3	Third-person shooter	[16]
Primal Carnage	Win, Lin	First-person shooter	[17] [18] [19]
Under Siege	PSN	Real-time tactics	[20]
WWE SmackDown vs. Raw Online	Win	Fighting, Professional wrestling	

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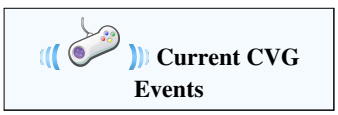

2011 and beyond in video gaming

List of years in video gaming (table)
… 2001 · 2002 · 2003 · 2004 · 2005 · 2006 · 2007 … 2008 2009 2010 **-2011-** 2012 2013 2014 … 2015 · 2016 · 2017 · 2018 · 2019 · 2020 · 2021 …
Related time period or subjects
… 2008 · 2009 · 2010 - **2011** - 2012 · 2013 · 2014 … … 1980s · 1990s · 2000s -**2010s**- 2020s · 2030s · 2040s … 20 century · **21 century** · 22 century …
Art · Archaeology · Architecture · Literature · Music · Science +...

The year **2011 and beyond** will see many new **video games**, including several sequels and prequels.

Events

Month	Day	Event
January	6-9	International Consumer Electronics Show 2011 will be held in Las Vegas, Nevada, USA[1]
February	26	The Nintendo 3DS, Nintendo's newest handheld console, releases in Japan.
	Feb 28 - March 4	Game Developers Conference 2011 to be held in San Francisco, CA[2]
June	7-9	E3 2011 will be held at the Los Angeles Convention Center.[3]
August	15-17	Game Developers Conference 2011 Europe will be held in Cologne, Germany.

2011

Video game platforms

Lin	Linux
Mac	Macintosh / Mac OS
NDS	Nintendo DS
PS2	PlayStation 2

PS3	PlayStation 3
PSN	PlayStation Network
PSP	PlayStation Portable
Wii	Wii

WiiWare	WiiWare
Win	Microsoft Windows
X360	Xbox 360
XBLA	Xbox Live Arcade

Scheduled releases

Month	Day	Title	Platform(s)			
JANUARY	1	*Two Worlds II*	Win, X360, PS3			
	11	*Kingdom Hearts: Re:coded*	NDS			
		Ghost Trick: Phantom Detective	NDS			
	18	*LittleBigPlanet 2*	PS3			
		MindJack	PS3, X360			
	25	*Dead Space 2*	Win, X360, PS3			
		Lord of Arcana	PSP			
FEBRUARY	1	*Ace Combat: Assault Horizon*	X360, PS3	8	*Test Drive Unlimited 2*	Win, X360, PS3
	15	*Warriors: Legends of Troy*	X360, PS3			
		Conduit 2	Wii			
		NASCAR The Game: 2011	X360, PS3, Wii			
		Marvel vs. Capcom 3: Fate of Two Worlds	X360, PS3			
		Lego Star Wars III: The Clone Wars	Win, X360, PS3, Wii, PSP, Wii, DS			
		Tactics Ogre: Let Us Cling Together	PSP			
	22	*Bulletstorm*	X360, PS3, Win			
		Killzone 3	PS3			
		de Blob: The Underground	NDS, PS3, X360, Wii			
	25	*Gray Matter*	X360, Win			
	MARCH	1	*The Sims Medieval*	Win, Mac OS X		
Michael Jackson: The Experience			PS3, X360			
8		*Dragon Age II*	Win, PS3, X360			
		Deus Ex: Human Revolution	Win, PS3, X360			
		God Eater: Burst	PS3			
		Homefront	Win, X360, PS3			
		Shift 2: Unleashed	Win, PS3, X360			
9		*Patapon 3*	PSP			
15		*Yakuza 4*	PS3			
		Okamiden	NDS			
		Shogun 2: Total War	Win			
22		*Crysis 2*	Win, PS3, X360			
		F.E.A.R. 3	Win, PS3, X360			
29		*Arcania: Gothic 4*	PS3			
		WWE All Stars	PS2, PS3, PSP, X360, Wii			
31		*Final Fantasy XIV*	PS3			

APRIL	12	*Brink*	PS3, X360, Win			
	20	*Portal 2*	PS3, X360, Win, Mac			
MAY	24	*Kung Fu Panda 2: The Kaboom of Doom*	PS3, X360, Wii, NDS			
	28	*Back at the Barnyard: Big Time Otis*	NDS			
SEPTEMBER	13	*Rage*	Win, PS3, X360			

Unscheduled releases

Title	Platforms	Genre	References
Afterfall Insanity	Win, Mac, Lin, X360, PS3	Role-playing game	[4]
Age of Pirates: Captain Blood	Win, X360	Action-Adventure	[5] [6]
Batman: Arkham City	Win, PS3, X360	Action-adventure, Beat 'em up, stealth	[7]
Darkspore	Win	Action, RPG	[8]
Devil's Third	PS3, X360	Third-person shooter	[9]
Diablo III	Win	Action role-playing	[10]
Driver: San Francisco	X360, PS3, Win, Wii, OnLive, Mac OS X	Sandbox, action, driving	[11]
Duke Nukem Forever	Win, PS3, X360	First person shooter, action	[12]
Gears of War 3	X360	Third person shooter, action	[13]
Guild Wars 2	Win	MMORPG	[14]
Hitman 5	PS3, X360	Action Stealth	[15]
Infamous 2	PS3	Open world, Action, RPG	[16]
I Am Alive	PS3, X360	First Person Action Survival	[17]
L.A. Noire	PS3, X360	Third-person Detective Thriller	[18]
Mario Sports Mix	Wii	Sports	[19]
Mass Effect 3	PS3, X360, Win	Action RPG	[20]
Max Payne 3	PS3, X360, Win	Third-person shooter	[21]
Might & Magic: Heroes VI	Win	Turn-based strategy	[22]

Mortal Kombat	PS3, X360	Fighting	[23]
MotorStorm: Apocalypse	PS3	Racing	[24] [25]
NBA Elite 11	PS3, X360	Sports	[26] [27]
NeverDead	PS3, X360	Third-person shooter	[28]
PlayStation Move Heroes	PS3	Action-adventure	[29]
Pokémon Black and White	NDS	Role-playing game	[30] [31] [32]
Ratchet & Clank: All 4 One	PS3	Action-adventure, platformer	[33]
Resistance 3	PS3	First-person shooter, Sci-Fi	[34]
SOCOM 4	PS3	Third-person shooter, Real-time tactics	[35]
Sorcery	PS3	Action-adventure	[36]
Star Wars: The Old Republic	Win	Massively multiplayer online role-playing game	[37]
Stronghold 3	Win	Real-Time Strategy	[38]
Subversion	TBD	Real-Time Strategy	[39]
The Grinder	Win, PS3, X360, Wii	First-person shooter survival horror, Third-person shooter	[40]
The Legend of Zelda: Skyward Sword	Wii	Action-Adventure	[41]
The Witcher 2	Win	Action RPG	[42]
Torchlight 2	Win	Action RPG	[43]
Twisted Metal	PS3	Vehicle combat	[44]

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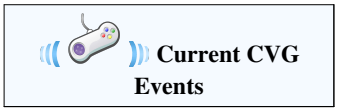

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