= Sega Saturn =

The Sega Saturn (?????? , Sega Sat?n) is a 32 @-@ bit fifth @-@ generation home video game console that was developed by Sega and released on November 22 , 1994 in Japan , May 11 , 1995 in North America , and July 8 , 1995 in Europe as the successor to the successful Sega Genesis . The Saturn has a dual @-@ CPU architecture and eight processors . Its games are in CD @-@ ROM format , and its game library contains several arcade ports as well as original titles .

Development of the Saturn began in 1992 , the same year Sega 's groundbreaking 3D Model 1 arcade hardware debuted . Designed around a new CPU from Japanese electronics company Hitachi , another video display processor was incorporated into the system 's design in early 1994 to better compete with Sony 's forthcoming PlayStation . The Saturn was initially successful in Japan , but failed to sell in large numbers in the United States after its surprise May 1995 launch , four months before its scheduled release date . After the debut of the Nintendo 64 in late 1996 , the Saturn rapidly lost market share in the U.S. , where it was discontinued in 1998 . Having sold 9 @.@ 26 million units worldwide , the Saturn is considered a commercial failure . The failure of Sega 's development teams to release a game in the Sonic the Hedgehog series , known in development as Sonic X @-@ treme , has been considered a factor in the console 's poor performance .

Although the system is remembered for several well @-@ regarded games , including Nights into Dreams ... , the Panzer Dragoon series , and the Virtua Fighter series , the Saturn 's reputation is mixed due to its complex hardware design and limited third @-@ party support . Sega 's management has been criticized for its decision @-@ making during the system 's development and cancellation .

= = History = =

= = = Background = = =

Released in 1988 , the Genesis (known as the Mega Drive in Europe and Japan) was Sega 's entry into the fourth generation of video game consoles . In mid @-@ 1990 , Sega CEO Hayao Nakayama hired Tom Kalinske as president and CEO of Sega of America . Kalinske developed a four @-@ point plan for sales of the Genesis : lower the price of the console , create a U.S.-based team to develop games targeted at the American market , continue aggressive advertising campaigns , and sell Sonic the Hedgehog with the console . The Japanese board of directors initially disapproved of the plan , but all four points were approved by Nakayama , who told Kalinske , " I hired you to make the decisions for Europe and the Americas , so go ahead and do it . " 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 Super Nintendo Entertainment System (SNES) decided to purchase a Genesis instead . However , the release of a CD @-@ based add @-@ on for the Genesis , the Sega CD (known as Mega @-@ CD outside of North America) , had been commercially disappointing .

Sega also experienced success with arcade games . In 1992 and 1993 , the company 's new Sega Model 1 arcade system board showcased Sega AM2 's Virtua Racing and Virtua Fighter (the first 3D fighting game) , which played a crucial role in popularizing 3D polygonal graphics . In particular , Virtua Fighter garnered praise for its simple three @-@ button control scheme , with the game 's strategy coming from the intuitively observed differences between characters that felt and acted differently rather than the more ornate combos of two @-@ dimensional competitors . Despite its crude visuals ? with characters composed of fewer than 1 @,@ 200 polygons ? Virtua Fighter 's fluid animation and relatively realistic depiction of distinct fighting styles gave its combatants a lifelike presence considered impossible to replicate with sprites . The Model 1 was an expensive system board , and bringing home releases of its games to the Genesis required more than its hardware could handle . Several alternatives helped to bring Sega 's newest arcade games to the console , such as the Sega Virtua Processor chip used for Virtua Racing , and eventually the Sega

32X add @-@ on .

= = = Development = = =

Development of the Saturn was supervised by Hideki Sato , Sega 's director and deputy general manager of research and development . According to Sega project manager Hideki Okamura , the Saturn project started over two years before the system was showcased at the Tokyo Toy Show in June 1994 . The name " Saturn " was initially the system 's codename during development in Japan , but was eventually chosen as the official product name . In 1993 , Sega and Japanese electronics company Hitachi formed a joint venture to develop a new CPU for the Saturn , which resulted in the creation of the " SuperH RISC Engine " (or SH @-@ 2) later that year . The Saturn was ultimately designed around a dual @-@ SH2 configuration . According to Kazuhiro Hamada , Sega 's section chief for Saturn development during the system 's conception , " the SH @-@ 2 was chosen for reasons of cost and efficiency . The chip has a calculation system similar to a DSP [digital signal processor] , but we realized that a single CPU would not be enough to calculate a 3D world . " Although the Saturn 's design was largely finished before the end of 1993 , reports in early 1994 of the technical capabilities of Sony 's upcoming PlayStation console prompted Sega to include another video display processor (VDP) to improve the system 's 2D performance and texture @-@ mapping . CD @-@ ROM @-@ based and cartridge @-@ only versions of the Saturn hardware were considered for simultaneous release at one point during the system 's development , but this idea was discarded due to concerns over the lower quality and higher price of cartridge @-@ based games .

According to Kalinske , Sega of America " fought against the architecture of Saturn for quite some time " . Seeking an alternative graphics chip for the Saturn , Kalinske attempted to broker a deal with Silicon Graphics , but Sega Enterprises rejected the proposal . Silicon Graphics subsequently collaborated with Nintendo on the Nintendo 64 . Kalinske , Sony Electronic Publishing 's Olaf Olafsson , and Sony America 's Micky Schulhof had previously discussed development of a joint " Sega / Sony hardware system " , which never came to fruition due to Sega 's desire to create hardware that could accommodate both 2D and 3D visuals and Sony 's competing notion of focusing entirely on 3D technology . Publicly , Kalinske defended the Saturn 's design : " Our people feel that they need the multiprocessing to be able to bring to the home what we 're doing next year in the arcades . "

In 1993 , Sega restructured its internal studios in preparation for the Saturn 's launch . To ensure high @-@ quality 3D games would be available early in the Saturn 's life , and to create a more energetic working environment , developers from Sega 's arcade division were instructed to create console games . New teams , such as Panzer Dragoon developer Team Andromeda , were formed during this time .

In January 1994 , Sega began to develop an add @-@ on for the Genesis , the Sega 32X , which would serve as a less @-@ expensive entry into the 32 @-@ bit era . The decision to create the add @-@ on was made by Nakayama and widely supported by Sega of America employees . According to former Sega of America producer Scot Bayless , Nakayama was worried that the Saturn would not be available until after 1994 and that the recently released Atari Jaguar would reduce Sega 's hardware sales . As a result , Nakayama ordered his engineers to have the system ready for launch by the end of the year . The 32X would not be compatible with the Saturn , but Sega executive Richard Brudvik @-@ Lindner pointed out that the 32X would play Genesis titles , and had the same system architecture as the Saturn . This was justified by Sega 's statement that both platforms would run at the same time , and that the 32X would be aimed at players who could not afford the more expensive Saturn . According to Sega of America research and development head Joe Miller , the 32X served a role in assisting development teams to familiarize themselves with the dual SH @-@ 2 architecture also used in the Saturn . Because both machines shared many of the same parts and were preparing to launch around the same time , tensions emerged between Sega of America and Sega Enterprises when the Saturn was given priority .

= = = Launch = = =

 Sega released the Saturn in Japan on November 22 , 1994 , at a price of JP ¥ 44 @,@ 800 . Virtua Fighter , a nearly indistinguishable port of the popular arcade game , sold at a nearly one @-@ to @-@ one ratio with the Saturn hardware at launch and was crucial to the system 's early success in Japan . Along with Virtua Fighter , Sega had wanted the launch to include both Clockwork Knight and Panzer Dragoon , but the latter was not ready in time . Aside from Virtua Fighter , the only first @-@ party title available on launch day was Wan Chai Connection . Fueled by the popularity of Virtua Fighter , Sega 's initial shipment of 200 @,@ 000 Saturn units sold out on the first day . Sega waited until the December 3 launch of the PlayStation to ship more units ; when both were sold side @-@ by @-@ side , the Saturn proved to be the more popular system . Meanwhile , the 32X was released on November 21 , 1994 in North America , December 3 , 1994 in Japan , and January 1995 in PAL territories , and was sold at less than half of the Saturn 's launch price . After the holiday season , however , interest in the 32X rapidly declined . 500 @,@ 000 Saturn units were sold in Japan by the end of 1995 (compared to 300 @,@ 000 PlayStation units) , and sales exceeded 1 million within the following six months . There were conflicting reports that the PlayStation enjoyed a higher sell @-@ through rate , and the system gradually began to overtake the Saturn in sales during 1995 . Sony attracted many third @-@ party developers to the PlayStation with a liberal $ 10 licensing fee , excellent development tools , and the introduction of a revolutionary 7- to 10 @-@ day order system that allowed publishers to meet demand more efficiently than the 10- to 12 @-@ week lead times for cartridges that had previously been standard in the Japanese video game industry .
 In March 1995 , Sega of America CEO Tom Kalinske announced that the Saturn would be released in the U.S. on " Saturnday " (Saturday) September 2 , 1995 . However , Sega Enterprises mandated an early launch to give the Saturn an advantage over the PlayStation . Therefore , at the first Electronic Entertainment Expo (E3) in Los Angeles on May 11 , 1995 , Kalinske gave a keynote presentation for the upcoming Saturn in which he revealed the release price at US $ 399 ($ 449 including a bundled copy of Virtua Fighter) , and described the features of the console . Kalinske also revealed that , due to " high consumer demand " , Sega had already shipped 30 @,@ 000 Saturns to Toys " R " Us , Babbage 's , Electronics Boutique , and Software Etc. for immediate release . This announcement upset retailers who were not informed of the surprise release , including Best Buy and Walmart ; KB Toys responded by dropping Sega from its lineup . Sony subsequently unveiled the retail price for the PlayStation : Sony Computer Entertainment America president Steve Race took the stage , said " $ 299 " , and then walked away to applause . The Saturn 's release in Europe also came before the previously announced North American date , on July 8 , 1995 , at a price of GB ? 399 @.@ 99 . European retailers and press did not have time to promote the system or its games , leading to poor sales . After its European launch on September 29 , by early November 1995 the PlayStation had already outsold the Saturn by a factor of three in the United Kingdom , where it was reported that Sony allocated ? 20 million to market the system during the holiday season compared to Sega 's ? 4 million .
 The Saturn 's U.S. launch was accompanied by a reported $ 50 million advertising campaign that included coverage in publications such as Wired and Playboy . Because of the early launch , the Saturn had only six games (all published by Sega) available to start as most third @-@ party games were slated to be released around the original launch date . Virtua Fighter 's relative lack of popularity in the West , combined with a release schedule of only two games between the surprise launch and September 1995 , prevented Sega from capitalizing on the Saturn 's early timing . Within two days of its September 9 , 1995 launch in North America , the PlayStation (backed by a large marketing campaign) sold more units than the Saturn had in the five months following its surprise launch , with almost all of the initial shipment of 100 @,@ 000 units being presold in advance , and the rest selling @-@ out across the U.S.
 A high @-@ quality port of the Namco arcade game Ridge Racer contributed to the PlayStation 's early success , and garnered favorable comparisons in the media to the Saturn version of Sega 's Daytona USA , which was considered inferior to its arcade counterpart . Namco , a longtime arcade

competitor with Sega , also unveiled the Namco System 11 arcade board , which was based on raw PlayStation hardware . Although the System 11 was technically inferior to Sega 's Model 2 arcade board , its lower price made it an attractive prospect for smaller arcades . Following a 1994 acquisition of Sega developers , Namco released Tekken for the System 11 and PlayStation . Directed by former Virtua Fighter designer Seiichi Ishii , Tekken was intended to be a fundamentally similar title , with the addition of detailed textures and twice the frame rate . Tekken surpassed Virtua Fighter in popularity due to its superior graphics and nearly arcade @-@ perfect console port , becoming the first million @-@ selling PlayStation title . On October 2 , 1995 Sega announced a Saturn price reduction to $ 299 . Moreover , high @-@ quality Saturn ports of the Sega Model 2 arcade hits Sega Rally Championship , Virtua Cop , and Virtua Fighter 2 (running at 60 frames per second at a high resolution) were available by the end of the year ? and were generally regarded as superior to any competitors on the PlayStation . Notwithstanding a subsequent increase in Saturn sales during the 1995 holiday season , these games were not enough to reverse the PlayStation 's decisive lead . By 1996 , the PlayStation had a considerably larger library than the Saturn , although Sega hoped to generate increased interest in the Saturn with upcoming exclusives such as Nights into Dreams .... Within its first year , the PlayStation secured over 20 % of the entire U.S. video game market . On the first day of the May 1996 E3 show , Sony announced a PlayStation price reduction to $ 199 ; on the second day of the show Sega announced they were matching this price , even though Saturn hardware was more expensive to manufacture . Sony 's price reduction was in turn a reaction to the release of the Model 2 Saturn in Japan at a price roughly equivalent to $ 199 .

= = = Changes at Sega = = =

In spite of the launch of the PlayStation and the Saturn , sales of 16 @-@ bit hardware / software continued to account for 64 % of the video game market in 1995 . Sega underestimated the continued popularity of the Genesis , and did not have the inventory to meet demand for the product . Sega was able to capture 43 % of the dollar share of the U.S. video game market and sell more than 2 million Genesis units in 1995 , but Kalinske estimated that " we could have sold another 300 @,@ 000 Genesis systems in the November / December timeframe . " Nakayama 's decision to focus on the Saturn over the Genesis , based on the systems ' relative performance in Japan , has been cited as the major contributing factor in this miscalculation .

Due to long @-@ standing disagreements with Sega Enterprises , Kalinske lost most of his interest in his work as CEO of Sega of America . By the spring of 1996 , rumors were circulating that Kalinske planned to leave Sega , and a July 13 article in the press reported speculation that Sega Enterprises was planning significant changes to Sega of America 's management team . On July 16 , 1996 Sega announced that Shoichiro Irimajiri had been appointed chairman and CEO of Sega of America , while Kalinske would be leaving Sega after September 30 of that year . A former Honda executive , Irimajiri had been actively involved with Sega of America since joining Sega in 1993 . Sega also announced that David Rosen and Nakayama had resigned from their positions as chairman and co @-@ chairman of Sega of America , though both men remained with the company . Bernie Stolar , a former executive at Sony Computer Entertainment of America , was named Sega of America 's executive vice president in charge of product development and third @-@ party relations . Stolar , who had arranged a six @-@ month PlayStation exclusivity deal for Mortal Kombat 3 and helped build close relations with Electronic Arts while at Sony , was perceived as a major asset by Sega officials . Finally , Sega of America made plans to expand its PC software business .

Stolar was not supportive of the Saturn due to his belief that the hardware was poorly designed , and publicly announced at E3 1997 that " The Saturn is not our future . " While Stolar had " no interest in lying to people " about the Saturn 's prospects , he continued to emphasize quality games for the system , and subsequently reflected that " we tried to wind it down as cleanly as we could for the consumer . " At Sony , Stolar opposed the localization of certain Japanese PlayStation titles that he felt would not represent the system well in North America , and he advocated a similar policy for the Saturn during his time at Sega , although he later sought to distance himself from this perception

. These changes were accompanied by a softer image that Sega was beginning to portray in its advertising , including removing the " Sega ! " scream and holding press events for the education industry . Marketing for the Saturn in Japan also changed with the introduction of " Segata Sanshiro " (played by Hiroshi Fujioka) as a character in a series of TV advertisements starting in 1997 ; the character would eventually star in a Saturn video game .

Temporarily abandoning arcade development , Sega AM2 head Yu Suzuki began developing several Saturn @-@ exclusive games , including a role @-@ playing game in the Virtua Fighter series . Initially conceived as an obscure prototype called " The Old Man and the Peach Tree " and intended to address the flaws of contemporary Japanese RPGs (such as poor non @-@ player character artificial intelligence routines) , Virtua Fighter RPG evolved into a planned 11 @-@ part , 45 @-@ hour " revenge epic in the tradition of Chinese cinema " ? which Suzuki hoped would become the Saturn 's killer app . The game was eventually released as Shenmue for the Saturn 's successor , the Dreamcast .

=== Cancellation of Sonic X @-@ treme ===

Sega tasked the U.S.-based Sega Technical Institute (STI) with developing what would have been the first fully 3D entry in its popular Sonic the Hedgehog series . The game , known as Sonic X @-@ treme , was moved to the Saturn after several prototypes were discarded . Featuring a fisheye lens camera system that caused levels to rotate with Sonic 's movement , the project was set back after Sonic creator Yuji Naka refused to allow the developers access to the engine he created for Nights into Dreams .... Sega Enterprises executives who visited STI in March 1996 were unimpressed by X @-@ treme 's progress , so Nakayama ordered that the entire game be reworked around the engine created specifically for its boss battles , and employees worked between 16 and 20 hours a day in an attempt to meet their December 1996 deadline . After programmer Ofer Alon quit and designer Chris Senn caught pneumonia , the project was cancelled in early 1997 . Sonic Team started work on an original 3D Sonic title for the Saturn (which eventually became Sonic Adventure) , but development was shifted to the Dreamcast . STI was officially disbanded in 1996 as a result of changes in management at Sega of America .

Journalists and fans have speculated about the impact a completed X @-@ treme might have had on the market . David Houghton of GamesRadar described the prospect of " a good 3D Sonic game " on the Saturn as " a ' What if ... ' situation on a par with the dinosaurs not becoming extinct . " IGN 's Tavis Fahs called X @-@ treme " the turning point not only for Sega 's mascot and their 32 @-@ bit console , but for the entire company " , although he also noted that the game served as " an empty vessel for Sega 's ambitions and the hopes of their fans " . Dave Zdyrko , who operated a prominent website for Saturn fans during the system 's lifespan , offered a more nuanced perspective : " I don 't know if [X @-@ treme] could 've saved the Saturn , but ... Sonic helped make the Genesis and it made absolutely no sense why there wasn 't a great new Sonic title ready at or near the launch of the [Saturn] " . In a 2007 retrospective , producer Mike Wallis maintained that X @-@ treme " definitely would have been competitive " with Nintendo 's Super Mario 64 .

=== Decline ===

From 1993 to early 1996 , although Sega 's revenue declined as part of an industry @-@ wide slowdown , the company retained control of 38 % of the U.S. video game market (compared to Nintendo 's 30 % and Sony 's 24 %) . 800 @,@ 000 PlayStation units were sold in the U.S. by the end of 1995 , compared to 400 @,@ 000 Saturn units . In part due to an aggressive price war , the PlayStation outsold the Saturn by two @-@ to @-@ one in 1996 , while Sega 's 16 @-@ bit sales declined markedly . By the end of 1996 , the PlayStation had sold 2 @.@ 9 million units in the U.S. , more than twice the 1 @.@ 2 million units sold by the Saturn . After the launch of the Nintendo 64 in 1996 , sales of the Saturn and Sega 's 32 @-@ bit software were sharply reduced , while the PlayStation outsold the Saturn by three @-@ to @-@ one in the U.S. market in 1997 . The 1997 release of Final Fantasy VII significantly increased the PlayStation 's popularity in Japan . As of

August 1997 , Sony controlled 47 % of the console market , Nintendo controlled 40 % , and Sega controlled only 12 % . Neither price cuts nor high @-@ profile game releases were proving helpful to the Saturn 's success . Reflecting decreased demand for the system , worldwide Saturn shipments during March to September 1997 declined from 2 @.@ 35 million to 600 @,@ 000 versus the same period in 1996 ; shipments in North America declined from 800 @,@ 000 to 50 @,@ 000 . Due to the Saturn 's poor performance in North America , 60 of Sega of America 's 200 employees were laid off in the fall of 1997 .

As a result of the company 's deteriorating financial situation , Nakayama resigned as president of Sega in January 1998 in favor of Irimajiri . Stolar would subsequently accede to president of Sega of America . Following five years of generally declining profits , in the fiscal year ending March 31 , 1998 Sega suffered its first parent and consolidated financial losses since its 1988 listing on the Tokyo Stock Exchange . Due to a 54 @.@ 8 % decline in consumer product sales (including a 75 @.@ 4 % decline overseas) , the company reported a net loss of ¥ 43 @.@ 3 billion (US $ 327 @.@ 8 million) and a consolidated net loss of ¥ 35 @.@ 6 billion (US $ 269 @.@ 8 million) . Shortly before announcing its financial losses , Sega revealed that it was discontinuing the Saturn in North America , with the goal of preparing for the launch of its successor . Only 12 Saturn games were released in North America in 1998 (Magic Knight Rayearth being the final official release) , compared to 119 in 1996 . The Saturn would last longer in Japan and Europe . Rumors about the upcoming Dreamcast ? spread mainly by Sega itself ? were leaked to the public before the last Saturn games were released . The Dreamcast was released on November 27 , 1998 in Japan and on September 9 , 1999 in North America . The decision to abandon the Saturn effectively left the Western market without Sega games for over one year . Sega suffered an additional ¥ 42 @.@ 881 billion consolidated net loss in the fiscal year ending March 1999 , and the company announced plans to eliminate 1 @,@ 000 jobs , or nearly one @-@ fourth of its workforce .

Worldwide Saturn sales include at least the following amounts in each territory : 5 @.@ 75 million in Japan (surpassing the Genesis ' sales of 3 @.@ 58 million in the country) , 1 @.@ 8 million in the United States , 1 million in Europe , and 530 @,@ 000 elsewhere . With lifetime sales of 9 @.@ 26 million units , the Saturn is considered a commercial failure , although its install base in Japan surpassed the Nintendo 64 's 5 @.@ 54 million . Lack of distribution has been cited as a significant factor contributing to the Saturn 's failure , as the system 's surprise launch damaged Sega 's reputation with key retailers . Conversely , Nintendo 's long delay in releasing a 3D console and damage caused to Sega 's reputation by poorly supported add @-@ ons for the Genesis are considered major factors allowing Sony to gain a foothold in the market .

= = Technical specifications = =

Featuring a total of eight processors the Saturn 's main central processing units are two Hitachi SH @-@ 2 microprocessors clocked at 28 @.@ 6 MHz and capable of 56 MIPS . The system contains a Motorola 68EC000 running at 11 @.@ 3 MHz as a sound controller , a custom sound processor with an integrated Yamaha FH1 DSP running at 22 @.@ 6 MHz capable of up to 32 sound channels with both FM synthesis and 16 @-@ bit PCM sampling at a maximum rate of 44 @.@ 1 kHz , and two video display processors , the VDP1 (which handles sprites , textures and polygons) and the VDP2 (which handles backgrounds) . Its double @-@ speed CD @-@ ROM drive is controlled by a dedicated Hitachi SH @-@ 1 processor to reduce load times . The Saturn 's System Control Unit (SCU) , which controls all buses and functions as a co @-@ processor of the main SH @-@ 2 CPU , has an internal DSP running at 14 @.@ 3 MHz . The Saturn contains a cartridge slot for memory expansion , 16 Mbit of work random @-@ access memory (RAM) , 12 Mbit of video RAM , 4 Mbit of RAM for sound functions , 4 Mbit of CD buffer RAM and 256 Kbit (32 KB) of battery backup RAM . Its video output , provided by a stereo AV cable , displays at resolutions from 320 × 224 to 704 × 224 pixels , and is capable of displaying up to 16 @.@ 77 million colors simultaneously . Physically , the Saturn measures 260 mm × 230 mm × 83 mm (10 @.@ 2 in × 9 @.@ 1 in × 3 @.@ 3 in) . The Saturn was sold packaged with an instruction manual , one control pad , a stereo AV cable , and its 100V AC power supply , with a power consumption of approximately 15W .

The Saturn had technically impressive hardware at the time of its release , but its complexity made harnessing this power difficult for developers accustomed to conventional programming . The greatest disadvantage was that both CPUs shared the same bus and were unable to access system memory at the same time . Making full use of the 4 kB of cache memory in each CPU was critical to maintaining performance . For example , Virtua Fighter used one CPU for each character , while Nights used one CPU for 3D environments and the other for 2D objects . The Saturn 's Visual Display Processor 2 (VDP2) , which can generate and manipulate backgrounds , has also been cited as one of the system 's most important features .

The Saturn 's design elicited mixed commentary among game developers and journalists . Developers quoted by Next Generation in December 1995 described the Saturn as " a real coder 's machine " for " those who love to get their teeth into assembly and really hack the hardware " , with " more flexibility " and " more calculating power than the PlayStation " . The Saturn 's sound board was also widely praised . By contrast , Lobotomy Software programmer Ezra Dreisbach described the Saturn as significantly slower than the PlayStation , whereas Kenji Eno of WARP observed little difference between the two systems . In particular , Dreisbach criticized the Saturn 's use of quadrilaterals as its basic geometric primitive , in contrast to the triangles rendered by the PlayStation and the Nintendo 64 . 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 . During early Saturn development , programming in assembly could offer a two @-@ to @-@ fivefold speed increase over C language . The Saturn hardware is considered extremely difficult to emulate . Sega responded to complaints about the difficulty of programming for the Saturn by writing new graphics libraries which were claimed to make development easier . Sega of America also purchased a United Kingdom @-@ based development firm , Cross Products , to produce the Saturn 's official development system . Despite these challenges , Treasure CEO Masato Maegawa stated that the Nintendo 64 was more difficult to develop for than the Saturn . Traveller 's Tales ' Jon Burton opined that while the PlayStation was easier " to get started on ... you quickly reach [its] limits " , whereas the Saturn 's " complicated " hardware had the ability to " improve the speed and look of a game when all used together correctly . " A major point of criticism was the Saturn 's use of 2D sprites to generate polygons and simulate 3D space . The PlayStation functioned in a similar manner , but also featured a dedicated " Geometry Transfer Engine " that rendered additional polygons . As a result , several analysts described the Saturn as an " essentially " 2D system .

Several models of the Saturn were produced in Japan . An updated model in a recolored light gray (officially white) was released in Japan at a price of ￥ 20 @,@ 000 in order to reduce the system 's cost and raise its appeal among women and younger children . Two models were released by third parties : Hitachi released a model known as the Hi @-@ Saturn (a smaller Saturn model equipped with a car navigation function) , while JVC released the V @-@ Saturn . Saturn controllers came in various color schemes to match different models of the console . The system also supports several accessories . A wireless controller powered by AA batteries utilizes infrared signal to connect to the Saturn . Designed to work with Nights , the Saturn 3D Pad is a fully functional controller that includes both a control pad and an analog stick for directional input . Sega also released several versions of arcade sticks as peripherals , including the Virtua Stick , the Virtua Stick Pro , the Mission Analog Stick , and the Twin Stick . Sega also created a light gun peripheral known as the " Virtua Gun " for use with shooting games such as Virtua Cop and The Guardian , as well as the Arcade Racer , a wheel for racing games . The Play Cable allows for two Saturn consoles to be connected for multiplayer gaming across two screens , while a multitap allows up to six players to play games on the same console . The Saturn was designed to support up to 12 players on a single console , by using two multitaps . RAM cartridges expand the amount of memory in the system . Other accessories include a keyboard , mouse , floppy disk drive , and movie card .

Like the Genesis , the Saturn had an Internet @-@ based gaming service . 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 . It could also be used for web browsing , sending email , and online chat . Because the NetLink was released before the Saturn keyboard ,

Sega produced a series of CDs containing hundreds of website addresses so that Saturn owners could browse with the joypad . The NetLink functioned with five games : Daytona USA , Duke Nukem 3D , Saturn Bomberman , Sega Rally , and Cyber Troopers Virtual @-@ On : Operation Moongate . Sega allegedly developed a variant of the Saturn featuring a built @-@ in NetLink modem under the code name " Sega Pluto " , but it was never released .

Sega developed an arcade board based on the Saturn 's hardware , called the Sega ST @-@ V (or Titan) , which was intended as an affordable alternative to Sega 's Model 2 arcade board as well as a testing ground for upcoming Saturn software . The Titan was criticized for its comparatively weak performance by Sega AM2 's Yu Suzuki and was overproduced by Sega 's arcade division . Because Sega already possessed the Die Hard license , members of Sega AM1 working at the Sega Technical Institute developed Die Hard Arcade for the Titan , in order to clear out excess inventory . This goal was achieved , as Die Hard became the most successful Sega arcade game produced in the United States at that point . Other games released for the Titan include Golden Axe : The Duel and Virtua Fighter Kids .

= = Game library = =

Much of the Saturn 's library comes from Sega 's arcade ports , including Daytona USA , The House of the Dead , Last Bronx , Sega Rally Championship , the Virtua Cop series , the Virtua Fighter series , and Virtual @-@ On . The Saturn ports of 2D Capcom fighting games including Darkstalkers 3 , Marvel Super Heroes vs. Street Fighter , and Street Fighter Alpha 3 were noted for their faithfulness to their arcade counterparts . Fighters Megamix , developed by Sega AM2 for the Saturn rather than arcades , combined characters from Fighting Vipers and Virtua Fighter to positive reviews . Highly rated Saturn exclusives include Panzer Dragoon Saga , Dragon Force , Guardian Heroes , Nights , Panzer Dragoon II Zwei , and Shining Force III . Although originally made for the PlayStation , games such as Castlevania : Symphony of the Night , Resident Evil , and Wipeout 2097 received Saturn ports with mixed results . Tomb Raider was created with the Saturn in mind , but the PlayStation version ultimately became better known to the public . Lobotomy Software 's PowerSlave featured some of the most impressive 3D graphics on the system , leading Sega to contract the developer to produce Saturn ports of Duke Nukem 3D and Quake . While Electronic Arts ' limited support for the Saturn and Sega 's failure to develop a football game for the 1996 fall season allowed Sony to take the lead in the sports genre , " Sega Sports " published Saturn sports games including the well @-@ regarded World Series Baseball and Sega Worldwide Soccer series . With about 600 official releases , the Saturn 's library is nearly twice as large as the Nintendo 64 's .

Due to the cancellation of Sonic X @-@ treme , the Saturn lacks an exclusive Sonic the Hedgehog platformer , containing only a graphically enhanced port of the Genesis title Sonic 3D Blast , the compilation Sonic Jam , and a racing game called Sonic R. The platformer Bug ! received attention for its eponymous main character being a potential mascot for the Saturn , but it failed to catch on as the Sonic series had . Considered one of the most important Saturn releases , Sonic Team developed Nights into Dreams ... , a score attack game that attempted to simulate both the joy of flying and the fleeting sensation of dreams . The gameplay of Nights involves steering the imp @-@ like androgynous protagonist , Nights , as it flies on a mostly 2D plane across surreal stages broken into four segments each . The levels repeat for as long as an in @-@ game time limit allows , while flying over or looping around various objects in rapid succession earns additional points . Although it lacked the fully 3D environments of Nintendo 's Super Mario 64 , Nights ' emphasis on unfettered movement and graceful acrobatic techniques showcased the intuitive potential of analog control . Sonic Team 's Burning Rangers , a fully 3D action @-@ adventure game involving a team of outer @-@ space firefighters , garnered praise for its transparency effects and distinctive art direction , but was released in limited quantities late in the Saturn 's lifespan and criticized for its short length .

Some of the games that made the Saturn popular in Japan , such as Grandia and the Sakura Wars series , never saw a Western release due to Sega of America 's policy of not localizing RPGs and other Japanese titles that might have damaged the system 's reputation in North America . Despite appearing first on the Saturn , games such as Dead or Alive , Grandia , and Lunar : Silver Star Story

Complete only saw a Western release on the PlayStation . Working Designs localized several Japanese Saturn games before a public feud between Sega of America 's Bernie Stolar and Working Designs president Victor Ireland resulted in the company switching their support to the PlayStation . Panzer Dragoon Saga was praised as perhaps the finest RPG for the system due to its cinematic presentation , evocative plot , and unique battle system ? with a tactical emphasis on circling around opponents to identify weak points and the ability to " morph " the physical attributes of the protagonist 's dragon companion during combat ? but Sega released fewer than 20 @,@ 000 retail copies of the game in North America in what IGN 's Levi Buchanan characterized as one example of the Saturn 's " ignominious send @-@ off " in the region . Similarly , only the first of three installments of Shining Force III was released outside Japan . The Saturn 's library also garnered criticism for its lack of sequels to high @-@ profile Genesis @-@ era Sega franchises , with Sega Enterprises ' cancellation of a planned third installment in Sega of America 's popular Eternal Champions series cited as a significant source of controversy .

Later ports of Saturn games including Guardian Heroes , Nights , and Shin Megami Tensei : Devil Summoner : Soul Hackers continued to garner positive reviews . Partly due to rarity , Saturn titles such as Panzer Dragoon Saga and Radiant Silvergun have been noted for their cult following . Due to the system 's commercial failure and hardware limitations , planned Saturn versions of games such as Resident Evil 2 , Shenmue , Sonic Adventure , and Virtua Fighter 3 were cancelled and moved to the Dreamcast .

= = Reception and legacy = =

At the time of its release , Famicom Ts?shin awarded the Saturn console 24 out of 40 possible points , higher than the PlayStation 's 19 out of 40 . In June 1995 , Dennis Lynch of the Chicago Tribune and Albert Kim of Entertainment Weekly both praised the Saturn as the most advanced gaming console available , with the former complimenting its double @-@ speed CD @-@ ROM drive and " intense surround @-@ sound capabilities " and the latter citing Panzer Dragoon as a " lyrical and exhilarating epic " demonstrating the ability of new technology to " transform " the industry . In December 1995 , Next Generation evaluated the system with three and a half stars out of a possible five , highlighting Sega 's marketing and arcade background as strengths but the system 's complexity as a weakness . Electronic Gaming Monthly 's December 1996 Buyer 's Guide had four reviewers rate the Saturn 8 , 6 , 7 , and 8 out of 10 ; these ratings were inferior to those of the PlayStation , which was scored 9 , 10 , 9 , and 9 in the same review . By December 1998 , Electronic Gaming Monthly 's reviews were more mixed , with reviewers citing the lack of titles for the system as a major issue . According to EGM reviewer Crispin Boyer , " the Saturn is the only system that can thrill me one month and totally disappoint me the next . "

Retrospective feedback of the Saturn is mixed , but generally praises its game library . According to Greg Sewart of 1UP.com , " the Saturn will go down in history as one of the most troubled , and greatest , systems of all time . " In 2009 , IGN chose the Saturn to be their 18th best video game console of all time , praising its unique game library . According to the reviewers , " While the Saturn ended up losing the popularity contest to both Sony and Nintendo ... Nights into Dreams , the Virtua Fighter and Panzer Dragoon series are all examples of exclusive titles that made the console a fan favorite . " The staff of Edge noted " hardened loyalists continue to reminisce about the console that brought forth games like Burning Rangers , Guardian Heroes , Dragon Force and Panzer Dragoon Saga . " In 2015 , The Guardian 's Keith Stuart declared " the Saturn has perhaps the strongest line up of 2D shooters and fighting games in console history . " Retro Gamer 's Damien McFerran stated " Even today , despite the widespread availability of sequels and re @-@ releases on other formats , the Sega Saturn is still a worthwhile investment for those who appreciate the unique gameplay styles of the companies that supported it . " IGN 's Adam Redsell wrote " [Sega 's] devil @-@ may @-@ care attitude towards game development in the Saturn and Dreamcast eras is something that we simply do not see outside of the indie scene today . " Necrosoft Games director Brandon Sheffield expounded that " The Saturn was a landing point for games that were too ' adult ' in content for other systems , as it was the only one that allowed an 18 + rating for content in Japan ...

some games , like Enemy Zero used it to take body horror to new levels , an important step toward the expansion of games and who they served . " Sewart praised the Saturn 's first @-@ party titles as " Sega 's shining moment as a game developer " , with Sonic Team demonstrating its creative range and AM2 producing numerous technically impressive arcade ports , but also commented on the many Japan @-@ exclusive Saturn releases , which he connected with a subsequent boom in the game import market . IGN 's Travis Fahs was critical of the Saturn library 's lack of " fresh ideas " and " precious few high @-@ profile franchises " , in contrast to what he described as Sega 's more creative Dreamcast output .

 Criticism has befallen Sega 's management regarding both the creation and handling of the Saturn . McFerran criticizes Sega 's management at the time of the Saturn 's development , claiming that they had " fallen out of touch with both the demands of the market and the industry " . Bernie Stolar has also been criticized for his decision to end support for the Saturn . According to Fahs , " Stolar 's decision to abandon the Saturn made him a villain to many Sega fans , but ... it was better to regroup than to enter the next fight battered and bruised . Dreamcast would be Stolar 's redemption . " Stolar has defended his decision , stating , " I felt Saturn was hurting the company more than helping it . That was a battle that we weren 't going to win . " Sheffield stated that the Saturn 's use of quadrilaterals undermined third @-@ party support for the system , but because " nVidia invested in quads " at the same time there is " a remote possibility " they could have " become the standard instead of triangles " ? " if somehow , magically , the Saturn were the most popular console of that era . " Speaking more positively of the system , former Working Designs president Victor Ireland described the Saturn as " the start of the future of console gaming " because it " got the better developers thinking and designing with parallel @-@ processing architecture in mind for the first time " . Writing for GamesRadar , Justin Towell noted that the Saturn 's 3D Pad " set the template for every successful controller that followed , with analog shoulder triggers and left thumbstick ... I don 't see any three @-@ pronged controllers around the office these days . "

 Douglass C. Perry of Gamasutra notes that , from its surprise launch to its ultimate failure , the Saturn " soured many gamers on Sega products . " Sewart and IGN 's Levi Buchanan cited the failure of the Saturn as the major reason for Sega 's downfall as a hardware manufacturer , but USgamer 's Jeremy Parish described the Saturn as " more a symptom ... than a cause " of the company 's decline , which began with add @-@ ons for the Genesis that fragmented the market and continued with Sega of America and Sega Enterprises ' competing designs for the Dreamcast . Sheffield portrayed Sega 's mistakes with the Saturn as emblematic of the broader decline of the Japanese gaming industry : " They thought they were invincible , and that structure and hierarchy were necessary for their survival , but more flexibility , and a greater participation with the West could have saved them . " According to Stuart , Sega " didn 't see ... the roots of a prevailing trend , away from arcade conversions and traditional role @-@ playing adventures and toward a much wider console development community with fresh ideas about gameplay and structure . " Pulp365 reviews editor Matt Paprocki concluded " the Saturn is a relic , but an important one , which represents the harshness of progress and what it can leave in its wake " .