The **History** of Flight Simulator

In October 2001 the latest version of Flight Simulator was launched by Microsoft - Flight Simulator 2002 (FS2002). Hundreds of enthusiasts and indeed pilots were involved in its development, programming and beta testing. It would appear that millions of copies have already sold worldwide of what can be considered as the "Eighth Generation" of this hugely successful franchise.

So if this is the eighth generation, what about the first and consecutive versions and what did they look like? In this first chapter we thought we should give you a complete overview of the history of Flight Simulator since its first release in 1979. From all those years ago many different versions have been released for a variety of operating systems and machines. In fact, Flight Simulator has become a catalyst for one of the biggest aviation genres in the world. Thanks to the inventiveness and dedication of a student called Bruce Artwick.

In the mid-70's Bruce Artwick was an electrical engineering student at the University of Illinois. Being a passionate pilot, it was only natural that the principles of flight became the focus of his studies. In his thesis of May 1975, called '*A versatile computer-generated dynamic flight display*', he presented the flight model of an aircraft displayed on a computer screen. He proved that a 6800 processor (the first available microcomputer at the time) was able to handle both the arithmetic and the graphic display, needed for real-time flight simulation. In short: the first flight simulator was born.

The Birth of Flight Simulator

In 1978 Bruce Artwick, together with Stu Moment, founded a software company by the name of subLOGIC and started developing graphics programs for the 6800, 6502, 8080 and other processors. In 1979 Bruce decided to take the model from his original thesis one step further and developed the first flight simulator program for the Apple-II (based on the 6502 processor). This followed a version ported for the Radio Shack TRS-80. Both versions were coded in their respective machine-code and both were loaded from a cassette tape!

Apple II Computer

subLOGIC FS1 hit the consumer market in November 1979 (see advert). Flight Simulator earned a reputation as being the best selling title for the Apple in 1981. By the end of 1997 Microsoft claimed that all their versions had sold not less than 10 million copies, making it the best selling software title in the 'entertainment' sector. In the year 2000 The Guinness Book of Records confirmed this by reporting that as of June 1999 Flight Simulator had sold a massive 21 million copies worldwide.

The screenshot (right) is from one of the first releases for the Apple II. As you can see it shows a resemblance to subsequent versions. At the bottom was a 'panel' (albeit simple) with a selection of gauges. On top was a three-dimensional (wire frame) display that rendered the scenery for a pilots perspective. Over 23 aircraft characteristics were taken into account and the frame rate would have been around 3-6 frames per second (A good frame rate today would be 25 fps - 60 fps). The terrain was small, flat with rivers running, or should we say drawn, across the landscape. It even had a 3 airports! Objects like mountains and bridges were already starting to make an appearance at this early stage too.
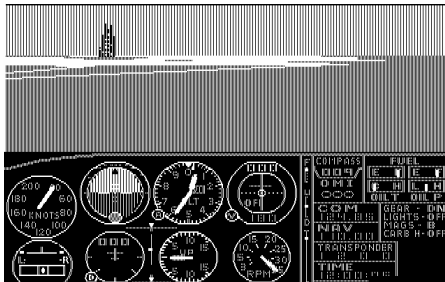
Microsoft Flight Simulator 1.00

Bruce Artwick's work didn't go unnoticed. Another clever young man from Redmond, USA had just set up his own small software company called Microsoft and was shifting his attention from the Commodore 64 (C64) to the newly developed IBM-PC. This gentleman went by the name of Bill Gates who soon set about entered a bidding war with IBM to obtain a license for Flight Simulator. Which he achieved.

In November 1982 **Microsoft Flight Simulator 1.00** hit the stores as one of the first PC entertainment titles, followed by version 2.00 a year later. More releases followed until version 2.14 in 1986. Although the CGA card and RGB monitor could only sustain 4 colours, a clever dithering (colour-mixing) system was added that magically generated an extra 6 colours. This helped vastly in the rendering of scenery and at the time made it look quite real. The focus on aircraft at that time was the

Microsoft Flight Sim 1.00

Cessna 182 that even included retractable landing gear!
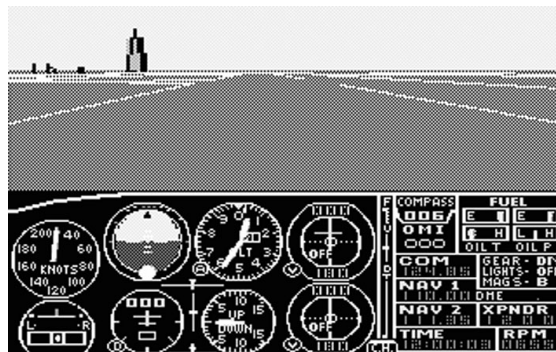
All the necessary flight controls were included in the panel and the minimum VFR (Visual Flight Rule) and IFR (Instrument Flight Rule) and associated communications equipment as required by the FAA (Federal Aviation Administration). OBI, ILS and DME were also included. The only important instrument that was missing was an ADF (Automatic Direction Finder). The use of a joystick was possible and even recommended!

Microsoft Flight Sim 1.00

MS-FS also featured a new and sophisticated co-ordinate system for the flight sim world developed by Bruce Artwick. In the new system the "world" had a flat surface of 10.000 x 10,000 square miles with a basic resolution of about 2.5 inches. The area encompassed all Continental USA, extending into Canada, Mexico and the Caribbean. The "populated" world consisted of 4 small areas: Chicago, Seattle, Los Angeles and New York/Boston. A total of 20 airports populated the co-ordinated area which increased to 80 in later versions. In-between was "nothing-land" that contained no scenery, no airports or radio-stations. You didn't want to go there on a dark cloudy night!

Microsoft Flight Sim 1.02 for Mac

The number of aircraft characteristics had been raised to 35. When looking from a distance this version bears an even more remarkable resemblance to later versions. But it wasn't yet possible to see cockpit interior or exteriors. You had to take Artwick's and Microsoft's word that it was indeed a Cessna you were flying. It was quite an achievement that all this worked on a 64K IBM-PC loaded from a single 5¼" floppy disk. Compared to FS-1 for the Apple II and TRS-80 this version could truly be named as a "Second Generation" flight simulator.

Microsoft Flight Sim 2.00

The **History** of Flight Simulator

## *Flight Simulator II*

From here on up until and including Microsoft Flight Simulator 3.0 the version history is a bit confusing. Both Microsoft and subLOGIC released parallel versions for different computers. In the following years subLOGIC itself released a parallel line in the form of a new version Flight Simulator II for the Apple II (1983), (right) which was an improved version of Microsoft Flight Simulator 2, made possible by the superior colour display of the Apple and running on a 48K system.

The aircraft modelled was a Piper Cherokee Archer and the scenery-world had the same 4 areas with over 80 airports as Microsoft Flight Simulator 2. The ADF (Automatic Direction Finder) was an extra. Similar versions for the Commodore 64 and Atari 800 and XL followed suit. They are all comparable to the version by Microsoft for the IBM PC and can also be considered as belonging to the second generation of Flight Simulator. But with better graphics! In 1987 Microsoft published a similar version 1.0 for the first generation Apple MacIntosh (in monochrome only).

Between 1984 and 1987 subLOGIC published at least 14 versions or releases of Flight Simulator II for a load of different personal computers, including the Commodore Amiga and Atari ST. A rare variant was released for the Philips MSX-computer with a strange addition: "*With Torpedo Attack*".
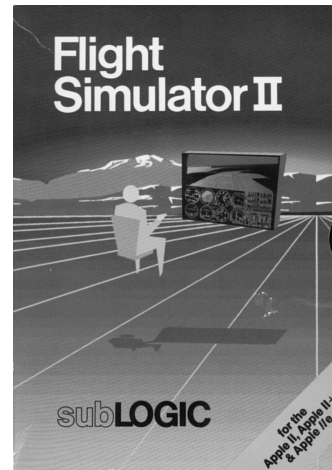
Later releases of FSII for the Amiga, Atari ST and MacIntosh were in reality a new concept. Not only were the number of calculations raised to 49 but the resolution was promoted to 1/100 of an inch. There was also a complete new interface with a menu bar at the top and dropdown submenus, like in modern applications instead of the previous clumsy editor. To add a bit of spice the Piper was replaced by a Cessna 182 together with a representation of a Learjet 25G. Sadly, the flight characteristics and bog standard panel (used for both aircraft) weren't very realistic. However, with the new addition of San Francisco Scenery the number of areas were increased to 5, now making a total of 120 airports, which seemed to make up for other disappointments.

The superior quality of the 68000 processor made for a superior display across all the editions mentioned above . Image quality was vastly improved with hidden surface elimination and surface shadowing. Day, night and cloud effects were more realistic and, for the first time, it was possible to see ones own aircraft from the outside - both in spot <u>and</u> tower views. A separate movable map was thrown in for good measure. All these new views included zoom features as well. Pilots could even monitor their mistakes with an "instant replay" feature.

Lastly, a Multi-Player option was added, which made it possible for two pilots to fly together online. Soon after this facility was discovered fan clubs like FSFAN in Europe extended the capabilities over complete networks. This enabled entire groups of pilots to fly together online.

Flight Simulation was now motoring and simmers had never had it so good!

The first add-on scenery disks

Until 1987 the "flyable" world in Flight Simulator (airports, navigation aids and some scenery), was restricted to 4 later 5 small sectors around major urban areas. In 1987 this was vastly expanded with the addition of the first series of scenery disks by subLOGIC. Twelve 5¼" scenery disks were developed covering the entire continental US, using official NOAA (National Oceanic and Atmospheric Administration) Aeronautical Charts and Airport/ Facility Directories. The scenery disks included enough radio-navigation aids as well as visual scenery to allow a user to navigate anywhere in the areas covered. A typical SD included approximately 100 airports and 100 radio-navaids, making them ideal for cross-country flights.

European Flight Simulator pilots had up until then been left "in the dark", but this was suddenly in 1988 changed when they were furnished with a release by subLOGIC of the *Western European Tour* scenery disk. For in this the whole flat co-ordinate area was relocated to Europe, stretching from Iceland to Luxor in Egypt and far beyond Russia! Detailed scenery was limited to the southern UK, Northern France and south west Germany and only contained big cities, rivers, roads and coastlines. For the first time though virtual pilots could now fly over the Thames, between the towers of the Tower Bridge, visit Stonehenge, cross the English Channel, gaze at the Eiffel tower in Paris and visit the Olympic Stadium in Munich. Another SD was released for Japan.

Microsoft Flight Simulator 3.00

Early 1988 Bruce Artwick split with Stu Moment, left subLOGIC and started his own company called BAO Ltd (Bruce Artwick Organisation). It was created for the purpose of developing and marketing simulation products, tailored to Microsoft Flight Simulator. Later that year Microsoft FS 3.0 was released, which featured 16 bit colour graphics at an (EGA) resolution of 640 x 350, a menu system, separate windows and, for the first time, (for Microsoft) exterior views of aircraft. Previous releases of Flight Simulator II (1986/87) for the Atari ST, Amiga and Microsoft FS 1.0 for the MacIntosh already incorporated all of these features.

Microsoft Flight Simulator 3.00 (BAO)

FS 3.0 included flight lessons, crash analysis, crop dusting and other scenarios. It also had autopilot functionality. If a hard disk was available, multiple scenery libraries could be set up with automatic coordinate setting when switching areas. FS 3.0 was also compatible with the earlier scenery disks by subLOGIC.

Microsoft Flight Simulator 4.00

Microsoft Flight Simulator 4.00

In 1989 Flight Simulator 3.0 for the PC was followed by a similar, but improved **version 4.0**. But was it still possible to run version 3.0 on a 10MHz 8086 PC-XT with 256 Kb memory and a floppy disk? This latest version needed at least a 12 MHz 80286 PC-AT, preferably a 33 MHz 80386 with 384 Kb memory and a hard disk. The basic resolution and number of colours were the same as with FS 3.0. Even the WW1 game with the Sopwith Camel from Flight Simulator 1 was still present with an enemy field and cardboard looking mountains.

First, Flight Simulator 4.0 contained many bug fixes and improved flight characteristics, but also included some new features never seen before. The scenery was greatly enhanced. Runway approach lighting was added with flashing strobes which were particularly spectacular at night. Dynamic scenery was added in the form of tow trucks, taxiing, departing and landing aircraft, balloons and sailboats.

The aircraft had night-lighting and the corresponding library now included a Schweitzer 2-32 sailplane. Air traffic controllers provided takeoff and landing clearance (through text instruction). A weather generator could generate dynamic weather: clouds, wind and turbulence. Finally, FS 4.0 included a basic aircraft editor that allowed the user to build his own simple aircraft designs.

In 1991 Microsoft released a version 4.0 for the Apple MacIntosh. In many respects it was more advanced than its PC counterpart - especially with respect to graphics and modularity. This was due to the superior quality and stability of its multi-window, graphics oriented, operating

Interior of Microsoft Flight Simulator 4.00

Flight Simulator 4.00 for the MacIntosh

system, as opposed to the two dimensional MS-DOS based platform of the time. The Mac version already featured a superior menu system and un-dockable windows. However, in aviation and simulation terms it was not that much different.

Opening up Flight Simulator

A whole new era started in 1990 when Microsoft, for the first time, made an opening in an historically hermetically sealed product. Until 1990 the only add-ons available were scenery disks from subLOGIC. This radically changed when Microsoft released " Aircraft and Scenery Designer" (A&SD), created by our friends at BAO. This for the first time allowed users to generate their own scenery and aircraft.

A&SD came with some ready made aircraft, including a Beechcraft Starship and the first Boeing 747-400 with a "glass cockpit". More importantly the design process was a simple affair. This was to change later however with the release of BAO's "FlightShop" as Flight Simulator became more and more complex.

The scenery design program was quite powerful. Furthermore, A&SD spawned a wealth of other programs like **SEE** (Scenery Enhancement Editor) by Kikiware (Laemming Wheeler), and **SGA** (Sound, Graphics and Aircraft Update) that contained the first Concorde, **AAF** (Aircraft and Adventure Factory) and **AFD** (Airport and Facility Directory) - all published by Mallard.

The knock on effects were broadened further by many flight simmers trying to unravel the inner secrets of Flight Simulator. All were eager to cash in on the boom in add-on development. However, most were concentrating on the structure of BGL files: Files that govern the basic scenery structure. BGL's soon became referred to as "Bruce's Graphic Language". (see "Installing Scenery for Flight Simulator" for a more complex description)

People like Gavioli, Kukushkin, Borgsteede, Schiratti and many others opened up the structure further by writing programs for "easy" scenery creation. One of the factors that greatly facilitated this process was the emergence of BBS (Bulletin Board System) and email.
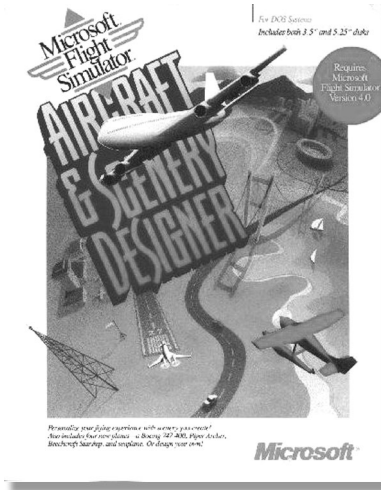
The Fifth Generation

Several years went by with no new versions of the franchise appearing on the shelves. Fans started to resign themselves to the fact that Flight Simulator was to be no more. However, their fears were diminished when in 1993 (4 years later), version 5.0 was launched by the BAO/Microsoft partnership - and boy what a release! Bruce Artwick was quoted in an interview as saying something like; "Odd versions (generations) contain new features and techniques. Even versions are refinements". If the former statement was true then it certainly became apparent in Microsoft Flight Simulator 5.0. In fact, Microsoft were so happy with their release they even gave it the strap line "As Real As It Gets".
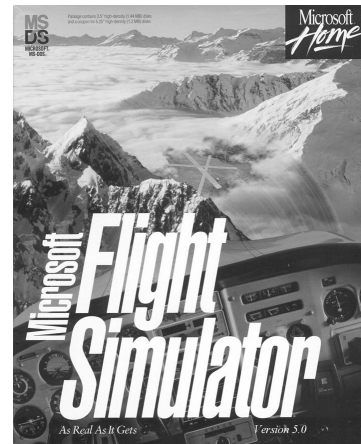
New scenery based upon a worldwide **spherical co-ordinate system** and a host of other new features blasted their way out of the box and this code was to set a standard for all subsequent versions. However, this new version upset some users as it outmoded Flight Sim 4.00 and was now only to be available for the **P**ersonal **C**omputer market!

Flight Simulator 5.0 came accompanied with a very good 284 page Pilot's Handbook and needed a 386, preferably a 486 PC with 530 Kb free memory to run it. The 640x400 display with 256 colours needed an SVGA graphics card. The sound was much improved and users no longer had to put up with a nasty hum through their speakers. Digitally sampled engine and other sounds were now the common place and made for great listening. The Learjet had been upgraded to a model 35A but still used the default Cessna panel, but was now technically referred to as "photorealistic". This was a bit of an overstatement but it looked much better nevertheless. Flight models were greatly enhanced too. The autopilot was expanded with a.o. ILS-lock and a "Land Me" function was added to help pilots who had fallen asleep at the controls.

The big changes however were in the scenery. Not only was it possible to fly everywhere in the world, due to the new co-ordinate system. But the scenery was now covered with photo realistic textures, making it look much more realistic. Due to the increase to 256 colours new dawn/dusk effects were possible and the horizon blended in gradient type colours which improved the perception of depth. In urban areas many new "cyber graphic" buildings were added with shadow and night lighting effects.

Unfortunately, the first release contained so many bugs and inconsistencies, that customers were very disappointed and lead to many shouting matches on the internet Bulletin Boards and Forums. Microsoft listened however and responded fairly quickly by releasing a bug fix (version 5.0a) in February 1994, that addressed all of the problems submitted to them.
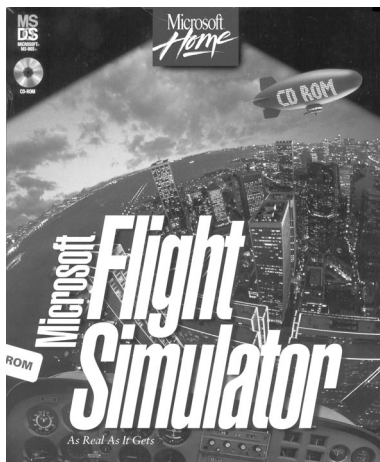
Later in 1994 Flight Simulator became more interesting for Europeans, when BAO released a scenery expansion called Europe-1. This covered Germany, Austria, Switzerland and The Netherlands. Europe-2 and 3 followed covering most of Europe with what was then considered highly realistic scenery. A plethora of other companies joined the bandwagon by providing detailed scenery for other parts of the world. The virtual world started to flourish and even more so with freeware scenery designers now cropping up all over the place too.

In the meantime a new fangled medium called CD-ROM(?) appeared on the scene and in 1995 Microsoft took advantage of this by releasing the new version Flight Simulator - version 5.1. In reality it was a beefed up version of 5.0 but with a bigger and more enhanced scenery engine. In fact, the scenery engine had been enhanced to 32bit and included much better looking textures. A cache system was also incorporated for faster and smoother loading of textures. Improved coastlines, night effects, clouds, and the addition of haze made the FS-world even more realistic. More that 350 airports were dropped into it and airport refuelling made a hop across the pond much more feasible by utilizing fuelling stations all over the virtual world. Finally, a performance switch was added, giving the user a choice between higher frame rates or better looks.

Also in 1995 BAO's long anticipated FlightShop arrived on the scene, but to some it came too late. The new co-ordinate system of Flight Sim 5.0 rendered all previous scenery and aircraft, created with A&SD, obsolete and something had to be done during the interim period between the release of FS5 and FlightShop. Fortunately, flight simmers from all over the world managed to understand (crack) the BGL scenery code of FS 5.00 and set about creating scenery generation programs for themselves. This lead to a stream of scenery becoming available on the Internet for download and file repositories began to build their databases. However, aircraft still proved to be a different prospect for designers and FlightShop was going to be the only program to solve their problems.

When FlightShop was released it gave designers the scope to create aircraft far superior to those found in Flight Simulator. In addition, FlightShop contained a few ready made aircraft, including a Boeing 747, DC-3, Beechcraft Baron and an ultralight. As more and more aircraft became available and designing techniques improved through "friendly competition" a flood of new planes appeared on the market. Some were even better than the default Flight Simulator aircraft themselves! The only drawback for most designers was inability to create moving parts and that only default FS panels could be used in conjunction with their super designs. Another part of FlightShop included modules for the creation of user defined adventures, including ATC (Air Traffic Control) and the creation of flight plans. In essence Flight Simulator, for the first time, was becoming interactive. It really was a major step forward for the flight sim industry and was a major contributing factor to the add-on market we know and love today.

BAO taken over by Microsoft !

In January 1996, not long after the release of FS 5.1, Bruce Artwick sold both BAO and his copyright to Microsoft. As he pointed out in a column in Microwings Magazine, he was convinced that a small firm like BAO would not be able to generate the resources needed to survive in the ever demanding world of computer entertainment in general, and Flight Simulation especially. Most of the developers of BAO joined Microsoft. Bruce Artwick himself did not make the switch, but he remained involved in the development of MS-FS as a consultant. Around the same time his former company subLOGIC was taken over by Sierra, another large publisher of gaming titles, to develop an up-and-coming and rival flight simulation title called **ProPilot**.

Generation 6

The very last version of Microsoft's Flight Simulator developed by BAO was Flight Simulator for Windows 95 (FSW95 or FS 6.0). This was released in 1996. According to Artwick, being an even-numbered generation, this would have been a refinement-release. In fact it can be regarded as such as most of its improvements related to better aircraft, fully-textured scenery and buildings etc. Some new aircraft were also added: the EXTRA 300S with instructions by aerobatic champion Patty Wagstaff, a Boeing 737-400 and Learjet 35A. Both included their own digital panel with new instruments and enhanced flight dynamics throughout.
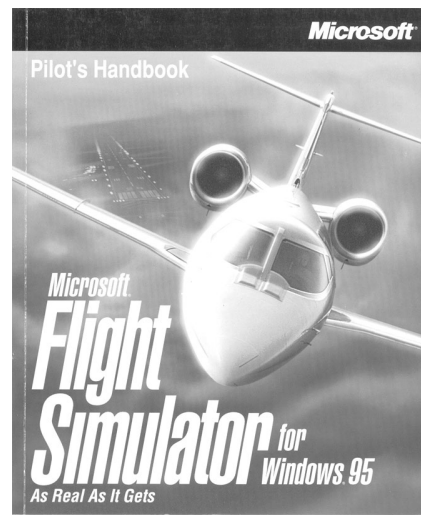
The new version demanded a bigger machine: the minimum now being a 100MHz 486 or 60MHz Pentium with 8-16 Mb memory, 40 Mb of disk space and SVGA for a resolution of 640x480 and 256 colours. Menus were now adapted to a Windows style. The most interesting thing however was that with the porting to Windows, frame rates improved by 20-50%. This was even with an upgraded resolution. This was contrary to what was expected by Anti-Windows users, who remembered the problems of trying to run older versions under Windows 3.11. In a column Bruce Artwick suggested that the passing of the 640K memory barrier and much faster graphic "blits" were THE major contributing factor to the overall improvement in performance under the Windows Operating System environment.
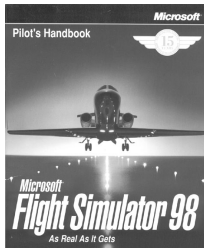
The next version, FS 98 (internally called version 6.1), was brought to market in August 1997 as the 15th year anniversary of Flight Simulator, boasting more than 10 million copies sold world-wide. This can be seen as being mostly a maintenance re-lease, nevertheless it included many new features. The most important of these were a true rotary wing helicopter by way of the Bell 206B JetRanger III. This version also brought a lot of handling ease, compared to its predecessors and a much higher resolution, up till 1280x1024 in stunning 16 bit colour.

Besides the helicopter there were a few other new aircraft: a Boeing 737-400, a Learjet 45S with a brand-new glass cockpit and a nice new photo- realistic panel for the Cessna. A very cool addition was a Virtual Cockpit View which added depth but unfortunately without live instruments. New sampled sounds also added to the feeling of reality. The navigation database was expanded to 3000 airports and a full FS installation needed 315 Mb of hard disk space.

Finally a new option was added to give pilots the opportunity to "fly-online via the Internet" by way of a new and upgraded "Multiplayer" system. Via a TCP/IP internet connection a user could now choose be-tween being a Player or an Observer. This system was snapped up by all kinds of groups. Real-time ATC FLY-ins and other online events held by Virtual Airlines started cropping up and many organisations were making the most of this novel and new fangled invention for other purposes. All kind of auxiliary add-ons became available including Squawk Box and Pro Controller - to name a few. MS joined in too by opening a special Flight Simulator Room, or "Gaming Zone" at http://www.zone.com.

Microsoft Flight Simulator 98

By 1999 MS made it to the records books with 21 million copies of Flight Simulator sold worldwide!

Generation 7

In September 1999 **FS2000** was released in two editions: Standard and Professional. FS20002 marked another example of ground breaking programming as it featured a completely new 3D scenery engine, this time based on an elevation grid database. Added to this new and improved high resolution coastlines, landmarks and seasonal textures. This rendered all earlier scenery more or less obsolete, but improved the realis-tic look of the scenery by a factor of 150%. It was reported that more than 130 develop-ers were involved in this version.

Other highlights were new aircraft including the King Air 350, Mooney Bravo, Boeing 737-300, Concorde (approved by British Airways) and a much improved Bell JetRanger III. All aircraft came with their own new photo realistic panels and even interior "Virtual Cockpits" that could be viewed in 360 Degrees.

Downloadable real-time weather from Jeppesen (the chart Manufacturer) was incorporated together with a host of navigational instrumentation including a GPS system, FMC and special IFR panels for training.

The airport and navaid database was also courtesy of Jeppesen and gave this version a stunning 21.000 air-ports to choose from. However, some were seriously corrupted and could not be used because of elevation data errors.

Interestingly, many of the features incorporated into this version had originally been created as add-on products (freeware and payware) for Flight Simulator for Win-dows 95 and 98.

20

The Good Flight Simmer's Guide

Some of the improvements to this version proved to be its biggest weakness. Soon after its introduction people started complaining about side-effects caused by the new scenery engine. Vanishing roads, uphill rivers, fading runways and sinking aircraft were just some of the problems reported. Pilots later discovered that these symptoms were caused by the inclusion of the new Navaid and Scenery Databases mixed with older, outdated bits of programming. Microsoft also removed all aircraft/building shadows and landing light effects, among other things. Removing features such as these were a crime to some flight simmers but Microsoft claimed that it was a trade off in favour of better performance. A first patch improved a few of the anomalies, but didn't keep everyone happy. So in March 2000 Microsoft issued a second update that solved most of the issues. To the satisfaction of many it has to be said. They even went further by making sure that shadows worked again. But alas, still no landing lights!

Generation 8

In October 2001 Microsoft's latest title, Flight Simulator 2002, was released. This is again a refinement generation. Nothing spectacularly new, but the list of improvements are long and very impressive. Microsoft seemed to have listened to its customers and monitored the add-on market very closely. They now boast that this newer version is created by real pilots - rather like Bruce Artwick.
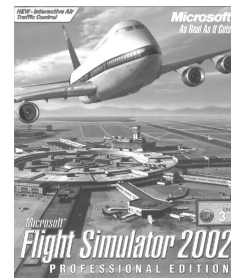
There are new aircraft models including the Boeing 747-400, Beech Baron 58 and Cessna Caravan Amphibian to name a few, each with stunning attention to detail. Many special effects are blended in beautifully. For example the virtual 3D-cockpit views with working instruments that can be used in conjunction with 3D Glasses. There is interactive ATC and new lessons and adventures for both newcomers and seasoned pilots. Even landing lights and shadows are in abundance.

The visually most striking change is the "**auto-gen**"erated scenery. As you fly above cities, farmland or other landscapes, Flight Simulator automatically adds buildings and vegetation appropriate to the scenery below. These objects blend in smoothly from the horizon and fill the scenery with detail that is unsurpassed by previous versions. While **Autogen** fills in ground details, a new AI (Artificial Intelligence) system generates air traffic between and around airports. You're no longer alone in the sky and you can even hear and Interact with ATC .

As a bonus Microsoft seems to have been able to speed up and optimise internal calculations considerably. Never before has the performance of aircraft scenery been so smooth and fluid. Undoubtedly there is still room for improvement, as will be proven by the add-ons that will be created for it in the months to come. Microsoft have already created an opening by including a "**gMax**" modelling tool for the creation of scenery objects together with an improved Flight Dynamics Editor for aircraft. So what's next?

The development of Flight Simulator has created a lot of excitement in the software business over the years and consistently remains in the monthly top 40 of software sales worldwide.

The inventeness of individuals never cease to mystify us as the end user. An independent "cottage" industry has emerged triumphant and is now worth **billions** of dollars each year. There are many thousands of people and dozens of companies who strive for excellence to make this genre "As real As It Gets". They develop add-ons that grow bigger and better as each year passes and as new tools become available to them. But that's a subject for the rest of this book.

One thing is perfectly clear however; we owe a great deal to one man who's dream it was to create the best Flight Simulator in the World. A man named Bruce Artwick.

Bruce Artwick